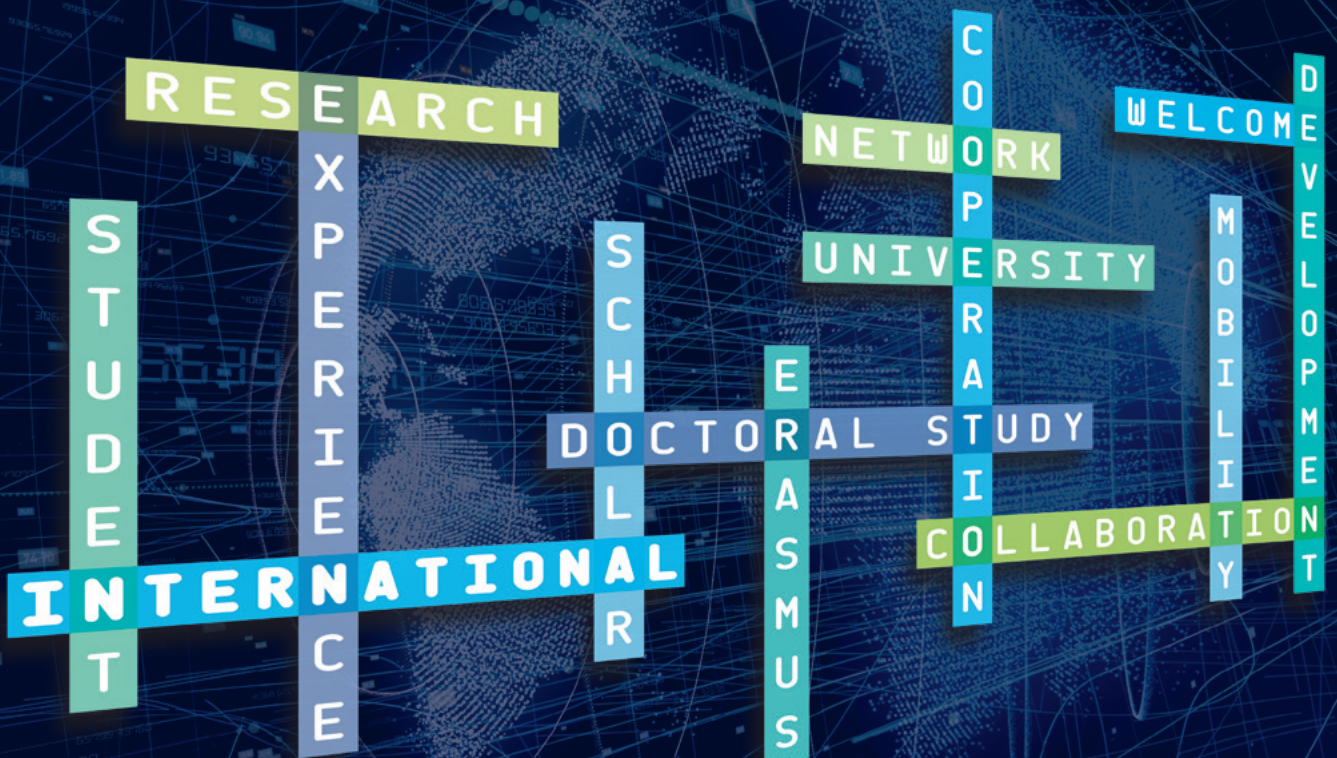




POLYTECH.NEWS

Le journal de la Faculté Polytechnique de Mons



Beyond
the boundaries
of learning





**POLYTECH
MONS**

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EDITORIAL

✉ Prof. Georges Kouroussis



The *Polytech News* is the journal, and official newsletter, of the Faculty of Engineering of the University of Mons (Polytech for short). Created in 1992, the *Polytech News* informs, communicates and disseminates all recent technical and innovative research work, and presents the teaching activities in the various engineering fields of applied science and our Faculty's social events. As editor-in-chief of this journal, I am pleased to present this special edition, dedicated to international relationships, including our mobility programmes and international policy.

For our students and colleagues, this edition presents useful information about the possibility to stay outside Belgium for a short while during their studies and/or research activities, showing the vast number of strong collaborations that the Polytech has developed, and the close international contacts that it has maintained over these past few decades.

This special edition was not easy to create. I would like to thank all the members of the editorial board and our guest editor, Diane, who made a concerted effort to collect information from our different departments, and to present a variety of informative and interesting documents. None of this would have been possible without the dedication, enthusiasm, productivity and skills of the whole team!

This is the first time that the *Polytech News* has been written in English, and the aim of doing this was to reach a large audience abroad. If you are not familiar with the Polytech, perhaps this journal will show you the warm, welcoming atmosphere that is prevalent in Mons, the high level of education offered here, and the quality research that our colleagues undertake, often in collaboration with other institutions. Regarding research, a short overview is given at the end of the journal about the recent PhD theses submitted at the Polytech (20 in one semester!). Do not hesitate to log onto our Facebook page and follow us (<https://www.facebook.com/PolytechNews>).

If you are reading this abroad, I hope that this edition inspires you to visit us, for research or education, for long or short projects. For our own students, hopefully you too will be inspired to take the steps to complete your curriculum with a mobility programme at another applied science faculty.

Whatever your profile, I hope you find this edition an interesting and insightful read!

PS: I also wish to thank the Centre for Modern Languages of the University of Mons, and more specifically Ms Natalie Dickson, for taking on the task of proofreading this edition.

A WORD FROM THE DEAN

A WORD FROM THE DEAN

✉ Prof. Pierre Dehombreux



The Faculty of Engineering of the University of Mons is deeply committed to the exchange of people and ideas across borders and continents. From its origin, Polytech Mons has greatly benefitted from the contributions of its international students, researchers and professors. In the 2017-2018 academic year, 10% of the students enrolled on the Bachelor's degrees offered by our Faculty came from abroad. This number rises to 30% for Master's degrees, and 50% for our PhD programmes. With 45 different nationalities, Polytech Mons demonstrates its ability to recruit international students for advanced training programmes. Beyond the numbers, our Faculty develops original projects for internationalisation abroad and at home, with a strong involvement from colleagues.

This special edition of *Polytech News* presents a selection of original initiatives that should convince both local and international students to join Polytech Mons for a long- or short-term academic project.

The University of Mons strongly supports the Faculty of Engineering's initiative to increase the offer of courses taught in English. The Centre for Modern Languages (CLV) is helping to implement Content and Language Integrated Learning (CLIL) in a very efficient way. The three specialisations of the Master's degree in Electrical Engineering (Signals, Systems and BioEngineering; Electrical Energy; Multimedia and Telecommunications) are taught entirely in English. It is not common to organise courses dedicated to international relations and intercultural communication especially designed for engineers and corporate executives... and yet Polytech Mons does!

Our students' results and prizes in international challenges also help to strengthen the reputation of the University of Mons. Our students in Mechanical Engineering won the Belgian Robotics Cup for the third year running. They qualified for the final international round with more than 30 top engineering schools from Europe, Canada and Africa... and they won the Eurobot cup without any defeat. Congratulations to them! During the Swiss Hackathon, with more than 400 top competitors, four of our computer and management engineering students received prizes for projects related to Artificial Intelligence and the Internet-of-Things. Four architecture students won prizes for the design and construction of a wooden music studio. The best is yet to come in the Shell EcoMarathon!

University development cooperation continues with a renewed level of activity: a new training programme has been launched in numerical telecommunications and photonics in Benin; higher education capacity building through quality deployments in engineering schools in Cameroon is supported by an Erasmus+ action; students are developing photovoltaic projects in Morocco with Mohammed I University in Oujda, etc.

Prof. Christine Renotte has been elected as the Dean, and Prof. Véronique Feldheim the Vice-Dean, of the Faculty of Engineering for the period 2018-2022, with the highest vote of confidence possible from our community. Let's push the boundaries of learning under their leadership!

A WARM WELCOME TO THE OF ENGINEERING

✉ Prof. Diane Thomas, Chair, FPMs International

The UMONS Faculty of Engineering (FPMs or Polytech Mons), formerly known as the Mining School of Mons, has been training engineers since 1837. It is the oldest engineering faculty in Belgium, as well as the oldest part of the University of Mons (UMONS). It awards engineering degrees (Bachelor, Master and PhD) in six different fields: Architectural Engineering, Chemical Engineering and Materials Science, Computer Engineering and Management, Electrical Engineering, Mechanical Engineering, and Geology and Mining Engineering. Every year, about 100 Master students graduate from our Faculty. These students are eager to transfer the knowledge they have acquired into real engineering skills by solving real-life design problems.

The International Relations Policy, promoting both outgoing and incoming students, researchers and teachers, is essential at a university, and particularly at an engineering faculty, as engineers embark on more and more international careers. Currently, engineering is a growing field with great career prospects, both throughout Europe and further afield.

That is why the FPMs is completely open to the world through various exchanges with both EU and non-EU countries, fostering international teaching, research activities and industrial relations.

Why a whole issue dedicated to this subject?

A special issue of the "Polytech News", our Faculty's journal, was already dedicated to this topic in 2010 (PN44), illustrating the essential internationalisation initiatives at our Faculty. Various follow-up issues of our journal have regularly highlighted the reinforced internationalisation policy and process, with short articles and 'postcards' describing students' exciting mobility experiences abroad.

We realised the relevance of producing an updated issue on the topic, as mobility at the FPMs has positively increased (more than 30 outgoing mobility placements, more than 50 incoming mobility placements, in 2016 and 2017 respectively), with more and more diverse, successful and highly-valued international experiences being carried out as part of the programmes on offer at the FPMs.

You will find hereafter a very rich selection of articles and accounts emphasising various, and sometimes unexpected, worldwide experiences, showing the strong international dimension of the FPMs.

CLOSE COLLABORATION BETWEEN UMONS AND THE POLYTECH TO PROMOTE INTERNATIONAL EXPERIENCES

The UMONS International Relations Office (SRI) provides information on the different programmes on offer, and can help students complete their mobility applications (choice of country, host university, etc.). The SRI also deals with the administrative aspects regarding mobility, including determining grant amounts, following up files, contacting the host institutions, and much more.

In this edition, the Vice-Rector for International Relations of UMONS gives us an outstanding overview of mobility possibilities.

In 2012, our Faculty created a special committee called "FPMs International" in order to address the different points specific to internationalisation at this Faculty. This committee brings together the Dean and Vice-Dean,



UMONS FACULTY



Erasmus coordinators (delegates of the different programme committees), and student, scientific and administrative representatives. Its role is to facilitate IN-coming and OUT-going mobility and to structure all the specific actions described below, reinforcing the actions of the SRI at the FPMs.

FOR POLYTECH STUDENTS DREAMING OF OUTGOING MOBILITY...

As part of the ENG'UP programme (a series of activities at the FPMs which aim to shape professional personality), the idea is to encourage students to carry out a mobility placement which is linked to their potential future career.

There are several possibilities to develop international competences, split into two categories:

- Optional academic and non-academic activities
- Mandatory academic activities that students decide to carry out abroad.

As examples of the first category, grants can be obtained to go abroad for language courses or summer courses as first international experiences improving foreign language skills.

“The idea is to encourage students to carry out a mobility placement which is linked to their potential future career.”

Mobility programmes allow students to spend from 3 months up to 2 academic years abroad at another higher education institution. They can study, carry out their Master's dissertation project, or even carry out a professional work placement. The choices available are flexible. The Polytech currently maintains more than 110 international partnerships in more than 35 countries around the world.

Besides improving foreign language skills, there are many good reasons to study and explore abroad, such as discovering other cultures and traditions,

ensuring personal development and growth, learning by alternative methods, gaining experience (academic and personal) valued by future employers, developing specialised skills, and confronting international social and economic challenges.

Mobility grants are awarded to students so that they can carry out their stay in the best possible conditions. It is essential to mention that additional financial support (by the Alumni Association or sponsors) is available.

NEW INTERNATIONALISATION PROGRAMMES “AT HOME” FOR FPMS STUDENTS

Some activities are also included in the FPMs programme and take place on campus. For example, two courses have been created recently: International Relations and Intercultural Relations. These courses are offered to all FPMs students, but are more specifically proposed to those who do not have the opportunity to go abroad for their studies, so they can still become aware of key international challenges.

STUDYING ENGINEERING AS AN INCOMING STUDENT: ENJOY YOUR STAY AT THE FPMS!

Coming to the Polytech Mons allows students to take courses and participate in projects, possibly complemented by a Master's dissertation. The Faculty of Engineering offers a wide range of Bachelor and Master courses taught in French and English. Within the framework of bilateral agreements between UMONS and other institutions, students can choose a stay of 5 or 10 months (1 or 2 semesters), or more as part of the T.I.M.E. network programme.

Three Master degrees (120 ECTS credits, covering 2 academic years) are taught in English: Multimedia and Telecommunications; Signals, Systems and Bioengineering; and Electrical Energy. These can be taken by our French-speaking students, but are designed particularly for exchange students, who can also choose optional courses in French organised by UMONS throughout the academic year.

It is possible to come to UMONS to carry out a placement (traineeship) within our scientific departments, enabling students to gain work experience, or to carry out a Master's dissertation in preparation

for a joint-supervised PhD programme. For this purpose, the offer of a Master's dissertation on a general topic is regularly updated by the “FPMs International” Committee.

Themed summer schools have also been introduced, with previous years covering Smart Coatings (2015) and Creative Programming / Geological Raw Materials (2016).

To make their stay fun, the “Polytech International Mons'ters” (PIMs) Committee, composed of students from the second year of Bachelor to the second year of Master, welcomes foreign students who take part in the international activities organised by our Faculty. They focus on the social aspects by ensuring students have an awesome experience in Mons, all the while sharing scientific knowledge and cultural heritage.

Moreover, every spring, the Student Federation of the Polytech arranges the International Student Week (ISW) of Mons, where various technical and fun activities for visiting students are organised. Foreign students coming to Mons for the Summer School or the ISW can certainly be seen as the first essential steps to give them the desire to come back to our Faculty.

PRESTIGIOUS INCOMING AND OUTGOING MOBILITY PLACEMENTS FOR FUTURE ENGINEERS

The Polytech is a member of the T.I.M.E. network (Top Industrial Managers for Europe), a network of excellence, which consists of 55 universities offering training programmes in engineering, mainly in Europe, but also in Australia, Brazil, China and Japan. Selected students who take part in this mobility scheme are given the opportunity to receive training abroad, usually for two years, and obtain a degree at the end of the programme from their host university, as well as a degree from UMONS. In this issue, our Dean, Prof. Dehombreux, the representative within the T.I.M.E. network, develops this topic.

For the awarding of double degrees, UMONS has also entered into partnerships with France, Brazil, Chile, and many more. You will read success story about a recently implemented joint degree between the Institut Mines Telecom Alès (IMT) (formerly Mining School of Alès) and the FPMs for architectural engineers. A scheme that could be repeated ...



Visit of a Polytech Mons' delegation to Chinese Universities (April 2018)



OUR ALUMNI AND OUR PROFESSORS ARE VALUED ABROAD!

We will show you, with some examples, that Polytech Mons engineers, our alumni, with their outstanding careers abroad, contribute to enhancing the reputation of our Faculty internationally through their knowledge and skills.

Many FPMs teachers with key competences are often invited abroad. This is the case for our teachers with expertise in mining engineering (our Faculty is an old mining school which has fortunately maintained its skills) giving lectures and seminars at higher education institutions in France, where mines have been closed and new challenges in relation to mining were not anticipated.

INTERNATIONAL COLLABORATIONS BEYOND STUDENT MOBILITY

Mobility also concerns research and academic staffs! The funding possibilities offered by national and international programmes facilitate the development of reciprocal interactions and the initiation of research and teaching collaborations to prepare and promote student exchanges. The relationship between the University of West Bohemia in Pilsen and UMONS is typically multifaceted.

FPMs COMMITTED TO DEVELOPMENT COOPERATION

Academic cooperation not only helps develop teaching and research, but it can also contribute to training people through these universities and other higher education institutions, helping them to function better. UMONS and the FPMs are very active in this field. Two examples are given here in these pages. Prof. M. Olivier has taken part in scientific exchanges with Vietnam, giving training courses in corrosion science and electrochemistry, and assisting Vietnamese students who come to Belgium each year to do their PhD theses. Prof. J-P Tshibangu explains his participation in a strong collaboration between Belgium and the Democratic Republic of Congo with activities related to mining engineering. The PHORAN project, funded by the ARES-CCD, aims to implement a Master's degree in Photonics and Digital Broadcasting at the University of Abomey-Calavi in Cotonou (Benin). Forty-seven

students are enrolled for the first year of the project. In order to train future Beninese teaching staff, PHORAN also includes the requirement for three PhD theses to be carried out at Belgian universities (UMONS and UCL).

FPMs students also take part in development cooperation projects and some examples of these projects have been mentioned in previous editions of our journal.

AND MUCH MORE...

Some of our colleagues joined the Faculty from abroad (e.g. France and Argentina), or across the linguistic border, to build their careers. Here, they tell us their stories.

You will also find linguistic and cultural recipes for a "Happy Meal" during your stay in Mons or abroad, as presented by the UMONS Centre for Modern Languages (CLV).

This issue is illustrated by numerous 'postcards' written by PhD and post-doc students with international experiences. They tell us how they decided upon their study destination, how they achieved their dream, what they have learnt, and how their experiences have been professionally beneficial.

WHERE TO FIND MORE INFORMATION ?

Organised by the "FPMs International" Committee, a Mobility Forum takes place annually (usually the seventh week of the first term) to present the FPMs students with the different opportunities and modalities to study abroad. Brochures and booklets are published to summarise the important instructions, including the deadlines for applications. In this issue, some students share their impressions about their international experience.

For all IN-coming and OUT-going students (Bachelor, Master and PhD), the "FPMs International" website (www.umons.ac.be/polytech/international) has been completely revamped. There are obviously strong links with the new International Relations Office website as they promote mobility programs and carry out the administrative procedures at the university. You will certainly find answers to most of the questions you have via these sites.



“ Polytech Mons engineers, with their outstanding careers abroad, contribute to enhancing the reputation of our Faculty internationally through their knowledge and skills. ”

STILL NOT SURE ?

You can be certain that every member of our Faculty has complementary arguments to convince you and can help you to go abroad or to come to Mons to have, in both cases, a very enriching experience!

To conclude this editorial, I would like to mention that it has been a pleasure for me to come back to the editorial board of the Polytech News, and I warmly thank Georges and his PN Team for their kind invitation. I want to commend a job well done, and the dedication of all involved. It has been a challenge to publish this issue entirely in English, but the effort has been well worth it.

On behalf of the "FPMs International" Committee I would like to thank all the contributors for generating such a rich and inspiring edition. I hope you enjoy reading it !

Internationalisation at UMONS: a world of possibilities



✉ Prof. Alain Vande Wouwer, Vice-Rector for International Relations

Nowadays, internationalisation seems to be a buzzword for many higher education institutions. After the early years, which saw the establishment of a wide array of bilateral agreements with universities in Europe and overseas, a more reflective time has now come, where collaborations are strengthened and developed in several directions, including research and education. Indeed, the key to a successful collaboration is the existence of interpersonal exchanges, and joint work on topics of mutual interest. The exchanges themselves also take multiple forms, from the classical exchange of students, made possible by the Erasmus+, Fame, and Belgica programmes, to the exchange of staff for experience sharing, and the organisation of international summer classes. One can also observe quite different approaches to internationalisation depending on the continent and the local job market. For instance, US students tend to opt for shorter group experiences abroad led by faculty staff, while Asian students favour short, individual experiences abroad, with the discovery of new countries and cultures as the main objective.

Over the past few years, UMONS, and particularly its Faculty of Engineering, has developed long-standing agreements with institutions worldwide, and has put in place a strategy fostering the increased exchange of students, either for a semester of courses at a partner institution, or to carry out an internship or a dissertation project. A wide range of partner institutions are now available from all continents, and recent years have seen the emergence of new destinations, particularly in the Asia-Pacific region. Countries such as Japan, South Korea, and Taiwan have developed very dynamic policies for expanding student and staff exchanges and participation in international research programmes.

As is to be expected, Australia, Canada, the United States, and Ireland (a newly active partner country, especially in the context of Brexit where new positioning in the region is necessary) are particularly popular destinations thanks to the possibility of experiencing total immersion in English. In recent years, US universities have developed their exchange policies, and some particularly successful partnerships are currently on-going. Examples of these are the bilateral agreement UMONS has with Northeastern University (Boston), within the framework of their Co-op programme, where US students come to UMONS for research internships in science and engineering, and the newly developed agreement with Carnegie Mellon University (Pittsburgh) in chemical engineering. Additionally, the Asia-Pacific region offers new prospects in this respect, as lead-

ing universities, such as KAIST (South Korea) and NTU (Taiwan), offer full programmes in English.

Besides English, immersion in other languages, such as German, Spanish and Portuguese, is also an important asset for the development of a future career in science and engineering. UMONS has developed a very rich network of partners in Latin America, including Argentina, Brazil, Chile, Colombia, Cuba, Mexico, and Peru, with the usual student exchanges, but also more ambitious schemes, such as double diploma programmes with the Universidade Federal de Santa Catarina (UFSC, Florianopolis, Brazil) and the Pontificia Universidad Católica de Valparaíso (Chile). At the time of writing, the Polytech is hosting a student from UFSC in the field of signals, systems and bioengineering. At the same time, one of our mechanical engineering students is currently carrying out a two-year stay at PUCV, giving him the opportunity to discover Chilean society, education and business, and to master Spanish.

German is another important language in science and technology, and we have very active exchanges with German and Austrian institutions, such as TU Berlin and TU Wien, to name but a few. Finally, UMONS being a French-speaking university, it has always put special emphasis on partner institutions in the French-speaking regions of the world, and Quebec is undoubtedly among the favourite destinations for our students. Thanks to the agreements UMONS has in place with Canadian institutions, a wide network of partners is available in various cities.

Living, studying, and researching abroad is an important stream of internationalisation, and statistics show that taking part in such exchanges significantly increases the chance of getting a job after graduation. However, there are other actions that can be taken at our university which can benefit all the students, leading to the concept of internationalisation at home. This includes inviting visiting professors to give seminars or classes, internet-based interactive exchanges between groups of students to work on joint projects, participation in MOOCs, group experiences abroad (visits, workshops), summer classes, etc.



“ Living, studying, and researching abroad is an important stream of internationalisation, and statistics show that taking part in such exchanges significantly increases the chance of getting a job after graduation. ”

What is the ideal university of tomorrow? Certainly one where the majority of students and staff can take advantage of various mobility programmes abroad and at home. This appears to be a necessity in a constantly evolving world, where the digital revolution gives everyone the ability to contact the rest of the world instantaneously, but where the knowledge of cultural and societal richness and diversity still needs to be built through authentic experiences.



IN AND OUT MOBILITY

Linguistic and cultural recipes for a successful stay at the FPMs and abroad!

✉ Viviane Grisez, Director, Centre for Modern Languages UMONS

APERITIF

TandemMons

In collaboration with the International Relations Office and the students, a reception committee for international ERASMUS+ students has been set up. Tandems, which are composed of a UMONS student and an international student, promote the better integration of incoming students and allow UMONS students to discover another culture or cultures.

STARTER

French as a Foreign Language for IN-coming students and introductory courses for OUT-going students

In the evenings, throughout the academic year, **FRENCH as a foreign language (FLE) courses are organised** for international students and researchers (56 hours / 5 ECTS per term).

Students are divided into groups according to their language level on arrival (A1, A2 or B1).

Evening courses are preceded by **optional preparatory courses** (intensive sessions). These are face-to-face courses and cover not just language but also cultural activities, which encourage the integration of the students and researchers into the local and national socio-cultural environment.

SPANISH, GERMAN & JAPANESE

Interfaculty evening courses in Spanish, German and Japanese (56 hours/year, 5 ECTS) are offered to students considering international mobility.

MAIN COURSE

Credited language initiatives

Courses and seminars in English, Dutch and Spanish are integrated into the Bachelor's and Master's programmes.

Our language courses consist of face-to-face classes and exercises, conversation seminars,

laboratory sessions, distance learning courses and other educational activities (flipped classroom, off-site activities, etc.).

Regarding other subjects of different course programmes taught in English, CLIL (Content and Language Integrated Learning) support is provided à la carte to teachers, and is integrated into courses at the FPMs.

Placement reports, Master's dissertations and scientific posters, written and presented in English, are validated with credits, and assessed based on linguistic quality.

SORBET

Remediation courses: ENGLISH and DUTCH

Interfaculty remediation courses in English and Dutch (A0 and A1 / 56 hours / evening courses) are offered to newcomers who have an insufficient language level, which could put them in difficulty in their normal programme. At the FPMs, the Dutch interfaculty course is included in the course programme.

CHEF'S SPECIAL

Scientific English courses and the RELTRAD proofreading service for international research!

Three scientific English workshops are offered to scientific and academic staff: **Speaking Practice for Scientists** (40 hours / 2 ECTS) - **Writing Practice for Scientists** (50 hours / 2 ECTS) and **English for Scientific Communication in Human Sciences** (30 hours / 2 ECTS). The content of the workshops is flexible and tailored to the needs of the participants.

A **proofreading service for scientific articles** is offered to academic and scientific staff. There is a specific procedure in place which guarantees the quality of publications in English.

DESSERT

Certification of Language Skills

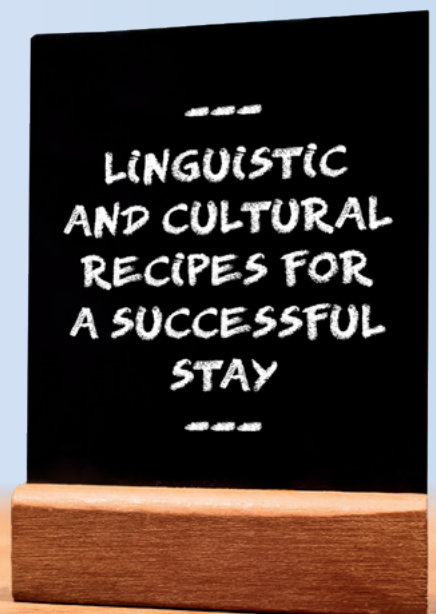
The following international tests are organised at UMONS:

- **TEFAQ** (Test d'évaluation du français adapté au Québec) and TEF Canada
- **TOEIC** (Test of English for International Communication)
- **TOEFL** (Test of English as a Foreign Language)
- **IELTS** (International English Language Testing System)
- **CNaVT** (Certificaat Nederlands als Vreemde taal)
- **Grants for all certification tests** are available to students without a grant who meet the conditions (maximum 100 €).

DIGESTIF

A job in Flanders or abroad!

Job seekers' workshops in English and Dutch are offered to Master's students as well as to scientific staff. On the programme: CV writing exercises, professional projects, and mock job interviews. (15 hours / 15 participants per workshop). Individual coaching is also offered throughout the year (CV corrections in English and Dutch, interview preparation).



Lola BOTMAN

I did an Erasmus in Germany between February and August 2017. I first spent 2 months with a company, called Pfizer, in Freiburg for an internship, and then I studied in Chemnitz for 4 months to complete my second semester.

I think doing an internship, in Belgium or abroad, is already a new experience on its own, which takes some adjustment. At the beginning, it was very tiring for me to get used to a fixed schedule, and actually work a full day. Nevertheless, I learned a lot and it was a great experience. Freiburg is a student city, there are many things to do, nice places to go for a drink or grab a bite. I happened to be there during the carnival, which is a big event in the city. I would recommend using Facebook groups (for example, English Speaking People in Freiburg) if you want to meet people or if you need advice.

Regarding the practical issues around organising my stay in Germany, I started the administrative formalities around January 2016, knowing that I wanted to do my Erasmus programme by February 2017. However, I would even recommend starting a little bit earlier. These things take a lot of time: making the decision to go, choosing the destination, doing all the paper work, etc. All the required documents need to be approved by professors here, the Dean, and also the authorities at the host University. Even though this aspect takes a lot of time and energy, it is all worth it. Once I arrived in Germany, I learned that the only way to pay the rent was by opening a local bank account, because they would not accept a Belgian one. To open a bank account I needed to register in the city, using my rental contract as proof of address. This step is mandatory in Germany because there is a public TV/radio tax for anyone living in the country. Normally, at the end of my stay in Freiburg, I would have had to 'sign out' of



the city, but as I moved to Chemnitz and 'signed in' there, it was done automatically.

Chemnitz was again a new environment, a new place, a new schedule, a new social network to build, new habits, and so on. Nevertheless, it was easier to make friends than in Freiburg. There is a large exchange student community in Chemnitz and many activities were organised for us. The classes were over by the middle of July and the exams took place between the 15th of July and the 15th of August. I would say that this is the biggest downside of Germany, because I was studying while everyone was on holiday in Belgium.

The learning agreement is one of the harder steps to go through. I compared the different classes given in Belgium with the classes given in Germany and I had to match the right number of credits. For this part it is very useful to be in contact with the host

university, as well as some students. If necessary, it is still possible to change your agreement up to one month after the semester starts. To find housing, I went through the university website. I asked for a single room with a shared kitchen. I would definitely recommend this, as it is a good way to make friends from the start. At the end of the semester I had to 'sign out' as I was leaving Germany, and had to stop the TV/radio taxes.

This Erasmus in Germany reminded me how much I like new adventures, and also how much I can learn, both in general and about myself, in such a short period of time. The first days of adapting and getting used to a new environment are not easy, but it is definitely worth it. I made new friends from all over the world, I met amazing people, I learned a new language, a new culture, new habits, a different way of teaching, etc. These are things we cannot acquire any other way.

Alexandre MEGRET



The two years I spent in Vienna were a great experience. First of all, it was the first time I lived alone, without my parents, but fortunately it was easy to communicate over the internet. It was a good way for me to be more independent. I met many people from all around the world, people from Europe, from Austria, Germany, France, and Spain, but also others from further away, from Japan and Australia. Studying abroad is not just about working every day. Welcome parties, museum visits, and city trips were organised by the local

ESN (Erasmus Student Network) to promote the city and the country. ESN also helps all Erasmus students to meet each other and they answer any questions about the university and life in the city. It was always possible to find something to do.

An exchange programme is a great way to discover a new culture, in terms of study and school, as well as in terms of life (language, habits). Don't be afraid of the language, people understand that you are not a native speaker and will help you. I encourage everyone to do a study exchange, at least for one semester, if not for one academic year or more. Everything you get from your exchange (language, friends, culture, professional network, etc.) will be a bonus in your life.

Maxime MARECHAL

My name is Maxime Maréchal and I am a final year mechanical engineering student. Since the start of my studies, I have always wanted to go abroad to do my Master's dissertation. After the January exams, and a very long trip, I settled into a room at Nagasaki University in Japan.

It is essential to start preparing well in advance for such a trip. You first have to get a passport, since the destination is outside Europe. Then, an appropriate visa is often necessary, due to the duration of the placement. You should also reserve your flights as soon as possible to get low prices. Finally, it is a good idea to go to your doctor to ask about the latest essential vaccines, and to ask about what you might need in a small first aid kit. Between completing a lot of paperwork and waiting for other documents to fill out, the administrative part will take most of your time. Fortunately, the final result is worth every second of your perseverance.

The cultural contrast in Japan is huge, and it makes your everyday experience very interesting. I wanted to immerse myself in a completely new environment that has always intrigued me. I have to speak English all the time to make my point, so this is an invaluable asset for a future international career.

Since my arrival, a tutor has been assigned to help me, and I have had the chance to visit the University and participate in some meetings. Other students are curious to discover your work, and your motivations for coming here. I quickly met

other foreign students at the International House. It is a great way to create links and have fun with open-minded people. During my free time, I enjoy visiting all the beautiful sights of the city.



Melody D'HONDT



Melody started her education in France, with two years of Higher Education Preparatory Classes (CPGE) specialised in mathematics and physics, and then joined the École des Mines de Douai. She arrived – as an incoming student – at the University of Mons in September 2016 for another two years, in order to become an architectural engineer. Being here has given her the

opportunity to complete her degree with a four-month stay at the University of Loughborough (UK), where she is currently carrying out her Master dissertation. She details her educational background below, and explains why she chose our university to complete her studies.

By the time I reached the end of my first engineering project, I had an insight into the everyday life of a structural engineer. I knew then that I wanted to work in civil engineering, to help shape the landscape in a beautiful way. Having taken Higher School Preparatory Classes (CPGE) specialised in mathematics and physics, I selected the École des Mines de Douai. There, I studied sciences, and acquired an in-depth knowledge of civil engineering.

During my studies at the École des Mines de Douai, I took my first step into research with a two-month project on modelling the behaviour of clay soils regarding their organic matter content. I also chose to work on a humanitarian and technical project. Our goal was to create plans, to carry out some research on energy, and to raise funds, in order to build a food bank for an orphanage in Egypt.

These courses and projects led me to embark on a three-month summer internship on a school construction site near Paris. At the start of the construction project, my job was to verify that the work had been done correctly and to monitor different tasks, such as earthworks and laying the foundations. Then, I worked as a construction director's

assistant at AIA Architectes in Lyon for four months. While the construction project was in the final stages on the building site of the Dijon Private Hospital, I also had the chance to work on the "Grand hotel Dieu" project in Lyon, which aimed to convert an 18th century hospital into a 5-star hotel.

It was through talking with key personnel during these internships, and by taking on different tasks during my projects, that I became interested in architectural engineering. This profession is, in my opinion, particularly fascinating because it makes the connection between the creativity of architects and the expertise of engineers, by enabling them to find a technical solution to architectural problems. In fact, I believe that many construction problems could be solved if the two trades were brought closer together.

That is why I decided to study for the Bachelor's degree in Engineering (specialist focus on Architectural Engineering) at UMONS, which has enabled me to broaden my knowledge in many aspects of engineering and architecture. I was able to take courses ranging from solid mechanics, reinforced concrete, soil mechanics, and structure calculation, to architecture, symptomatology, and urbanism. Besides, I chose to take the structural engineering option to learn how to build, regardless of construction materials. With this experience, I know that in the future, regardless of the branch in which I choose to work, I will be able to appropriately combine both engineering and architecture to solve the problems I am confronted with.

Studying in English at Polytech-Mons

✉ Dr Zacharie De Grève



Polytech-Mons, the UMONS Faculty of Engineering, offers a wide range of Master's courses taught in French and English for our local and international students. Within the framework of a bilateral agreement between their home institution and UMONS, exchange students can opt for a stay of 5 or 10 months (1 or 2 semesters). Their academic programme can be exclusively made up of courses and projects, or can be complemented by a Master's dissertation, depending on what is agreed with the home institution. At present, four Master's degrees are taught in English, and, regardless of the chosen programme, exchange students may choose optional courses in French (including a special French course for beginners) to improve their language skills while studying in English.

Multimedia and Telecommunications

This two-year Master course has been established to transmit the research expertise developed at UMONS in the Information Technology Research Centre (CRTI) and the Institute for New Media Art Technology (NUMEDIART).

The CRTI focuses on technologies used for sensing, formatting, transmitting, processing and exploiting data, signals and information. Its expertise covers a wide range of technological resources, as well as important research and development capabilities, enabling its participation in both regional and international research projects.

Today, the CRTI is represented by more than 70 full-time researchers, along with researchers from two accredited research centres co-founded by the University: MULTITEL and CETIC.

Interdisciplinary research and innovation is encouraged, and is structured around several technological areas:

- Electronics and Microelectronics
- Computer Science
- Telecommunications
- Information Processing, Data Analysis and Decision Support
- Signal Processing and Multimedia

MULTITEL is an independent research centre in multimedia and telecommunications. It was founded in 1999 by the Faculty of Engineering. It currently employs about 80 people who work in multidisciplinary teams of engineers, technicians and marketing specialists. Its main goal is to develop and implement innovative projects in collaboration with local and international companies. MULTITEL's scientific fields include voice technologies, data fusion, optical fibre applications, image processing and computer network management. Besides its R&D activities, MULTITEL is active in the sectors of optics, telecommunications and company computer networks.

This Master programme focuses on Multimedia and Telecommunications and is organised over 2 academic years with 120 ECTS credits. The programme offers various courses and involves completing project work (during the autumn term) and undertaking a Master's dissertation (during the spring term), all under expert supervision.

NUMEDIART is a multidisciplinary research institute whose main goal is to develop new technologies for companies working in the multimedia and digital sectors. This institute brings together researchers, industrialists and artists working on 6 main research themes:

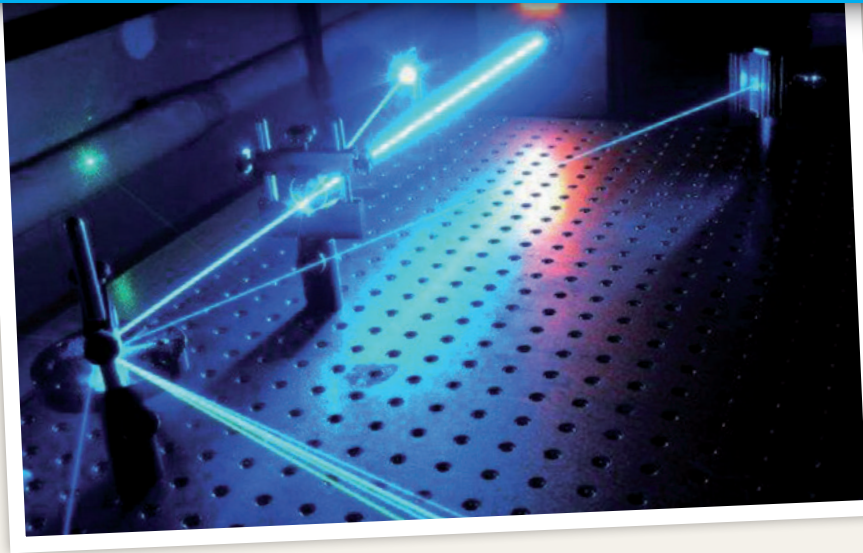
- Multimedia information retrieval
- Performative media
- Monumental projections (3D mapping)
- Motion capture (MOCAP)
- Smart spaces
- Augmented reality

“ The CRTI expertise covers a wide range of technological resources, as well as important research and development capabilities, enabling its participation in both regional and international research projects. ”

Signals, Systems and Bioengineering

This two-year Master programme focuses on methods and techniques for measurements, signal processing, system modelling, optimisation and control, as well as robotics, with applications





in biomedical engineering and process applications in the bio industry.

The course programme is organised over 2 academic years and is composed of 120 ECTS credits. The keywords of this programme are “signals”, “systems” and “control” as well as “biomedical engineering” and “bioprocess applications”. The programme spans various domains including biomedical signal and image processing, population

and biological system modelling, hardware and software instrumentation, advanced control strategies for biomedical and bioprocess applications, and the use of technology in various processes related to human health, the environment, food and renewable energy.

This programme involves completing two projects and undertaking a Master’s dissertation, all under expert supervision. Students can also choose some optional introductory courses, depending on their previous educational background.

The goal of the **“Smart Grids – Smart Metering” Chair** funded by ORES (the company in charge of the electricity and natural gas distribution grids in Wallonia, Belgium) is to prepare the technological revolution represented by Smart Grids in the electricity sector, in the current context of energy transition. It aims to develop knowledge in this field as well as in the field of smart metering, and focuses on:

- studying the impact of decentralised electricity production (e.g. photovoltaic and wind power) on distribution grids,
- developing new data analytics capabilities using Artificial Intelligence techniques, relying on the data collected by the Smart Metering devices which are massively deployed in modern electricity grids,
- managing the electricity demand by ensuring it matches production,
- novel communication strategies for transferring data on power distribution networks,
- preparing the expected massive penetration of electric vehicles on these networks.

All these topics are being addressed by a team of about 10 PhD researchers and 4 Senior researchers.

BIOSYS is an R&D Excellence group active in the scientific and engineering aspects of life sciences, including bio-signal and image processing, bio-chemical system analysis and bio-process modelling, optimisation and control, ecology and environment, as well as bio-mechanics and bio-optics. Several laboratories (active in chemical and biochemical engineering, mechanical engineering, signal processing, control, computer science, mathematics and telecommunications) participate in this research group.

Electrical Energy

This Master programme focuses on three core subjects: the study and modelling of electrical machines, of power electronics and drives, and of modern electrical power systems (including renewable energies and smart grids).



This programme was designed drawing upon the research expertise developed at UMONS through the ORES “Smart Grids – Smart Metering” Chair, started in 2011, and in relation to the concerns of the ENERGY Institute of UMONS.

The course programme is organised over 2 academic years and is composed of 120 ECTS credits. It offers various courses and involves completing a first-year industrial Master project, during which the student has to tackle a real-world technical challenge, and undertaking a Master’s dissertation, all under expert supervision. All courses are taught in English. Students can also select optional courses (in French), depending on their educational background.



Mattia HAHAUT, student in Mechanical Engineering

I am currently in the last year of my Master’s degree in Mechanical Engineering (specialist focus on Mechatronics). With this option, we must constantly juggle concepts of electronics, computer science and mechanics. Throughout my studies, I have had courses in English, which I have found to be very rewarding. I always make sure that I learn technical words in different fields because, having chosen Mechatronics, I know that

I could end up working in several domains within the engineering profession. Thanks to this vocabulary, I was able to speak more easily during my internship. At first, it seemed strange to have courses and take notes in English, but after a week I got used to it and it wasn’t a problem anymore. In a professional environment, engineers must use industrial language in English on a daily basis, and this Master’s course has prepared me for this.

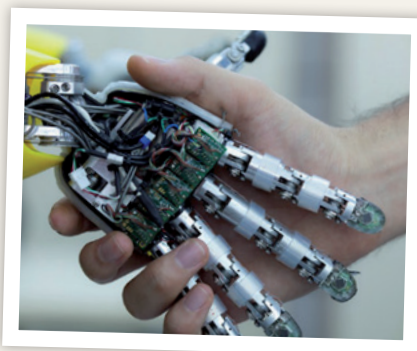
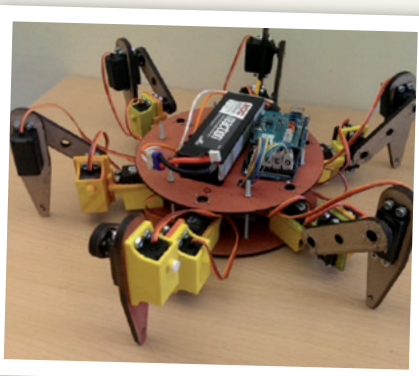
The **ENERGY Institute** is dedicated to research and development in the field of energy, and takes on an integrated approach to its research, employing techniques from many disciplines covering scientific, technological, societal, legislative, economic and political aspects.

Indeed, the challenges related to energy transition are so high that long-term political plans are being devised (target of 80% to 95% reduction of greenhouse gas emissions by 2050 in Europe, compared to levels in 1990). Such policy objectives require new developments in all sectors of society. The issue of energy, therefore, requires an integrated multi-disciplinary approach with a short-, medium- and long-term vision in mind.

To this end, UMONS established the ENERGY Institute to deal with R&D in this area. Its activities are based on the expertise of more than 85 members in the fields of sciences, applied sciences, economics, architecture and urban planning. The Institute's mission is to support these various areas of R&D (biofuels and combustion, carbon capture and storage, photovoltaic technologies and wind power, smart grids, smart cities, materials and process for energy applications, geothermal energy), with the aim of implementing future energy systems into society.

Mechatronics

The Master in Mechanical Engineering comprises a common core of 75 credits, 15 credits of elective courses, and a specialised focus of 30 credits to be chosen from "Design and Production", "Energy and Power Systems" and "Mechatronics". The common core programme provides a background in solid and fluid mechanics, machinery, heat transfer, and design/production, as well as in some cross-disciplinary topics, such as control and electronics. Students must also complete an industrial work placement (12 weeks) and the Master's dissertation.



“ **Robots, drones, driver/pilot assistance systems in the automotive or aeronautics industry, self-balancing personal transporters, or computer-aided manufacturing systems are all examples of mechatronic applications.** ”

During the second semester of the first year, students can have their full curriculum in English if they choose to focus on Mechatronics.

According to the NF E 01-010 French standard, mechatronics consists of an “approach aimed at the synergistic integration of mechanics, electronics, control theory, and computer science within product design and manufacturing, in order to improve and/or optimise its functionality”. Robots, drones, driver/pilot assistance systems in the automotive or aeronautics industry, self-balancing personal transporters, or computer-aided manufacturing systems are all examples of mechatronic applications.

The programme is constructed from the usual structure of a mechatronic system: in order to improve the performance of a given mechanical system, it is fitted with sensors and actuators. The signals from the sensors are acquired by a processing unit which, in turn, commands the actuators so as to obtain the desired behaviour of the mechanical system. The programming of the processing unit generally requires some modelling of the system and the application of control theory. Moreover, the programme includes a machine design project, whose outcome is the computer-aided design (CAD) of a moderately complex machine, and a digital control project, consisting of programming the control of an actual mechanical system, such as a robot leg, a unicycle robot, a retrofitted plotter, etc.

Celia ROBLES LOPEZ,
Erasmus student



My name is Celia Robles López and I come from Villacarrillo, a town in the province of Jaén, in the south of Spain. I study industrial engineering at the Higher Technical College of Engineers of Seville, and this year I am continuing my studies at the UMONS Faculty of Engineering (Polytech) thanks to an Erasmus scholarship.

I chose to come to Mons for a whole year of my studies for many reasons. The first one was to improve my level of French, since I have always liked this language a lot, and have already studied it before. In addition, I believe that Belgium has an enviable geographical situation in Europe, so I knew I could travel easily and cheaply. Furthermore, Mons is a very comfortable city to live in, not too big, not too small, and you have everything you need nearby. Finally, if you want to discover new things you always have the opportunity to take a train to go somewhere else. I have to admit that even if I will never get used to the cold weather of this city, Mons has become my second home (a good pair of gloves and a scarf have helped a lot too!).

Since arriving here, I have had the opportunity to meet many people, foreigners and Belgians, which has allowed me to learn about different cultures and traditions. This multicultural environment is really enriching, and sharing different points of view with completely different people is a unique experience. In general, everyone is open to talking with you and helping you if you need.

Furthermore, one of the facilities provided by Polytech-Mons is that they offer a series of Master's courses that are entirely in English, which allows the inclusion of Erasmus students in the classes. The practical work (laboratories) is also done in English.

In conclusion, I am very happy to have spent these months in Mons, and am equally happy that I still have several months left here !

STUDENTS ON THE MOVE

Travelling abroad is a good way for students to gain skills and experience, both for their personal life and their future professional career. It opens the mind, offers networking opportunities, helps to develop language skills, etc. In some cases, travelling is a necessity, since the studied topics cannot be covered in a classroom. This is particularly true for architects (architecture study trip) and mining engineers (geology field trip, mining trip) who need an in-depth understanding of 3D spaces that a picture or a sketch cannot fully render. Travelling also offers the opportunity to meet people and to

share professional experiences, either with other students and teachers (IG international exchange with Poznan University of Technology, StarTech contest winners going to Texas A&M University, individual mobility programmes like T.I.M.E. or Erasmus) or with fully trained engineers and researchers (mining trip, conference participation, professional internships).

Let us take you on a world tour through France, Germany, Switzerland, Italy, Portugal, Denmark, Poland, Texas, South Carolina, and even South Africa...

Architecture Study Trip

✉ David Bayle, Chiara Fucelli and Dominique Deramaix



The architecture trip is a fundamental experience for architectural engineering students. The contact with another environment improves a student's knowledge of architecture and urbanism. The trip is for 3rd Bachelor and 1st Master students, and is organised by the Architectural and Urban Engineering Unit. Students leave their familiar surroundings for a week for a destination that changes every year.

Due to time constraints, trips are often organised in Europe. One year students visit a "cold" country and the following year a "hot" one, which suits

everyone, as all groups get to leave two years in a row. These alternations also enable the students to understand different ways of living and building, according to the climate and culture. The buildings visited are chosen because of their historical and contextual value, the reputation of the architect/engineer who designed them, the technological innovations they brought, etc. When possible, the proposed itineraries take students on tour with local architects, designers, and engineers, as well as with researchers who explain the interest of sites.

Two years ago, the students went to Milan, a city full of history, where many new projects were developed thanks to the EXPO 2015. During the journey, students had a layover in Ronchamp to visit Le Corbusier's chapel. They also visited the Vitra site near Basel, and were impressed

by some of the industrial "cathedrals" of the modern era in Turin.

Last year, the destination was Copenhagen in Denmark. This city is the southern capital of Scandinavian culture. Students discovered a place that is proud to be a small capital with the typical Nordic energy and vitality. Well known for their famous designers, Danish people are also recognised for their architecture and ecological development. The first half of the trip was used to discover the Danish capacity to build on polder along the channel and the seaside in order to expand the city. The students also cycled all around the city. The second half of the trip, the students went to different areas in the north of the country, called Zealand, where they saw the Louisiana Museum of Modern Art, and different masterpieces by Danish architects, such as Jørn Utzon and Arne Jacobsen.

This year, students will visit Porto in Portugal. There they will see the famous works of modern architects, like Alvaro Siza and Souto de Moura, and more contemporary ones, such as the "casa de musica" by Dutch architect Rem Koolhaas.

The architecture trip is an opportunity for students to discover some emblematic architecture 'in the flesh', not just through images. Going through buildings that they only know from photos enables them to understand spaces, functions, and technical solutions. This trip is also a quality exchange between the students and the teachers.



The Mining Trip: an Unforgettable Experience of *in situ* Teaching

✉ Dr Fanny Descamps



How can you graduate as a mining engineer if you have never once been to a mine? For some time now, the Mining Engineering Unit has organised a trip abroad in order to visit diversified mining operations and to apply the theoretical knowledge learnt through mining courses in the field (geology, rock mechanics, mining techniques, mineral processing, etc.). From the mid- to late nineties, the students, led by Prof. Tshibangu, travelled to France. There they visited several mines (uranium, barite, gold, collieries in Lorraine), as well as oil production facilities in Champagne, the underground laboratory for radioactive waste disposal (ANDRA), and the French Institute for Petroleum (Paris). With the progressive closure of mining sites in France, the mining trip was then organised in Spain, where there are facilities for sepiolite production, open cast and underground coal mines, Zn-Cu-Pb mines, etc. At that time, being able to go on such a trip really seemed like an amazing dream for the students. I was one of those.

The year 2002 represents an important milestone in the organisation of this activity. Indeed, with the desire to broaden the students' view on the mining industry, new horizons were sought. Is there a place in the world where you can visit large mining operations for commodities like diamonds, chromium, platinum, gold, and even coal, in only 10 days? Yes, if you travel to South Africa, because of its extraordinary geology. The idea was challenging: we had to find contacts in the mining industry, among those big international companies (Anglo American, De Beers, ...), organise the journey to Johannesburg and between mining sites, plus find appropriate accommodation... all for an affordable price. With a lot of personal investment and the help of sponsors (including the University and the engineer's association), we did it. After

fifteen years, the mining engineering students still sign up for the mining trip to South Africa.

To give an example, let me take you on unforgettable experience: a gold mine visit, at depths exceeding 3,600 m. The Kloof mine lies in the Witwatersrand Basin. The mined layer is a 1-2m thick quartz conglomerate with a 22-25° dip. Gold is encased in the conglomerate cement with a mean grade of 5g per ton of rock. We have visited this mine several times with different groups of students. The working conditions can be very severe because of the mine's depth. There the miners have to work in 30°C temperatures (after cooling the air) with an 85-90% relative humidity. A first shaft takes you to 700 m in depth then a secondary shaft goes to the level we visited. The extension of the mine is such that a train transports people from the shaft to the working areas. In these thin layers, hand-held equipment is still common and high stresses are a major challenge to deal with.

Besides the wide variety of commodities and techniques, and the size of mining sites, this immersion in an English-speaking country is great for improving the students' technical vocabulary. This skill is evaluated by means of a now famous test, referred to as "mining TOEIC". As a personal project, each student has to prepare a short presentation before the trip on one particular mine or commodity, based on the available literature and mining databases. Once back in Belgium, they also have to write

a more detailed individual report on a specific case developed during the visits. The contact with the industry also develops soft skills, such as human relationships, and team building, safety and environmental concerns. Some students even take the opportunity to gather contacts for their internship or future job.



IG students go to Poznan

✉ Prof. Pierre Manneback



Consider 11 students and 2 professors going out for international exchange. Destination: Poznan University of Technology, one of the best in the field in Poland. Objective: meeting Polish engineering students and some of their professors, and performing some challenges in mixed teams.

The first challenge was about cybersecurity, and was called "Capture the Flag". It was one day of intensive cogitation. The second challenge was about graph theory and big data networks. The objective was to design and implement a heuristic

for detecting communities on a graph. Time was too short to build a competitive solution, but many ideas emerged from the Belgian-Polish teams.

Additionally, each student presented their Master's dissertation, and several courses were given on image processing, software engineering and visualisation.

Last but not least, we had opportunities to visit a very large computer centre, with an impressive virtual reality lab. On top of all of this, we took the time to see the city and its numerous shopping centres.

“ **Objective: meeting Polish engineering students and some of their professors, and performing some challenges in mixed teams.** ”

This was an exciting experiment for all of us, thanks to our Polish partners!

StarTech Contest Prize: a Stay in the Lone Star State

☒ Charles Dehombreux, Vincent Stragier and Yannick Molle, Bachelor students

Every year, five teams of second-year students compete against each other during the StarTech contest, organised by WSL (Walloon incubator for engineering sciences). The goal of each team is to develop a business model and a pitch around an innovative idea.

The DomoGrid is a home automation solution that allows users to reduce their energy bills using a producer-oriented approach. This project won the first place and gave Charles Dehombreux, Vincent Stragier and Yannick Molle the opportunity to visit Texas A&M University, which is situated 70 km northwest of Houston, for one week. Here is their account of the trip.

“Let’s begin with some crazy numbers. There are around 70,000 students on the Texas A&M campus, including 16,000 engineering students, and yet the ratio of students per instructor is still around 17. It is quite hard to realise that all these people live on a campus – or should we say town? – in the middle of the Texan countryside.

During the week we were there, we had many opportunities to meet entrepreneurship specialists, including professors and incubator directors, who all shared their passion for innovation with us. The goal of these meetings was to improve the way of thinking we developed during the StarTech competition. We

also met entrepreneurs who are very committed to their work, and therefore could offer a range of good advice. Finally, we had interesting exchanges with students and discovered how life works on the campus of an American university.

It is difficult to talk about this trip without mentioning the warm welcome we received upon arrival, and the hosts’ kindness throughout the week. It is incredible to think that we can have this kind of opportunity as students. Thanks to the WSL for making this experience possible.”



Material Sciences and Chemistry Students Attend a Scientific Conference

☒ Prof. Maurice Gonon

Since 2006, on three separate occasions, the Chemistry and Material Sciences Department has suggested that final year Master’s students take part in a scientific trip. Each time, the purpose was to offer the students a first opportunity to attend a scientific conference, over a period of three or four days.

The first of these trips was organised in 2006 under the students’ own initiative. Two of them had seen a flyer announcing the annual meeting of the French

Ceramic Society in Toulouse, during which a visit of Airbus was planned. Together with their fellow students, they managed to convince the Department to finance the trip. Since then, two other trips have been organised, one in Mittelwihr, Alsace (2012), and another in Rennes, Brittany (2017).

Attending a scientific conference is a good opportunity for students to get a different perspective on the research world. They can see that most conference talks are given by young researchers.

They can talk with them and ask questions about their motivation for doing a PhD thesis. They can also realise that research offers a chance to travel around the world. It is also a way for us teachers to highlight the close links between the research topics presented and the courses given to the students.

In addition to the more serious matters, the trip is also an opportunity to have fun during the social events (conference dinners, visits, etc.) and gather some funny anecdotes.



An International Industrial Internship

☒ Mattia Hahaut, Master student

For their last year at the Faculty of Engineering, students must do an industrial internship, and I did mine at Solvay s.a., a Belgian company founded in 1863. Solvay s.a. specialises in the field of chemistry and employs 27,000 people across 139 industrial sites in 58 countries. Their headquarters are in Neder-over-Hembeek (Brussels). In 2016, their sales amounted to 10.9 billion euros. The history of the Solvay group dates back to 1861 when Ernest Solvay discovered how to produce sodium carbonate. Since then, the company has grown to become one of the world leaders in chemical, plastic and pharmaceutical activities.

During my internship, I worked on two projects. The first one was on a new crushing line in a silica plant in Wloclawek, Poland. The other one was the study of a procedure for installing tapered roller bearings in a carbon fibre production plant in South Carolina, USA. I mainly worked on these two projects from Brussels with the help of specialists, although I also went on trips abroad in order to better understand and analyse the problems.

My first trip was to Poland. There, I saw the evolution of the construction of the new crushing line as well as a production shutdown. I also carried out some inspections and had the chance to travel to Austria to perform tests on the new roller crusher at the supplier’s site. For the second project, I visited suppliers in England and Germany and performed tests to confirm the choices made during the procedure.

The trip to Wloclawek in Poland was my longest trip. Life in Poland is similar to here, except for the cost of living. It is possible to eat for 4.50 euro in a restaurant! Wloclawek is very cool in summer. The biggest difference is the language, but the workers understand English. For me, the most important thing was to speak a lot with other people and not to be worried about making mistakes. In a production plant, it is more important to explain things clearly than it is to have perfect English.

I travelled a lot between Brussels and other sites abroad, either for a few weeks or a few days. The days on site were quite long, as I had only a limited

time to gather all the required information before heading back to Brussels. It was not easy to follow this rhythm, but it was an enriching experience and I would recommend it to others. It helped me to develop organisational skills, which enabled me to effectively plan my trips abroad and maximise my time on the sites to gather all the essential information. In addition, having to manage two different projects at the same time taught me to better manage my time in order to complete all my tasks well.

While working at Solvay, I learned how to work with foreign suppliers: I saw how to organise a day of tests in their factories, how to approach problematic topics and how to communicate effectively. These are social skills that are important when, as was the case for me, the financial stakes are substantial. Furthermore, I participated in safety trainings to learn the risks associated with my projects.



SEVEN TEENS HEAD TO WASHINGTON WITH THEIR ROBOT!



✉ Maxime Duménil

In mid-July, seven 16- to 18-year-olds headed to Washington D.C. in the United States. Their objective: to participate in a brand new robotics competition – the FIRST Global Challenge.

The aim of this international competition is to attract young people's interest in STEM (Science, Technology, Engineering and Mathematics) subjects. For its first edition, the organisers were looking for robotics specialists from all countries. To find the representatives for Belgium, they turned to the Mons-based section of the Young Belgian Scientists Association (Jeunesses Scientifiques de Belgique) and the Science and Technology Dissemination Centre (SciTech²) of UMONS. Evidently, their 5 years of experience organising extracurricular activities in robotics has earned them international recognition!

Accepting this challenge, both partners launched a call for participants, reaching out to young people from the Wallonia-Brussels Federation. Twenty candidates were shortlisted, and a draw was held to find the seven lucky participants for this fabulous adventure.

What was the challenge? All the teams had to create a robot capable of performing a series of simple tasks related to water decontamination using the same kit, which included about ten kilogrammes of motors, sensors and other spare parts. Specifically,

the robot had to be able to store water (symbolised by blue balls) and clean it (pollution symbolised by orange balls). The robot had to be able to move, “visually” recognise the balls, and sort them.

Another original aspect of this competition was the cooperation between the teams. There were matches pitting super teams, each with three different national teams, against each other! It was an opportunity for beautiful multinational and multilingual exchanges, because the participants of each super team had to understand each other and work together in order to implement a winning strategy!

Suffice it to say that this challenge required some very serious preparation, technically, socially and culturally speaking. For 4 months, the team met every Wednesday afternoon at the “FabLab Mons”. The youths were supervised by Laurent Cardon and Maxime Duménil, both graduates of the Faculty of Engineering, as well as a team of activity leaders and engineering students participating in the Robotics Cup... a great source of inspiration!

Did someone mention a competition in the USA? What about travel expenses? This adventure was made possible, and accessible to all, thanks to many supporters, including the UMONS Faculty of Engineering, which was eager to support these budding engineers!



“ It was an opportunity for beautiful multinational and multilingual exchanges. ”

The Belgian team did not win. However, just completing the project, and having participated in this competition, bringing together 160 countries, is an extraordinary achievement in itself. Nicolas, Quentin, Tom, Matis, Diégo, Yona and Emile returned with their heads full of memories and eyes sparkling with happiness and pride!



ISW MONS 2017: A MONS'TERS WELCOME

✉ Andy Denil, Student Federation of the FPMs



Each year, the Student Federation of the Polytech organises the International Student Week (ISW) of Mons. In 2017, it took place from the 5th to the 11th March. This week, high in emotion, was the opportunity for foreign students to discover the customs of Belgian students, to taste all the special beers Belgians are so proud of, and to discover the manufacturing industries of Belgium by visiting some quarries and old mines.

The week began with a welcome dinner, where a typical Belgian meal was served. The welcoming committee for the foreign visitors was made up of the board of our Federation, the presidents of all of our student associations and the Dean of the Faculty. After a quick presentation of everybody, and a great meal, we all went on to the Faculty bar, which opens from midday to midnight every day.

On Monday, we visited Mons. We walked through the Grand Place, where you can find a small statue of a monkey, one of the symbols of Mons, which brings you luck if you stroke its head. We then went through the Jardin du Mayeur and visited the Saint Waltrude Collegiate Church. After this little sight-seeing trip, we went back to the bar to taste lots of Belgian specialty beers. In the evening, there was a special event we call "The King of Mons", which is a drinking race that all the student associations from different studies take part in.

On Tuesday, we visited the "La Malogne" mine. It is an old mine which was exploited for the high content of phosphate that was found in the chalk. It is an interesting place to visit for geologists because there are lots of faults in the region, some of which can be observed in this mine. In the afternoon, we visited an old underground coalmine, "Le bois du Casier". Sadly, it is famous in Belgium because of a fire that killed around 250 miners in 1956. That evening the yearly Belgian Beer Party was organised, which is an inclusive party with only specialty beer to chug!

On Wednesday, we spent the whole day in Brussels to visit the capital and its main square. We also went to see the famous Manneken-Pis, which means the "pissing boy". It is a fountain made of bronze. We dressed the boy in the traditional hat and red coat of our faculty and made him piss beers for us to drink!

On Thursday, we visited the Dubuisson Brewery. The most famous beer produced there is the "Bush 12", which contains 12% alcohol, as the name indicates. In the evening there was a special party which only takes place during the ISW, the "Crasino". It is a big 1920s casino themed party. You can play poker, blackjack, roulette, and so on, in order to win drinks tickets! Everybody is well dressed and there are some dances and shows put on by the students.

On Friday, we visited the open quarry of Antoing. It is an aggregate quarry run by CBR, the Belgian subsidiary of HeidelbergCement. Every year we visit this company and we always have the chance to see some blasting operations. We also visited the cement plant next to the quarry. In the evening there was a rock music concert organised by people who studied at our Faculty 30 years ago. The atmosphere was great.

After a week full of emotion and joy, we finished on Saturday with a Thanksgiving celebration where the board of the Federation received great presents.

Every year, the Federation of Mons organises the ISW, in spring. If you are interested in this project, and if you want to support it, feel free to contact us and ask us for our sponsorship form.

Antoine SCOHIER

My name is Antoine Scohier, I'm a final year Geology and Mining Engineering student.

Travelling has always been important for me, as I want to discover and be a part of the world I'm living in. Choosing the Geology and Mining specialisation has given me the opportunity to study geology in the South of France, and to work on drilling 3 km deep rocks in a South African gold mine. Moreover, I'm leaving for Chile in a few months to carry out my Master's dissertation.

Each year, the Student Federation of the UMONS Faculty of Engineering, under the watch of the D.R.E., organises the International Student Week (ISW), which celebrates student life and introduces us to foreign student traditions. Thanks to our Student Federation I got the chance to go abroad twice in 2016, first to Helsinki (Finland) and then to Miskolc (Hungary).

My 2016 ISW Helsinki trip began on 31st January and ended on 7th February. Finnish material and mining engineering students had prepared a

week-long road-trip across Finland for us and our Dutch, English, German, Hungarian and Norwegian comrades. During the day, we drove, relaxed and visited companies working in mining (Sandvik, Outotec, Ovako). In the evening, we shared dinner with the company's engineers (former Helsinki students) in authentic Finnish lodges near frozen lakes. Saunas and midnight baths were a daily deal.

I left again for the 2017 ISW Miskolc trip on 10th April accompanied by Croatian, English, Finnish, German, Hungarian and Norwegian students. We stayed in a university residence, just like our Cité Pierre Houzeau (except there are six of them on their campus), for seven days. Miskolc has a great industrial past, which we could see during the visits of andesite and coal open-pit quarries. This ISW also was more about culture and lifestyle: we visited a wine cellar, a pálinka distillery, a mining museum inside the university, etc.

The Helsinki and Miskolc ISW trips were not that similar, as you can likely tell, but in the end they shared



a common point with the Mons ISW – they bring people together and make us discover new things.

In short, it makes us feel happy and carefree, as we're only connected to each other by our age, studies and love for having fun. As a conclusion to my ISW experience, I would encourage any student that reads these lines to apply for this incredible adventure.

POLYTECH INTERNATIONAL MONS'TERS

✉ Andy Denil, Student Federation of the FPMs

The Polytech International Mons'ters, abbreviated to PIM's, is one of the student committees of the UMONS Faculty of Engineering. The committee is composed of up to ten engineering students from the second bachelor to the final year. Its purpose is to welcome foreign students who take part in the summer courses organised by our Faculty during the first week of July. These foreign students come from all around the world, they arrive alone in a country where they don't speak the language and they don't know the customs. It is our job to take care of these students, to pick them up at the airport or the train station, to guide them through the city of Mons, to make sure they attend their lessons, to entertain them after classes, and to make them discover our culture.

A typical day during this summer courses week begins by making sure every student is awake, by having breakfast with them and by guiding them to their classes. At midday, we go and pick them up to have lunch together at the Faculty restaurant,

and then take them back to classes. After their lessons, we organise some activities to entertain them, we have a typical Belgian dinner together and we organise some games for the evening. As the foreign students come to follow classes and to pass a test at the end of the week, these evening activities are not obligatory to allow the visiting students to study.

We organise cultural activities, such as a tour around Mons, a visit of the "Grand Hornu" coal mine, a visit of the Belgian nuclear research centre in Mol, and so on. However, we also organise more relaxed activities, such as bowling and concerts, and we have a barbecue with the professors.

This week is an opportunity for the Faculty students to live an international experience inside our own country. It gives us the chance to discover new cultures, to meet new people and to practice English without going abroad. It is a wonderful and rewarding experience for all.



THE SMARTEST TRAINBRAIN: A COMPETITION WON BY UMONS

Maxime Maréchal and Sébastien Van Laecke won "The Smartest TrainBrain" competition organised by HR Rail, SNCB and Infrabel. Maxime and Sébastien are both final year Mechanical Engineering students at the Faculty of Engineering (UMONS). This competition aims to give participants (52 engineering students this year, from 8 universities and colleges

in the country), a taste of the technological challenges offered by the Belgian railways.

In this year's competition, which was the fourth to be organised, the first task was to calculate the electrical consumption of the air conditioning system of a train running between Bruges and

Liège. A jury composed of engineers from Infrabel (the Belgian railway infrastructure manager) and SNCB (the Belgian national railway company) then selected 20 teams from those with the correct answer. During the final, on 13th December, they faced one last challenge: to guarantee passenger safety in the event of a short circuit caused by a catenary breakage. The top six teams were then able to present their solution to the jury. After some great teamwork between friends, and a short presentation in English, the UMONS students were awarded first prize by the company's engineers.

It was the second time Maxime and Sébastien participated in the competition. The first time was in the 2016 edition, and they went back home having been placed second. That year, the qualification problem was about calculating the braking distance of a train. The final was about optimising a repair schedule for the Belgian railways.



UMONS SUCCESS
AT EVERY SMARTEST
TRAINBRAIN COMPETITION

2016 EDITION

Maxime Maréchal and
Sébastien Van Laecke,
2nd place

2015 EDITION

Clément Dutoit and
Sébastien Mercier,
4th place

2014 EDITION

Jérémy Vanstals and
Aurélien Bernard,
2nd place

Visiting Scholars from/at the Faculty of Engineering



✉ Prof. Georges Kouroussis

Mobility also concerns academic staff! The possibility of funding offered by national and international programmes supports the development of exchanges and allows the applicant to initiate long-term collaborations. Just a few of the recent mobility activities undertaken by our staff are detailed below.

SEMI and CEFIM Collaborate on Reliable Microelectronics



The Analogue Group of the Electronics and Microelectronics Unit (SEMI), led by Prof. Fortunato Dualibe, hosted Dr Tinus Stander from the Carl and Emily Fuchs Institute for Microelectronics, University of Pretoria, South Africa, from 26th June to 21st July 2017. This exchange was funded by an FSR-FNRS bilateral research programme between South Africa and Wallonia, and was aimed at establishing and strengthening the research collaboration between the two regions.

The research topic under investigation is built-in self-testing circuits for microelectronics in harsh environments. Most microelectronic devices are damaged over time when operating in hazardous environments, for example, satellites in outer space, yet very few reliable methods exist for these circuits to self-test and report on failures. The purpose of the collaborative project is to exploit a technique known as oscillation-based testing (OBT) to test high frequency circuits in outer space, thereby improving the long-term survivability of space missions.

Dr Stander and Prof. Dualibe spent the time comparing test and development resources, identifying relevant literature and technologies, as well as drawing up some preliminary designs. Dr Stander also presented a public lecture on his research group's activities to an audience which included visitors from the Universidad de Las Palmas de Gran Canaria (ULPGC).

The project is scheduled to run until December 2018, and will include a future visit by another South African researcher to UMONS, as well as two outbound visits by researchers from UMONS to Pretoria. The project has already led to two co-authored international conference papers (in collaboration with the Universidad Católica de Córdoba, Argentina, with which both institutions have strong ties), and is expected to produce more output over the coming years.

The University of Thessaly and UMONS Consolidate Research into Environmental Noise and Vibrations from Urban Light Transit

Prof. Konstantinos Vogiatzis, from the University of Thessaly (Greece) – Department of Civil Engineering, completed a 3-month visit (from September 2016 to February 2017), at the Theoretical Mechanics, Dynamics and Vibrations Unit of the University of Mons, under the *Fonds de la Recherche Scientifique (FNRS) – Missions Scientifiques 2016-2017*. This scientific project was the natural development of Prof. Vogiatzis's previous work, at the European Commission's Joint Research Centre – Institute for Health and Consumer Protection in Ispra (Italy), and the strong collaboration with Prof. Georges Kouroussis from the



University of Mons. Together, in recent years the two have worked on several studies into mitigation solutions for ground-borne noise and vibration problems. This FNRS action offered the means to consolidate the existing collaboration. Interactions between Prof. Vogiatzis and the members of the Theoretical Mechanics, Dynamics and Vibrations Unit were the key to undertaking this in depth research.

During his stay at UMONS, Prof. Vogiatzis, work focused on the evaluation of representative packages of diversified measures and tools within noise action plans (NAP), also extending the relevant work in the domain of vibration and ground borne noise from the analysed light rail transportation networks. This innovative approach is expected to provide additional value to a more structured framework for identifying, quantifying, and comparing a complete implementation of the Environmental Noise Directive (2002/49/EC), which evaluates a combination of measures for all acoustic environmental parameters at different transportation noise sources.

The work during this period was presented in a lecture to the Mechanical Engineering students. This lecture on environmental noise in Europe, entitled "The 2002/49/EC Directive and the new common noise assessment methods for Europe (CNOSSOS-EU) within the EU future noise policy", was also published in a high-level international book, in a journal, and was presented at conferences.

Furthermore Prof. Vogiatzis and Prof. Kouroussis, as members of the ICSV24 international committee and directors of the IIAV institute, organised a T10 Theme Area (Road and Rail Traffic Noise and Vibration) during the 24th International Congress on Sound and Vibration (ICSV24) held in London from 23rd to 27th July 2017. This Theme Area covered the broad issue of the generation and propagation of sound and ground borne vibrations from road and rail transport. Structured sessions were partly dedicated to the urban environment, with low speed rail bound transport and road transport. In addition, novel mitigation measures against noise from main roads, such as low noise pavements, were highlighted.

The staff of the Theoretical Mechanics, Dynamics and Vibrations Unit appreciated the work performed and the outcome of this FNRS project, and they exchanged multiple ideas about the implementation of their findings in the EU noise policy, expressed through the CNOSSOS-EU (phase B), which was set to be fully operational in EU countries by end of 2017. The visit was also the opportunity for Prof. Vogiatzis to see the city of Mons, and he got to taste typical Belgian dishes and some famous local beers, including Saint-Feuillien, which has become one of his favourites!

Mohammed I University, Oujda, and UMONS Consolidate Research into Large-scale 3D Shape Content-based Retrieval

A new collaboration in the field of Computer Science has recently been established between three partners: Prof. Mohammed Benjelloun (Faculty of Engineering (University of Mons)), Prof. El Wardani Dadi (National School of Applied Sciences Al-Hoceima, attached to Mohammed I University, Oujda, Morocco) and Prof. El Mostafa Daoudi (Faculty of Sciences of Mohammed I University, Oujda, Morocco).



This tripartite cooperation was started with the scientific mission of Prof. Benjelloun, who went to the Mohammed I University in 2015, and Prof. El Wardani Dadi then visited the Faculty of Engineering (UMONS) in 2016. These month-long missions were part of the annual call for scientific missions by the F.R.S-FNRS. To date, three missions have been carried out: one in 2015-2016, the second in 2016-2017 and the third in 2017-2018.

The main objective of these missions, funded by the F.R.S-FNRS, is to continue and consolidate our cooperation on the domain of large-scale 3D shape content-based retrieval, which is an active research topic related to different fields, such as computer vision and pattern recognition. Indeed, large databases of 3D models have become available on the web. However, when the dataset size gets very large, the retrieval process becomes very challenging. The challenges come from storage, computation speed, and features representation.

In order to design a 3D shape retrieval method that respects the two requirements of an efficient retrieval system, which are the relevance of the results and computational efficiency, four articles have been published in which several techniques and approaches are proposed, including HPC solutions. Despite the many methods proposed in the literature for 3D shape retrieval, the current approaches are either inaccurate or too expensive, in terms of computing time, and therefore do not meet the needs of an efficient system of content based shape retrieval.

For the last two-month mission, from 1st October to 30th November 2017, Prof. El Wardani Dadi came to the Faculty of Engineering of the University of Mons. This mission was focused on the application of the deep learning approach in order to design an efficient system of 3D shape retrieval. Indeed, this approach has shown great efficiency in many applications, especially, in retrieval and classification applications.

New Scientific and Academic Exchange between UMONS and the University College Cork, Ireland

The University College Cork (UCC), Ireland, and UMONS have started a new collaboration in the field of advanced Big Data analysis for multimedia management. This cooperation has been established between Prof. Saïd Mahmoudi (Faculty of Engineering at UMONS) and Prof. Ken Brown from the INSIGHT Centre for Data Analytics at UCC.

This scientific and academic exchange started with Prof. Saïd Mahmoudi's scientific mission in UCC in October 2015. This mission was funded by the annual call for scientific missions by F.R.S-FNRS. Until now, Prof. Saïd

Mahmoudi has carried out two one-month missions, the first in 2015-2016 and the second in 2017-2018.

The main objective of these research stays was to initiate and consolidate a bilateral collaboration in the field of advanced Big Data analysis for multimedia management. The scientific goal is to develop new methods allowing the management of large multimedia databases composed of images or videos. The idea is to implement video and image analytic algorithms using deep neural networks and big data processing frameworks. One of the methods implemented is, for example, image search engines allowing the retrieval of a user query presented as an image in a large database. Another example is abnormal event detection in videos.

Testimony of Prof. François Ducobu from the Machine Design and Production Engineering Unit, on his visit to Mondragon University, Spain

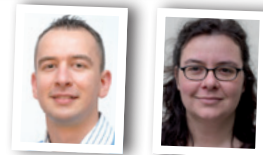
My main research field is the study and modelling of manufacturing processes, particularly machining. I had the opportunity to undertake two research stays at Mondragon University in Spain: one of three months in 2014-2015, and a second one-month stay in 2016. These research stays were carried out in the Lab of Prof. Arrazola, one of the most renowned researchers in this field. This collaboration is now strong, and we ended up working together, along with other Belgian and Basque partners, on a two-year European project that was submitted while I was in Spain.

FPMs Professor visits South West Jiaotong University (China)

Eleven world-renowned experts are involved in the "Talent Introduction and Innovation Base of Railway Engineering System Dynamics" 111 project. The project is led by the Traction Power State Key Laboratory of the South West Jiaotong University (SWJU). This project welcomes selected experts to take part in this Chinese national programme, and aims to attract leading overseas scholars and researchers from the best universities in order to promote academic exchange, research collaboration, and knowledge sharing. Beginning in 2016, Prof. Georges Kouroussis provided a series of interesting lectures in the field of railway-induced ground vibrations, signal processing in vibration engineering, and multibody dynamic simulations. His trip to China was also a great opportunity to visit the facilities of the Traction Power State Key Laboratory (one of the best railway laboratories in China) and to initiate new collaborations with Chinese colleagues. Furthermore, Prof. Kouroussis was able to learn more about the city of Chengdu - home of the giant panda and a place known for its spicy food and lip numbing dishes.



Co-building a New Doctoral Education Framework with the Scientific Community



✉ Prof. Angeline Aubert, Prof. François Ducobu

One of the many actions regularly implemented by the FPMs to support its continuous enhancement is a yearly thematic awayday for faculty staff. The objectives of this day are multi-fold:

- Sharing and pooling of knowledge, experience and best practices.
- Professional development and training in a given field, such as project-based learning in Engineering Education, CLIL (Content and Language Integrated Learning, i.e. teaching a scientific topic in a foreign language), etc.
- Launching a new branch of the FPMs Action Plan.

Some key parameters are at the heart of the awaydays' success, both in terms of staff satisfaction and the efficiency of their outcomes. They are based on key issues effecting the Faculty, usually assessed by way of a **survey** on current practices and needs, and aim to build upon the innovative experiences acquired by those who work and study here. They draw on benchmarking and benchlearning to identify what could be improved... and how! They lead to concrete decisions, commitment from the Faculty and its authorities, and concrete actions on the ground.

In May 2017, "FPMs au vert 2017" was focused on doctoral education and was open to academic and scientific staff (from PhD students, including research and teaching assistants, to senior researchers). Keynote speeches and workshops explored several issues, ranging from research environments to doctoral coursework (offered and required) and quality of supervision. The issue of internationalisation was also central to debates. The continuity of the curriculum development, from Bachelor degree to PhD, can be highlighted in the way the development of advanced scientific skills in engineering is articulated with the development of the student's personal and professional project (ENG'UP!).

From 2018, PhD students at the Faculty of Engineering will benefit from revised doctoral education, taking previous researchers' feedback into consideration, and emphasising academic involvement and international best practices. As a matter of fact, researchers at different stages of their careers, and from various backgrounds, are involved in the working group in charge of designing the new training pathway. For instance, based on a revised qualification framework, and in conjunction with a core of research training by an individual research experience, the PhD programme will be reinforced (noticeably for research integrity and transferable skills), fostering increased mobility and enhanced personal/career development.

The PhD thesis can be seen as a long-term sports contest, such as the Tour de France, a marathon or the 24 hours of Le Mans. PhD students can count on the support of their supervisors (= coach) and family and friends (= supporters). The daily work on research is like an athlete's training, and several championships are organised each year, such as the Thesis Advisory Committee, conferences and publications. As a high-level sportsperson, who juggles sport and study, a research and teaching assistant has to deal with different research and pedagogical tasks.

The "FPMs au vert 2017" survey was specifically focused on doctoral training. To obtain as many responses as possible, the survey was conducted in both English and French. The high response rate (47%), with nearly 20% of the responses in English, and nearly 25% of respondents women, shows that this matter concerns many of the scientists at the Faculty. Respondents cited their interest in scientific research as the main reason for starting a PhD thesis. The desire to have a career in academia was the third most cited reason, even though few academic positions are available.

The scientists stated that they were satisfied, or very satisfied, with their working conditions, and the only negative point raised was the amount of administrative work required. They said they were generally very satisfied with the quality of their supervisor's support, which covers integration into the scientific community, scientific contributions, and general encouragement. However, most felt that they were not prepared enough for their future career.

Approximately 60% of the Faculty's theses are currently written in English. Half of the scientists questioned declared their inte-

rest in writing their thesis in English, mostly because it would facilitate its publication and the international visibility of the work. To achieve this, they suggested that they would need support to improve their level of English, but said that it would be better not to make the English thesis mandatory. Instead they suggested that this should be something to be discussed with the supervisor. At present, workshops in English are organised by the Centre for Modern Languages (CLV), so there are already initiatives in place to answer this need. However, the scientists currently do not take enough advantage of them, mostly due to their having strict deadlines and full schedules.

Nearly 40% of the scientists did not have a mobility project planned or had never been abroad for their studies or research. The mean duration of mobility is around three months. According to the survey, the two main factors preventing a stay abroad were the researcher's family situation (with no significant difference between women and men), and the negative impact it would have on the organisation of the lab. On the other hand, the opinion of the supervisor, as well as the information and the contacts they or the University/Faculty could provide, were found to be favourable factors for mobility. According to nearly half of those who replied, the grants and other financial support available to the scientists was a negative point. To make the sources of this financial support more visible to scientists, a mobility guide with all the necessary information that must be known before going abroad (even for a short stay, like a conference) was written by the board of the scientific assembly in February 2016. The **results of the survey** on this point show that more advertising is needed for this crucial information to be widely known.

“Some key parameters are at the heart of the awaydays' success, both in terms of staff satisfaction and the efficiency of their outcomes.”

RESEARCH STAFF MOBILITY

✉ Prof. Saïd Mahmoudi, Prof. François Vallée

Mobility also concerns research staff. During their thesis, or post-doctoral research, our researchers benefit from several funding possibilities offered by UMONS, or by international collaboration programmes, to develop innovative collaborations with foreign institutions so that they can consolidate their scientific research. Some examples are presented here.

Computer Science Unit Research Team spends one month in Porto, Portugal

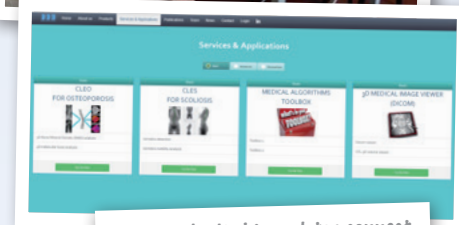
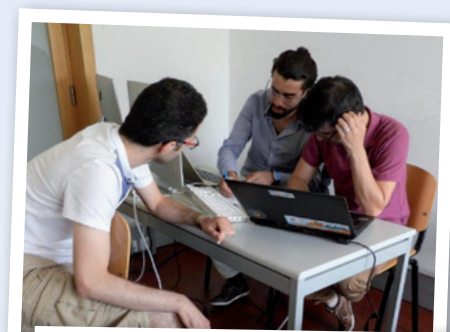
During the summer, from 3rd to 27th July 2017, a research team from the Computer Science Unit, composed of Sidi Ahmed Mahmoudi, Mohammed Amin Belarbi, Mohammed El Adoui and Mohammed Amine Larhmam, participated in the eNTERFACE'17 workshop. This workshop serves to establish a tradition of collaborative, localised research and development work by gathering, in one place, a team of leading professionals in multimodal human-machine interfaces together with students (both graduate and undergraduate). This group then worked on a pre-specified list of challenges for four whole weeks.

The research group formed a team called CTCV (Cloud-based Toolbox for Computer Vision) in order to develop a real time cloud-based toolbox for computer vision applications. This platform integrates an image and video processing toolbox and a 3D

medical computer-aided diagnosis for osteoporosis and scoliosis. Each connected guest, or user, can select the required algorithm from the toolbox or the medical application, load their data and retrieve results with an environment similar to a desktop.

The integrated algorithms and applications can be executed in real time and in a secure way. The related libraries and hardware drivers are automatically integrated and configured in order to offer users access to the different algorithms without the need to download, install and configure software and hardware. Moreover, the platform offers access to the integrated application from multiple users. In terms of security, each connection is secured with SSL protocol and the exchanged data are secured with SFTP protocol and encrypted with an efficient method of data compression.

Experiments were conducted with three kinds of algorithms: 1) An image processing toolbox, 2) a video processing toolbox, and 3) 3D medical methods, such as computer-aided diagnosis for scoliosis and osteoporosis. These experiments demonstrated the interest of this platform for sharing several scientific contributions related to the computer vision domain. The scientific researchers were able to develop and share their applications easily and in a safe way. The address of the developed platform is: <https://bone.media-process.com/>



Users are invited to register, connect, and test our applications.

Anass Rahouti, from the Civil Engineering and Structural Mechanics Unit, spends two months in Auckland, New Zealand

Anass Rahouti has been working at the University of Mons as a research assistant since 2015. An account of his experience in Auckland, New Zealand, follows.

During my studies at the University of Mons, I decided to start a PhD in Engineering Sciences, and by that point I already had the idea to study abroad. I do not know why I was always attracted to the idea of studying abroad, but I have always felt the need to discover other countries, cultures and traditions. I also believe that, as an engineer, having international experience is a real asset. Unfortunately, I did not have the possibility to realise this dream until last year.

I carried out a short-term scientific mission at the University of Auckland (UoA) in New Zealand. I joined an international research team there for two months. This experience is one of the best experiences I have had until now.

From a professional point of view, it increased my knowledge in the field of risk management, and particularly in the fields of evacuation modelling, human behaviour science and innovative training techniques based on Virtual Reality tools. It also expanded my professional network. During my stay, I shared an office with three other researchers from around the world: an Italian postdoctoral researcher, a Chinese researcher, and a Japanese Professor. It was enriching to learn from them.

The objective of my stay was, however, not limited to a temporary research collaboration. I also created a permanent collaboration to allow our Master's students (i.e. architectural engineering and IT engineering students) to have the possibility to carry out their Master's dissertation at the UoA. A Master's student from the IT department is currently at the UoA for a 4-month stay and an architectural engineering student will join the UoA team from September 2018.

From a personal point of view, I have learnt to feel at home very quickly everywhere I go, to make friends, to improve my English, and to adapt myself to the local culture. I often ate dinner with my flatmates, Andres and Tatianna, who were from Columbia and Mauritius, and this allowed us to share lovely moments. I think it was an enormously invaluable experience, and I believe it could prove advantageous for my future work. It has also enriched my life and made me grow as a person.

Bryan Olivier, from the Theoretical Mechanics, Dynamics and Vibrations Unit, visits the University of Wisconsin-Madison in the United-States

As I am currently writing a PhD thesis entitled 'Subsystem coupling using co-simulation methods', I was invited to attend a two-week summer workshop on Multicore and GPU computing and applications in dynamics by the Technical Committee of Multibody Systems and Non-linear Dynamics of the American Society of Mechanical Engineers. The aim of this interesting workshop, which took place at the University of Wisconsin-Madison in the United-States, and which was organised by Dan Negrut and Radu Serban, was to investigate the benefits of parallelisation in the solver-coupling approaches that I am currently studying.

Clément Dutoit and Lucas Equeter, from the Machine Design and Production Engineering Unit, attend a Doctoral School in Paris

From the 23rd to 27th October 2017, we took part in a T.I.M.E.-organised Doctoral School on Vulnerability, Risk and Resilience of Complex Systems and Critical Infrastructures in Paris, which involved professors from Politecnico di Milano and CentraleSupélec. International multidisciplinary working groups were formed in order to further investigate industrial reliability and maintenance issues proposed by the event's industrial partner, AirLiquide.

Simone Gremmo, from the Fluids-Machines Unit, spends two months at Mississippi State University

As a PhD student, I have always tried to prioritise interactions with researchers and professors from other institutions. As such, conferences and symposia are great places to have discussions and start new collaborations. Recently I was able to travel abroad for a conference, where I met a professor from the USA. This professor provided me with some very useful advice for my PhD, so I decided to suggest a collaboration with him, for us to work together on a specific subject. Thanks to this collaboration, I spent two months at Mississippi State University as a visiting PhD student. I am convinced that this has been the most valuable and enriching experience so far in my academic career. Besides learning new methods to improve my work, I worked with other post-graduate students and researchers, and created new professional contacts.

Benoit Vanus, Electrical Engineering, from Mons to Canada

Right from the start, at the FPMs, I knew that an exchange programme would be part of my studies. As I got into my Master's degree in Electrical Engineering, with a focus on telecommunications, optical fibres started grabbing my attention, so I sought a way to study them more. Then, Prof. Wuilpart suggested that I do my Master's dissertation in Canada and have fun with fibres in Prof. Bao's lab. In January 2016, I was on a plane headed for Ottawa to enjoy a real Canadian winter, and I must admit, as cold as it was, I liked it. A few months later, Prof. Bao suggested that I extend my stay and embark on a PhD focusing on fibre sensors. I could hardly refuse this opportunity and decided to stay to further explore this snow-hockey-maple-poutine country. I am currently doing an 8-month placement at Hatch, as part of my PhD, and working on radar system design and fibre-based sensors. Going abroad, and staying there, was one of the best decisions I have ever made. It has opened my eyes to the world's diversity, so experiencing this is something I cannot recommend enough. I have also discovered that

Canada is full opportunities and has a lot to offer, so we will see in 2020 if I decide to stay or not... And even though winter seems harsh, after a while you slowly start thinking: "Oh sweet, only -10°C today, I don't even need my winter jacket!"

Dr Zacharie De Grève, Electrical Power Engineering Unit, Mobility Experience



I consider mobility to be a fundamental component in my life as a researcher, and one which has been ever present throughout my Master's, my PhD, and now, my postdoctoral work. My mobility experience started during my Master's degree in Electrical Engineering at the UMONS Faculty of Engineering, as I did a 1-month summer placement in 2006 and a 4-month placement for my Master's dissertation in 2007. Both of these mobility projects were carried out in Martigny (Switzerland) at the IDIAP Research Institute, a research foundation affiliated with the École Polytechnique Fédérale de Lausanne (EPFL). I also built strong contacts with the Grenoble Electrical Engineering Laboratory (G2ELAB) of the Université Grenoble-Alpes during my PhD (through a 3-month placement in 2011) and my early post-doctoral years (several 2-week stays in 2013 and 2014). More recently, with the help of Dr. Fabian Lecron from the UMONS Engineering Innovation Management Unit, some colleagues and I started to develop a new research activity at the frontier between electrical power engineering and computer science. This led to two research stays at the Universitat Politècnica de Catalunya (2 months in 2016) and at the University of Oxford (one month in 2017), both undertaken with Fabian. These mobility schemes were funded by sources as varied as the FNRS (Fund for Scientific Research), European Erasmus+ grants, and support from our home institution and the host institutions when possible. It is impossible for me to state all the benefits of these placements. Beyond common publications and projects, which are necessary when undertaking mobility programmes, being able to discover other working organisations and experience other cultures was the most rewarding aspect. It was also a great opportunity to meet experts in the field and build long-lasting contacts, who are still part of my professional network, and who I now consider to be friends.



Dr Pierre Bénard, from the CORIA Laboratory in Rouen, visits the FPMs

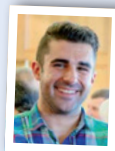
As a French postdoc, I was welcomed at UMONS by the Fluids-Machines Unit and the Thermal Engineering and Combustion Unit for two months (October-December 2017) to work on numerical simulations of reacting and non-reacting flows. Flameless combustion, wind turbine wakes and urban flows were some of the topics covered during this stay. It was a great opportunity to enhance the already productive collaboration between UMONS and the CORIA laboratory in Rouen (Normandy, France).

Dr Johan Jason (Electromagnetism and Telecommunications Unit), a post-doctoral researcher from Sweden



I hold a Master's degree in Engineering Physics from Lund University Sweden, and a PhD in Electronics from Mid Sweden University, Sundsvall, Sweden. I have an industrial background in fibre-optic measurements in telecommunications and sensing thanks to my PhD and my work at Fiberson AB, a Swedish company in Hudiksvall. Research in fibre-optic sensing is extremely limited at Swedish universities; it is studied at one institute and some activities in the field take place in few companies. The company I was working for participated in a COST action on fibre-optic sensing for safety and security. This was very valuable for me, in terms of networking and knowledge exchange, especially in my domain of distributed sensing. During the final year of my PhD studies, I had the opportunity to undertake a short-term scientific mission at the Electromagnetism and Telecommunications Unit of the Faculty of Engineering at UMONS. When I was asked, three years later, if I was interested in a postdoc position on a project in the Unit, it was, in many ways, easy to decide to return. The project, with Alstom as industrial partner, aims to develop a distributed sensor system for conditional monitoring of railways. The combination of academic research with an industrial application is perfect, and the experience and knowledge I can develop here is very important for my future career.

Dr Daniel Ainalis (Theoretical Mechanics, Dynamics and Vibrations Unit), a visiting post-doctoral researcher from Australia



My name is Daniel Ainalis and I am Postdoctoral research fellow working in the Department of Theoretical Mechanics, Dynamics and Vibrations under Prof. Georges Kouroussis. I have been at the University of Mons for two years working on a recently funded project focused on blasting and vibrations, titled BlaVib. I grew up in Melbourne, Australia, where I completed my Bachelor's degree and Ph.D. in Mechanical Engineering at Victoria University. I have long held the ambition to become an academic and after I completed my Ph.D., I knew the next move for me was to further my research experience and skills in Europe.

I found the Postdoctoral position via the Euraxess portal in 2015, and after submitting my application I was shortlisted for an interview. By chance I was already going to be in Europe during that time for a conference in Spain, and I jumped at the opportunity to meet Georges and the team to discuss my suitability for the project. I had received a couple of other offers, however the opportunity to be involved at the beginning of a new project and have an impact on its direction and focus was particularly appealing. The UMONS offer was the standout to me, and I accepted. I began my Postdoctoral position in November 2015 on the BlaVib project. The aim of the BlaVib project is to develop better simulations using advanced engineering tools and approaches to ensure that urban areas are not subjected to dangerous ground vibrations. This interdisciplinary project also involves members from the UMONS Geology and Mining department, and also industry partners.

During my stay in Belgium I have lived in Mons and Brussels and found the country, the people, and the culture to be endearing. I have learnt a lot about the fascinating history of Belgium, and it is a country that I will always have great fondness for. If I had to pick one thing about Belgium to tell a foreigner, it would have to be the amazing variety

of beers – the only problem is that two years is not enough to try them all!

Professionally speaking, one of the highlights of my time at UMONS has been the opportunity to work with Prof. Georges Kouroussis. Not only did Georges (and the entire department) do everything he could to make me feel at home, but he also has a good reputation in the international research community and I was fortunate to be able to learn a lot from him during my time. Georges was also encouraging about other research work and supported me in working on some other projects focused on railway and heavy vehicle dynamics.



The BlaVib project is only in its beginning phases and will continue beyond my stay, and I have been working closely with Loic Ducarne over the past year, a local Ph.D. student. To date, several internal technical reports have been produced, establishing the state-of-the-art and identifying avenues for further research. We have published two journal papers and two peer-reviewed conference papers within the BlaVib project, and further publications are currently being worked on. Our research has been presented at international conferences in Athens and London, and we have published in high-profile international journals such as "Science of the Total Environment".

Moving forward, I recently accepted a position as a Research Associate at Imperial College London in the Centre for Transport Studies, where I will be evaluating the effectiveness of a recently developed energy recovery system that is currently being installed on heavy goods vehicles for pilot trials. Despite moving on from UMONS, I have already planned to maintain close contact with Georges for future research projects and we already have several publications currently being reviewed / prepared for submission in blasting, railway, and truck dynamics. I look forward continuing tackling challenging engineering problems with Georges and the team in the future. I will always look fondly back on my time spent at UMONS and the people I have met, and I hope these relationships continue to grow stronger as I further my own research career.



ADD A STRING TO YOUR BOW WITH A DOUBLE DEGREE IN ENGINEERING THROUGH THE T.I.M.E. NETWORK

✉ Prof. Pierre Dehombreux, Dean



Different student mobility schemes have emerged over the last decades, from short-term internships in companies abroad to full academic Master's degrees jointly organised by 3 or 4 partner universities. One of the most attractive opportunities for students is to obtain a double degree given by two complementary engineering schools. With the investment of one additional year of study, students are admitted to two selective engineering schools and are challenged on a wider variety of scientific, technological and human skills.

The T.I.M.E. Association, which stands for Top Industrial Managers for Europe, was founded in 1989 and is the oldest European network of engineering schools. The Faculty of Engineering of the University of Mons was among the first members, joining in 1993. The T.I.M.E. Association promotes graduate student exchanges and double degrees throughout Europe and the world to enable students to achieve a broader, high-level scientific engineering education with an in-depth intercultural experience.

Today, T.I.M.E. is a network of fifty-five engineering schools, faculties and technical universities, not only from Europe but from around the world, with Brazil, China, and Japan among its associated countries. All members are leading institutions in their own countries. All have a strong international dimension in their research, teaching and industrial relations, and all are committed to international cooperation, exchange and recognition of overseas courses of study. The association only welcomes new members under strict conditions and really stands as a network of excellence. T.I.M.E. membership is a quality label for the reciprocal academic recognition among their members.

“The main advantage of the double degree is to extend one's network to a global level, leading to international and multi-domain job opportunities.”

Emilien Bredael, T.I.M.E. Alumni (Centrale Paris)
Tactical Planning Support Engineer
at ArcelorMittal France

The main partners of the Faculty of Engineering of the University of Mons include the French Grandes Écoles : Centrale / Supélec (Paris, Lille, Lyon, Metz, Nantes, Marseille), Institut Supérieur d'Aéronautique et de l'Espace – SUPAERO (Toulouse) and other prestigious schools, such as the Politecnico di Milano, Universidad Politécnica de Madrid, Technische Universität Wien, Doshisha University (Kyoto) and the Universidade de São Paulo. Leibniz Universität Hannover and Polytechnique Montréal are expected to join the list in the near future.

The students involved in such double degree programmes are selected on the basis of their academic results, personal motivation and commitment. They usually spend four years at their home institution and two years at the host university. They get the benefits of any long international stay: an opportunity to master another language, access to complementary courses and training, exposure to different study methods and learning approaches, and the ability to work in intercultural environments. A double degree provides the students with in-depth personal training and development, which will enrich their initial curriculum and increase their employability for top positions in international companies.

About 6 outgoing students and 5 incoming students are involved in T.I.M.E. mobility activities and pursue double degrees at Master's level each year.

SUPAERO in Toulouse is one of the preferred destinations for students in mechanical and electrical engineering. The Faculty of Engineering of the UMONS attracts a significant number of students from the Écoles Centrales in architectural engineering, thanks to its balanced offer of design and technical courses (energy, structural stability), etc.

The activity of the T.I.M.E. Association is not restricted to student mobility. As a network of top engineering schools and faculties, it is an active think tank, determined to make real progress on the key challenges in engineering education: innovation for training students and graduates, use of open and distance learning in engineering education or strengthening academy-industry partnerships.

Doctoral education is also involved. Three of our assistants have been invited to a T.I.M.E. Doctoral School on Vulnerability, Risk and Resilience of

Complex systems. In July 2018, a Summer School will be open to students and professionals from all over the world so that they may interact and work in the field of sustainability and global economy.

“The main advantage of double degree is that it opens the doors to a career in a big multinational company, such as Airbus, thanks to the very well reputed status of the ISAE SupAero diploma in this company.”

Vincent Foucart, T.I.M.E. Alumni (ISAE SupAero)
Airbus Future Projects

Our most motivated and brilliant students are encouraged to apply for this outstanding double degree programme. Most engineers are destined to become managers. Although T.I.M.E. members focus on scientific and technical research and training, the humanities are also represented and, in this respect too, the T.I.M.E. double degree plays a vital role. What better way to develop as a person than to study abroad for a significant period, in a different language, alongside students from a variety of backgrounds? Intercultural skills and adaptability are vital in today's world and will become even more so in the future. The T.I.M.E. profile corresponds exactly to the high-potential, internationally aware and mobile young graduates companies seek to recruit and develop to become the leaders of tomorrow.



FPMs Architecture Department and IMT Alès (FR)... success story?

✉ Prof. Laurent Van Parys, Coralie Avez

Six incoming students, two outgoing students, and one PhD focus on a fresh, new academic collaboration between two historical mining schools.

Established almost two centuries ago, the Mining School of Mons (1837) and the Mining School of Alès (1843) appeared in the same context, and with the same goal: to help the expanding and flourishing local coal mining industry.

Over the decades, both schools successfully showed their ability to evolve and adapt to new challenges, all the while maintaining their original and common spirit. The Belgian school is now part of UMONS (FPMs), while the French school has joined the IMT – Institut Mines Télécom.

The IMT of Alès awards 200 engineering degrees per year, specialised in fields as broad as “Engineering and Management of Complex Systems”, “Mining Engineering and Management of Mineral Resources”, “Eco-innovation and Advanced Materials Engineering”, “Civil Engineering”, and “Environment, Energy and Risk Engineering”.

The shared history of these two schools is paved with collaborations and exchanges in various fields (chemical engineering, mining, industrial risk management, etc.). Today, this symbiosis has achieved an unprecedented level of cooperation, through the development of a joint degree in the field of construction, architecture and urban planning.

This initiative arose in 2012, as the prolongation of a joint research project conducted by the UMONS Research Institute for Energy under the supervision of Prof. Marc Frère.

Effective since September 2015, this collaboration is done in the spirit of the Bologna decree, promoting student mobility and exchanges within Europe. One of the opportunities offered by this programme is for students to finish their degree at another university than the one they started at.

This is the option offered through this particular partnership. After four years at French universities, selected students join the Master degree in Architectural Engineering at the FPMs, with a special focus on energy efficiency. The number of students who can join the programme is limited. Students are selected through a competition process in their home institution, and then must do a preparatory one-year degree at the host university. This way, they graduate with both degrees (a so-called joint degree) after seven years of studies (4 + 3 years).

The same applies to students from the FPMs (architectural engineers with a focus on structural stability), who may complete their education with in-depth learning of geotechnics and hydraulics.

Since this educational programme brings together students from different parts of Europe, it generates enthusiasm regarding mobility and experiences abroad. That is the reason why so many graduates



with this joint degree start their career holding international positions and/or in major companies (Paris Airport, Kenzo, etc.).

The implementation of the joint degree has, of course, been simplified by the solid relationship between the members of the academic staff from the relevant departments at both institutions, and by the recent re-organisation of the Architectural Engineering curriculum offered at the University of Mons. The new sequence and division of courses makes the departure of outgoing/arrival of incoming students in the middle of the course easier.

Now that the system is up and running, selected students from both faculties can find that this collaboration provides them with the opportunity to acquire new skills and reinforce their professional qualifications.

Could this collaboration be the first in a long series of success stories?

Alexandre MEGRET



Studying abroad is a unique opportunity. When I heard about the possibility of doing an exchange, I knew that I had to do one. My questions were: How long? Where? When? Through my Master's degree in Chemical Engineering and Materials

Science, it was possible to do a T.I.M.E. exchange (Top Industrial Managers for Europe), which is a double degree exchange programme, and it entails doing one year at the home university and two years abroad.

I decided to study at the Technische Universität Wien in Austria. On their Materials Science Master's programme, more or less 50 percent of the lectures are in German, so I went in Vienna during the summer before my first year in order to attend intensive German classes. This month allowed me to have a first contact with the city and to improve my German, which was not very good at the time.

I am usually asked why I chose Vienna. Firstly, I had received some advice from a friend who had

studied there, so I knew that the quality of education was great. Secondly, and above all, I wanted to improve my language skills. Germany has a lot of research centres, and German is usually used there, so I knew studying in Austria, in German, would be the best way to pick up the language quickly. As doing a T.I.M.E. exchange means studying for an extra year, I attended some lectures, and did some practicals, that I would not have had here in Belgium. In other words, I have enhanced my training through this T.I.M.E. exchange.

Another good reason to do an exchange is that you can build a professional network. For example, for my current work, I was looking for collaborations with foreign labs, and a professor I had in Vienna kindly put me in contact with people I am still working with today.



INTERNATIONAL RELATIONS AND INTERCULTURAL COMMUNICATION FOR ENGINEERS



✉ Prof. Pierre Dehombreux, Prof. Adrien Jahier, Prof. Alice Safar

In the Age of Discovery, when the first circumnavigation of the globe was achieved in 1522, there were approximately 500 million people in the entire world. There are now over 7.5 billion people and the globalization process puts an increasing number of people belonging to different cultures in contact.

In today's global business environment, understanding international relations and cultural issues has become essential for the successful management of engineering projects.

It is vital to make engineering students aware of this development. Therefore, new and original courses have been added to the curriculum of engineering students at the Polytech Mons: International Relations and Intercultural Relations.

International Relations

The purpose of the International Relations course is to introduce students to some of the broad themes of the field, and provide the students with methodological and practical tools to understand and evaluate arguments about contending issues in international affairs.

International Relations embrace international law and regulations, international institutions and organizations and various geopolitical aspects with a special focus on demographic growth, control of natural and energetic resources, transportation, and migration.

This means that the study of international relations must focus on interdisciplinary research that addresses, anticipates, and ultimately solves public policy issues.

It has been said that if the human race were to be wiped out in the next 50 years it would not be because of disease or an asteroid hitting the Earth, but because of foreign policy and international relations. Throughout the world, hundreds of conflicts are raging, thousands of nuclear weapons are stockpiled while thousands of people die each day from poverty caused by the way the international system operates. These are only some of the reasons why everyone should have the opportunity to study International Relations.

The course will encourage students to examine the effect of globalization and international economic integration on industries and the links between national economies, military power and security.

Students will also consider how globalization affects these links, and will assess differing national policies for technology and innovation. The course will also include some discussions on important topics, such as technology transfer, the social construction of information technology, and the institutional power of the internet, but to name a few.

Intercultural Relations

The Intercultural Relations course will help future engineers to cope with different cultures in the workplace. More precisely, its goal is to develop increased intercultural awareness and overall intercultural openness. The course is based on an enriched pedagogical approach combining lectures, case studies (German, Russian, Indian, Chinese, Japanese cultures), and group discussions. As such, students will develop new skills in intercultural communication and reach the following goals: understand the power of culture in a communication process, acquire the capacity of identifying cultural differences, identify what the obstacles are to efficient communication, and develop tools for creating a common communicative ground.

Understanding international relations and successfully managing intercultural communication can provide real advantages for the success of global-scale industrial projects. This is a key issue for the economic growth of our small country, which is still one of the top 15 importing/exporting countries worldwide.

Whatever their activities could be, engineers will work in international and multicultural professional environments. The students are encouraged to discover other cultures and practices with mobility programmes or double degrees. The new courses, taught in English, provide an additional comprehensive measure to acquire international skills. Polytech Mons is particularly proud to demonstrate its ability to include original teaching activities that correspond to the needs of today's world in the engineering curriculum.

PRESENTATION OF MS. ALICE SAFAR

Alice Safar has been a lecturer at University of Mons since 2004. She holds Master's degree in International Law and Linguistics and is currently completing her PhD on semantic technology use in diplomatic negotiation.

Her domains of expertise are, among others, international relations and law, diplomatic negotiation, linguistics, information technology and political speech analysis.

Apart from her duties as lecturer, Ms Safar is in charge of project implementation at the EU Commission DG SANTE.

PRESENTATION OF DR ADRIEN JAHIER

Adrien Jahier has a doctorate in Communication and Information Sciences from the University of Toulouse (France). His PhD thesis focused on NGO advocacy around EU institutions in the field of climate change mitigation. He also teaches at ULB and IHECS. His work has been published in several peer-reviewed journals. Dr Jahier has worked for different research bodies and institutions, including the French Ministry of Defence and the geopolitical TV show "Le dessous des cartes" (Arte).



Academic Cooperation with the D.R.C. in the Field of Applied Sciences



✉ Prof. Jean-Pierre Tshibangu

Until the late eighties, Belgian cooperation partly funded the operation of the Democratic Republic of the Congo's three state universities: Kinshasa (Unikin), Lubumbashi (Unilu) and Kisangani (Unikis). After a break in the nineties, the challenge was huge when cooperation started again in 2001. The first PhD student arrived at the Mining Engineering Unit in 2002, thanks to funding from the UMONS Faculty of Engineering. Then Unikin and Unilu benefited from a CUI (Cooperation Universitaire Institutionnelle) programme for the period 2003-2007, which was intended to refurbish the universities' infrastructure and give some grants for PhD research and career development for Professors. Meanwhile, bilateral cooperation by means of CTB (Coopération Technique Belge) developed a programme for funding PhD theses.

During the early two thousands the interest in mineral resources increased in international markets. This appeared to be an opportunity for the D.R.C., and particularly for Katanga province, where large copper and cobalt orebodies occur. For Unilu, one of the main objectives of the CUI programme was to contribute to the development of the province and the country through mining potential.

In the framework of the CUI programme, the creation of the Mining and Geology Pole, under the supervision of Prof. Tshibangu, was a major step in the development of local skills. New laboratories were created and existing ones were updated. There was also investment in computerisation, career development

activities for academics and technicians. The organisation of an electro-mechanical option in applied sciences was also built. Several assistant teachers from Unilu came to Belgium for their PhD theses. They have got now academic positions in the D.R.C. In addition, a joint publication (Annales du Pôle Mines-Géologie) in 2007 encouraged young researchers to publish their scientific work. The Mining and Geology Pole activities ran until March 2014 allowing for many PhD theses to be undertaken.

A colloquium was also organised in Lubumbashi in 2010 with the participation of companies, and political and administrative representatives.

The University of Mbuji-Mayi represents another interesting experience of cooperation in D.R.C. under the initiative of the Mining Engineering Unit of UMONS. This university was created in the nineties, and offered a good level of teaching, thanks to the financial support of Miba, a diamond mining company. Thanks to CUD funding, Prof. Tshibangu created a materials laboratory in 2007 in a partnership between UMONS, ULiège and UCL. Three PhD theses were also funded. However, owing to some financial problems encountered by Miba, the organisation of a conference for the restructuring of the University led to the appointment of Prof. Tshibangu as the Rector for a transitional period of two and a half years.



Artisanal process



Despite its huge mineral resources, development in the D.R.C. is still a challenge and the academic community can play a major role in this process. Since 2001 cooperation programmes have shown an improvement in the infrastructure and the training of new scientists and academics. There is still today a strong relationship between the universities of Lubumbashi and Mbuji-Mayi and the Mining Unit of UMONS.

Vietnam-Belgium centre for corrosion protection of metals



✉ Prof. Marjorie Olivier

Over a period of 15 years the Materials Science Unit has acquired recognised skills in the synthesis of materials and sol-gel surface coatings, which are used to replace hexavalent chromium-based coatings because of their toxicity and carcinogenic properties.

Having become an expert in selecting corrosion inhibitors and using electrochemical techniques, the Materials Science Unit has developed new environmentally friendly conversion treatments, as well as adhesion promoters. It has also specialised in the development of protective coatings that are self-healing, anti-bacterial, do not show fingerprints, and are durable.

Within the framework of cooperation and development, the Materials Science Unit is helping to create a skills centre at the Institute for Tropical Technology in Vietnam (Hanoi) which develops environmentally friendly surface treatments for protecting metals. The project has been awarded financing, for the period 2013-2018, by the ARES/PRD project. The Centre, which officially opened on 8th April 2015, has acquired modern devices to synthesise nano-size additives in order to evaluate the corrosion protection of coatings by measuring their mechanical and electrochemical properties. The Vietnamese researchers come to Belgium for six months (for PhD students) or one week (for the experts) every year to prepare their PhD theses and participate in research and training

activities at the University of Mons (UMONS) and Université Libre de Bruxelles (ULB).

Three PhD theses will be defended in 2018, two at UMONS, and one at ULB.

Each year, as a professor, I provide training courses in Corrosion Science and Electrochemistry in Vietnam. Those who follow the training are Master students, PhD students and industrial partners, who all have activities in corrosion science and surface protection. This cooperation project has been extremely rich in scientific exchanges, as well as in human ones between people with different cultures, approaches and lifestyles.

Collaboration between the University of Mons and the University of West Bohemia in Pilsen



✉ Prof. Olivier Verlinden

The University of West Bohemia (UWB) in Pilsen was founded in 1949 as the Institute of Technology, a branch of the Czech Technical University. It became independent in 1953, merged with the College of Education in 1991, and officially adopted its present name. The UWB has developed progressively over the years and now consists of nine faculties (Mechanical Engineering, Electrical Engineering, Applied Sciences, Economics, Education, Law, Philosophy and Arts, Art and Design, Health Care Studies) and one institute (Language Studies). The University has about 2,000 employees and 12,000 students, among which 4,000 are studying engineering. A total of six internationally recognised research institutes have been initiated by the UWB.

The universities, and the cities, of Mons and Pilsen share several characteristics. Mons and Pilsen are medium sized cities, and were both chosen to be European Capitals of Culture in 2015. Both universities are spread throughout the city in several independent buildings, although more recent sites and research centres are located on the edge of town. Research is organised in institutes. At UMONS, research institutes correspond to generic research domains involving departments from various faculties. UWB's research institutes are more directly linked to specific faculties, for example the NTIS (New Technologies for the Information Society), RICE (Regional Innovation Centre for Electrical Engineers) and RTI (Regional Technological Institute) originate

from the Faculties of Applied Sciences, Electrical Engineering and Mechanical Engineering, respectively. Both universities are user-friendly, with active student associations, and both organise a specific welcome for their international students. Last but not least, Belgium and the Czech Republic share the same tradition of beer brewing and... drinking. More specifically, the famous Pilsner-Urquell brewery, employing 2,000 factory workers (the largest in the Czech Republic), is one of the most visited tourist spots in Pilsen.

UWB and UMONS collaborate in different ways. In 2014, UWB and UMONS signed an Inter Institutional ERASMUS+ agreement, motivated, on each side, by the desire to promote the international mobility of students by increasing reciprocal attractiveness. In parallel, WBI (Wallonia-Brussels International) granted a first collaboration project running from 2014 to 2016, which was renewed for the period 2017-2019, between the Theoretical Mechanics, Dynamics and Vibrations Unit of UMONS and the UWB Faculty of Science's Department of Mechanics. The purpose of the project, entitled "Development of student exchanges through research into the dynamics of mechanical systems", is to encourage students to do their Master's dissertation at the partner university and, in some way, to contribute to the research activity of the host university. In practice, a delegation of two professors spends about a week each year at the partner university, in order to prepare and promote exchanges, as well as to get a better

“ The University of West Bohemia has about 2,000 employees and 12,000 students, among which 4,000 are studying engineering. A total of six internationally recognised research institutes have been initiated by the UWB. ”

understanding of the teaching and research activities of the partner, and the industrial fabric of the host region. Up to now, only one Belgian student and one Czech student have completed such an exchange, but we can reasonably hope for more participation in the future. The agreement also provides the opportunity for publishing common papers for conferences.

Beyond the good relationships between the staff members, who regularly meet at international conferences, the University of Pilsen is interesting for several other reasons. The University has brand new buildings and modern research centres, thanks to European funding. Moreover, the city hosts several industrial plants, including Skoda, which collaborate intensively with UWB and contribute to applied research. Although Skoda cars are no longer constructed in Pilsen itself, they are still very active in transportation and energy.

From 2018, a new international experience will be offered to the students in the form of mechanical projects to be completed by international teams. This activity is essentially coordinated by the Machine Design and Production Engineering Unit on the Belgian side (Prof. Edouard Rivière) and the Faculty of Mechanical Engineering on the Czech side. During the academic year 2017-2018, two students will collaborate on the design of a grease hose bending machine. Larger teams will be established after this first experience.



POLYTECH MONS ENGINEERS AROUND THE WORLD

Many engineers from Polytech Mons spend (part of) their whole career abroad, and contribute to enhance the reputation of our Faculty at the international level. Some of them talk about their experience.

The International Section of the AIMS Polytech Mons Alumni

✉ Pierre Dupont, Polytech Alumni



Since AIMS – or “Association des Ingénieurs de la Faculté Polytechnique de Mons”, an association which gathers Polytech Mons alumni – was launched by A. Devillez in 1853, our engineers have crossed seas and borders and spent their careers abroad, both in neighbouring regions and much further afield. As such, they have had a lot of influence, developing industrial projects in countries with high economic potential and being committed actors of cooperation and development projects.

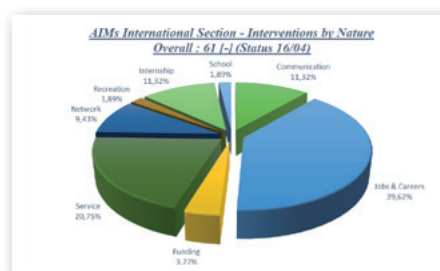
Following some requests from our foreign-based members, and also as a result of the fact that almost 8% of the total number of AIMS members are living and working abroad (77% in EU, 8% in Africa, 7% in the Americas, 6% in Asia and 2% in the Pacific), we decided to reserve a specific space for our expatriates, which reflects the open-minded and adventurous spirit that has always driven our association. Along with the need to answer different questions related to the globalisation and internationalisation of a career in engineering, the path our students have taken was surely another key reason to launch the “AIMS International Section” in 2014. Some of the questions that have come up so far on our desk at 9 Rue de Houdain in Mons include: “What do I have to think about while planning a business trip to Mexico?” / “Are there any AIMS members in Japan that I can meet near Tokyo?” / “How much will it cost if I move from the UK to the Netherlands, and what about social security?” / “I would like to do an internship in Latin America, are there any offers in Buenos Aires?” / “After

graduation I would like to improve my English in the States, can I start working as a professional engineer without any problems?” And ... we give answers!

In order to do this, we pool our knowledge from our AIMS engineers based in more than 28 countries around the world, and we have created an “Ambassadors Platform” that supports us answering many of our members’ questions.

We have defined five basic missions to be fulfilled by our volunteers, depending on their schedules and free time. More information on these main missions can be found on our website: www.aims.fpms.ac.be.

With no fewer than 31 ambassadors, 2 local correspondents, 3 ambassadors for international institutions, such as the EU, BEI and SHAPE, we handle an average of 62 interventions per year. It is interesting to note that nearly 67% (+23% in 2017) of our interventions supporting AIMS members are mainly for questions about travelling, working, or doing business and internships outside Belgium.



and/or local head-hunters that want to get information from our database while looking for those with specific experience or for emerging professional candidates. In that matter, due to strong local partnerships, we also provide 100 international job offers a year in different disciplines, mainly covering the USA, Canada, China, India, Australia and Germany.

What about the future? Knowing that the question of internships is, and will remain, a strong topic for the future (because it is a great source of job opportunities), the International Section is currently working on an “International Database of Internship Offers” that will be made available to the Faculty. Another topic is devoted to architects, as we would like to improve our contact with big civil engineering companies in North America. A third objective is the improvement of our “Lifelong Learning Offers Database” where AIMS can find different formal and non-formal ways of improving and sharing/promoting their knowledge (conferences, seminars, webinars, etc.).

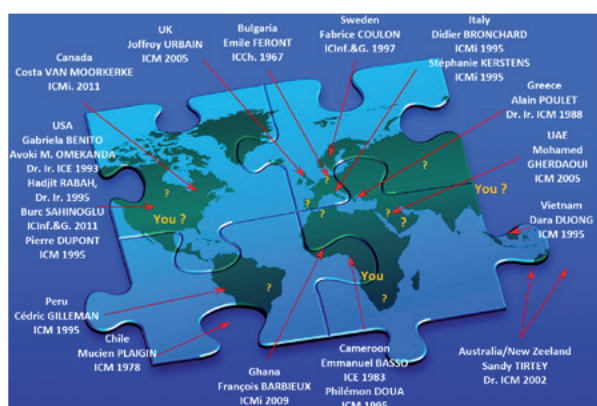
Last but not least, because the number of yearly interventions seems to be increasing, we will surely need more collaborators! Every contribution is truly welcome, so feel free to contact us if you think you can help in any way!

THE “AIMS INTERNATIONAL SECTION” IN NUMBERS:

- Between **8% and 10%** of all AIMS members abroad
- 28** countries around the world
- 5** basic missions (data management, education, jobs & careers, educational support, recreation)
- 31** ambassadors
- 2** local correspondents
- 3** ambassadors for international institutions
- 2** chairmen of international professional societies
- 4** administrators of international technical committees
- 7** peer reviewers of international journals
- 62** interventions a year

AIMS Polytech MONS Alumni, International Section
For the attention of Pierre DEHOMBREUX
and Pierre DUPONT

www.aims.fpms.ac.be – aims.international@umons.ac.be
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About 24% of the questions asked concern people abroad who want to inform Belgian residents about their activities, or who are looking for Belgian partners/subcontractors. Some questions relate to members who are suffering from homesickness and want information, job offers or support so that they can come back to Belgium.

In addition, 9% of our interventions are linked to international

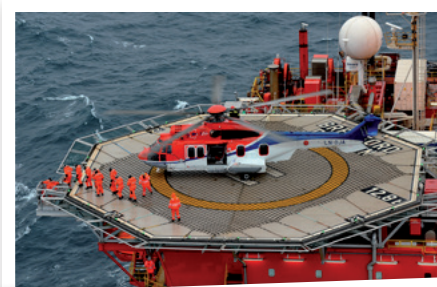
☒ Marie-Laure Wattiez, Geology and Mining Engineer

What if you could go to work in a helicopter, flying at high speed and low altitude, above the fierce grey waves of an ice-cold sea? What if you were to meet customers in the vast plains of Kazakhstan to discuss a one million dollar project? What if you were to see Ankara by night? How does it feel to stay in a five star hotel in Budapest, before heading to the wild and rough landscapes of the Carpathians? As your speedboat approaches the floating drill rig set in the mangroves of Borneo, are those signboards saying 'beware – crocodiles' for real? How much saffron can you buy with a million manats, in the market of Ashgabat?

Not all of us dream of adventure, but as I finished my studies, I just knew I wanted to travel. I wanted a job that would bring me something different, where I would feel my contribution would matter. After three months training with a diamond drilling tools company in Belgium, I packed my bags and

started a thirteen-year-long journey that would take me all over Europe and to countries I hardly knew existed. This really put everything I thought I knew into perspective. The technical responsibilities entwined with the intense human bond that brings people together on large projects.

I graduated in 2002 as a mining engineer, and spent nine years in several positions related to drilling operations for oil and gas wells. I spent two years in Dubai as a technical instructor, then moved back to Scotland to support steel tubing installation for some of the deepest wells drilled by BP in the North Sea. The large scope of technical and soft skills I had learnt at the FPMs proved invaluable. I now am working on a PhD in rock mechanics, as I decided to see what it is like to teach at a university. Life is a learning curve and if you have a thirst for a challenge, being a mining engineer is a great place to start!



☒ Alaleh Motamedi, Mechanical Engineer



Born in Iran, I moved to Belgium at 15 years old. However, in 1994, after my graduation from Polytech Mons, a new unexpected life started for me.

At 25, after 2 years with an engineering company, I left Brussels for Abidjan to join my other half, Frederic Beghain, also an Engineer from Mons, who had started working for ABB. Following your husband is usually not a good career choice, but an engineering degree opens up your options.

I started working as an engineer at the World Bank in Abidjan, working on transport and urban development projects. This was a fantastic way

to learn about the basics of investment projects in a developing country.

Four years later, Frederic was offered new challenges first in Istanbul, Turkey and then in Manchester, United Kingdom. It was an opportunity for me to start the Euro*MBA programme, while working as a consultant on different international projects and enjoying my recent motherhood.

In 2004, I was offered a position at the World Bank in Morocco as project procurement specialist. Project procurement is an essential part of the implementation of public investment projects. It consists of ensuring that contracts are procured in a way that delivers value for money. The challenge is even more interesting on large investment projects requiring international competition. It's a job for engineers: it requires a combination of ana-

lytical skills and technical, legal and commercial know-how on an international level.

Three years later, I was taking charge of the North African portfolio, based in Washington DC, USA. In 2009, I moved to a more strategic position in the Policy Unit, working on staff training and the monitoring of an annual portfolio of 11 billion U.S. dollars, covering everything from metro lines in Brazil to power plants in India.

The latter post opened the door to my latest challenge in Luxembourg. Here I work for the European Investment Bank, which is the bank of the European Union and the largest multilateral development bank in the world. Since 2014, I have been working with the head of procurement on an annual portfolio of 70 billion euro of investment projects worldwide. Is this our last international move? Never say never!

☒ Antoni Loche, Geology and Mining Engineer

My name is Antoni Loche. I completed my Master in Geology and Mining Engineering at the Faculty of Engineering in 2010. A few months later, I joined HeidelbergCement, one of the world's largest building materials companies, also known as CBR in Belgium. I was hired as a mining engineer and geologist for the Africa Technical Department based in Brussels. My function is to provide operational support to African countries (± 12 countries), and technical support for the different projects in Africa when it comes to raw materials. The scope is pretty vast, as it includes everything from exploration to mining, including crushing. Indeed, my degree

in Geology and Mining Engineering gives me the advantage of being able to work in both domains, which is pretty rare. However, this position requires significant flexibility, because I need to travel to Africa frequently, as I have about 15 missions a year and spend an average of 120 days abroad. Business travel can be a chore for many, but I find that it has many benefits for me. I enjoy the fact that I can work in a different environment and deal with different cultures. Additionally, I get to meet new people from different backgrounds and continuously learn from them, and I particularly like travelling to Africa because it is an amaz-

ing continent full of surprises. Moreover, working abroad can help you develop your adaptation skills and expand your working horizons.

You definitely avoid a monotonous routine and it is a fast track to career progression. Finally, you evidently end up with many stories to tell your family and friends!



☒ Caroline Steinfort and Arnaud Lust, Mechanical Engineers

Caroline Steinfort and Arnaud Lust are both mechanical engineers from the Faculty of Engineering in Mons. Caroline works in the oil and gas sector (TD Williamson) and Arnaud works for a steelmaking company (NLMK). In 2013, Caroline had the opportunity to move with her company to join the Engineering Office in Stavanger, Norway, where she became the Operations Engineering Manager. Arnaud then left his position as Supply Chain Manager to become the Sales Manager for Nordic countries for NLMK. In making this move, they had the opportunity to discover a new country, with its different culture, with their two children. The change of scenery was radical: climate, language, work organisation, etc.

In Norway, communication is flawless because most people, inside as well as outside the office

environment, speak English fluently. Their children are enrolled at the British school in the city where they have contact with a lot of different nationalities (Japanese, Brazilian, Canadian, Australian, etc.).

In Norway, the organisation of the working day leaves time for family life, which may explain why Norway is ranked as the best country on the human development index (indicator of wellbeing established by the UN).

In spite of the harsh climate (more than 200 days of rain per year in Stavanger), it is a great place for doing hikes to appreciate the beautiful scenery (mountains, fjords, glaciers, etc.).

Their wonderful experience will be over soon, as Arnaud will come back to Belgium to become the



Supply Chain Director at NLMK, and Caroline will follow to take on the role of Key Account Manager in Nivelles.

Interview by Prof. Edouard Rivière-Lorphève

MINING ENGINEERING TEACHERS OF OUR FACULTY INVITED TO FRENCH INSTITUTIONS

☒ Prof. Philippe Ancia



Since the end of the 20th century, most of the mines in France have been closed (coal and metal mines). Some mines only remain open for industrial minerals, such as talc in Luzenac, and micas, kaolin and andalusite in Brittany. However, many opportunities exist and challenges still arise in relation to mining.

Quarries for aggregates, cement raw materials, dimensional stones, etc., are still very active and need more and more mining-related skills (planning and optimisation, mitigation of vibrations during blasting, environmental aspects, such as water management, etc.).

The closure of mines during the 20th century was carried out without long-term considerations. This has led to many problems today and impacts on human activities and the environment. Examples of some of the problems encountered include subsidence and ground collapse, water spillage, acid rock drainage, heavy metal contamination, and radioactivity.

Furthermore, new challenges have arisen over the past decade. We need access to raw materials – minerals and metals – in order to produce the goods needed by our society for buildings, roads and new technologies (IT, windturbines, solar panels, electric vehicles, etc.). The latter requires very specific materials, such as Rare Earth Elements (REE), and Indium, Cobalt, and Lithium, which are very strategic because they are essential, no substitutes are available, and they are currently produced in a very limited number of places around the world (97% of REE are produced in China). For this reason, the European Union, through its Horizon 2020 programme, promotes the surveying of remaining deposits, and new sources, of mineral resources in Europe. In many European countries, new prospecting permits have recently been granted with the possible opening of new mines. However, it has also been realised that waste, and end-of-life goods and devices, can be the source of materials (metals, plastics, etc.), and the recovery of certain materials can be achieved

with techniques close to the techniques used in the processing of ores (urban mining).

Due to the closure of mines, most French higher education institutions involved in mining related training have stopped their activities in the domain and turned to other domains, such as material sciences (ceramics, plastics, etc.). Consequently, they have lost people with key knowledge in mining activities. Now, they need teachers to provide courses and help to train engineers to be able to take on the opportunities and challenges described. This is the reason why teachers from the Mining Engineering Unit of our Faculty have been invited to give courses in several higher education institutions in France. Jean-Pierre Tshibangu is in charge of courses at the University of Nancy (open pit and underground mining) and Philippe Ancia has been involved in courses at the University of Lille-Villeneuve d'Asq (waste management and recycling) and at the École Nationale Supérieure des Mines d'Alès (treatment of polluted soils).

A CAREER AT THE FACULTY OF ENGINEERING

Talented researchers and teachers from other institutions and countries are always welcome to apply for a position at the Faculty of Engineering of UMONS. Three of our colleagues, who decided to build their career in Mons, tell their own stories. In their mother tongue, please.

Maurice GONON, from France

**Associate Professor - Service de Science des Matériaux (Materials Science Unit)
Head of the research activity on ceramics and glasses**



Mon arrivée à la Polytech remonte au 1^{er} septembre 2001, j'avais alors 36 ans. J'ai été engagé en tant qu'assistant docteur, au sein du service de Science des Matériaux, alors dirigé par le professeur J-C. Descamps.

Originaire de la ville de Lyon, j'ai commencé mes études à l'université Claude Bernard (Lyon I) par une formation en Génie Mécanique et Productique. Je me suis ensuite orienté dans le domaine de la Science et du Génie des Matériaux en réalisant une thèse de doctorat à l'INSA de Lyon en collaboration avec une filière du groupe ELF. Mon travail de recherche sur le développement de composites SiC/Si-C-N-O à partir de précurseurs organométalliques, a marqué le début de ma spécialisation dans le domaine des céramiques et des composites céramiques techniques.

Après ma thèse, en 1994 et 1995, j'ai effectué un post-doc en République d'Irlande, à l'université de Limerick. Lors de ce séjour, j'ai assisté à plusieurs workshops organisés dans le cadre de projets de recherches en commun entre Mons et Limerick. C'est ainsi que j'ai eu mes premiers contacts avec Mons et la Polytech, via le centre de recherche

BCRC-INISMa. A l'occasion de ces réunions, j'ai également eu connaissance de la mise en place d'un projet Européen TMR (Training Mobility of Reseacher) dans le domaine des vitrocéramiques oxynitrides. J'ai alors postulé pour le contrat de post-doc proposé par le service de Science des Matériaux de la Polytech.

C'est ainsi que j'ai effectué un premier séjour à la Polytech de septembre 1996 à janvier 1999. Après un peu plus de deux années de post-doc, j'ai envisagé pour une première fois la possibilité de m'installer durablement à Mons. La taille humaine de la Polytech et la convivialité régnant dans les services d'enseignement et de recherche constituaient à mes yeux un cadre de travail très agréable. Hélas, la perspective d'obtenir à ce moment-là un poste à court terme était très peu probable. Je suis donc reparti en France pour un contrat d'enseignement et de recherche temporaire à l'INSA de Lyon, tout en gardant contact avec le service de Science des Matériaux de la Polytech. Aussi lorsqu'en 2001 j'ai appris que le professeur Descamps recherchait un assistant, j'ai présenté sans hésitation ma candidature.

C'est ainsi qu'en septembre 2001, je suis revenu à Mons et y ai retrouvé un univers déjà familier, surtout concernant les activités de recherche. La reprise en mains des équipements du laboratoire, des collaborations avec les centres de recherche montois BCRC-INISMa et Materia-Nova, et le développement d'une thématique de recherche se sont opérés rapidement. Mon travail d'assistant a consisté à seconder le professeur Descamps pour les séances des laboratoires et d'exercices, puis de reprendre progressivement sa charge de cours à partir de 2003, après ma nomination comme premier assistant. Formé à l'enseignement dans une très grosse institution, où chaque matière est sous la responsabilité d'un groupe d'enseignants (chaque promotion compte presque 1000 étudiants à l'INSA de Lyon), mon adaptation comme enseignant à Polytech a présenté quelques difficultés. Toutefois, grâce à l'aide et au soutien de mes collègues du département de Science des Matériaux, j'ai pu assez rapidement trouver mes marques. Après 16 années, je ne peux que me réjouir d'avoir fait ce choix de carrière et continue à envisager l'avenir avec sérénité.

Fortunato DUALIBE, from Argentina

Associate Professor - Service d'Electronique et de Microelectronique (Electronics and Microelectronics Unit)



Nací en Resistencia, Argentina. Pasé mi infancia en Añatuya, un pueblo del norte argentino. Desde niño me atrajo la tecnología, sobre todo porque era escasa. No había ni siquiera televisión. Todo había que leerlo o bien, imaginarlo. Recién en la secundaria, en el colegio La Salle de la ciudad Córdoba, pude acceder a esa maravilla tecnológica. Quería entender cómo funcionaban esos aparatos que traían imagen y sonido desde tan lejos hasta tu living. Entonces elegí estudiar Ingeniería Electrónica. Me gradué de Ingeniero en la Universidad Nacional

de Córdoba, fundada en 1613. Mi primer trabajo fue en una empresa de video juegos. Todo era tecnología de punta de los años 80: enormes placas repletas de circuitos integrados de última generación. Curioso por descubrir un chip por dentro, decidí iniciarme en microelectrónica. Primero, con una formación básica en diseño de circuitos integrados en una escuela de verano Brasilerio-Argentina (EBAI), donde realicé mi primer silicio que funcionó y todo: tenía 2 transistores...peor es nada. Luego, siguió una beca de iniciación a la investigación (Agencia

Córdoba Ciencia), que me permitió unirme al equipo de Microelectrónica de la Universidad Católica de Córdoba (UCC). Allí trabajé también como docente durante 17 años, marcados por un training en Japón, y a continuación el contacto con Bélgica a través de la UCL, donde pude realizar un doctorado en microelectrónica. De regreso a la UCC, me aboqué a la menuda tarea de coordinar y dirigir la formación doctoral en ingeniería electrónica. A pesar de la formación alcanzada, sentía que faltaba algo: transitar por una empresa de semiconductores.

ERING OF UMONS: WHY NOT?

Ward DE PAEPE, from Flanders

Associate Professor – Service de Thermique et Combustion (Thermal Engineering and Combustion Unit)



Hallo, mijn naam is Ward De Paepe en ik ben sinds 1 september jullie nieuwe collega. Mag ik mij even voorstellen?

Ik ben geboren op 11 juli 1987, toevallig ook de Feestdag van de Vlaamse Gemeenschap, te Aalst, vanwaar ook mijn voorliefde voor *Oilsjt Carnaval* vandaan komt. Gezien mijn interesse voor wiskunde en wetenschappen, was het niet meer dan logisch dat ik, na mijn middelbare studies aan het VKO in Opwijk, de studies ingenieurswetenschappen aanvatte aan de Vrije Universiteit Brussel (VUB) in 2005. Het was daar dat ik mijn passie voor thermodynamica ontdekte, waardoor ik dan ook de afstudeerrichting Werktuigkunde-Elektrotechniek koos. Voor mijn eindwerk werkte ik rond het onderwerp van *stoominjectie in een microturbine*, wat meteen ook mijn eerste kennismaking was met de microturbine.

De *microgasturbine* of kortweg *microturbine* is, zoals het woord zelf zegt, een 'kleine' gasturbine die vooral gebruikt wordt als WarmteKrachtKoppeling (WKK). Dit wil zeggen dat deze machine simultaan elektriciteit en warmte produceert en dit met een rendement dat aanzienlijk hoger ligt dan wanneer dit afzonderlijk zou gebeuren. Tijdens mijn doctoraatsthesis heb ik de impact van waterinjectie op het rendement van de microturbine onderzocht. Het doel van deze studie was na te gaan of er een manier bestond om de opgewekte warmte, die niet nuttig gebruikt kan worden wanneer er geen vraag naar is, eventueel toch gerecupereerd kan worden door injectie van water in de cyclus. Zo zou het elektrisch rendement tijdelijk verhoogd kunnen worden,

wat toelaat de warmte en elektriciteitsproductie volledig van elkaar los te koppelen. Via simulaties ontdekte ik de optimale cyclus, die de naam *micro Humid Air Turbine* meekreeg. Aangezien er op de VUB een microturbine staat, werd beslist om de theorie aan de praktijk te toetsen en de microturbine om te bouwen. Na veel bloed, zweet en tranen, slaagde ik erin om de nieuwe cyclus werkende te krijgen en ook experimenteel aan te tonen dat met de aangepaste opstelling de verwachte rendementsverhoging behaald kon worden en zo kon ik dus succesvol mijn doctoraat verdedigen aan de VUB in 2014.

Na mijn doctoraat besliste ik om in de academische wereld te blijven en het potentieel van de microturbine verder te exploreren tijdens een postdoctoraal onderzoek aan de VUB en later aan de Université Libre de Bruxelles (ULB). Door niet langer alleen te focussen op de ontkoppeling van de warmte- en elektriciteitsproductie, maar ook te kijken naar andere toepassingen, zoals brandstofflexibiliteit en CO₂ uitstootreductie, breidde ik de scope van mijn onderzoek uit. Het was ook aan de ULB dat ik te horen kreeg dat UMONS een vervanger zocht voor professor Lybaert en besloot ik dus mij kandidaat te stellen, met als onderzoeksthema de ontwikkeling van een flexibele, CO₂-neutrale microturbine voor toepassing in toekomstige gedecentraliseerde elektriciteitsnetwerken. Gelukkig voor mij kende mijn sollicitatie een positieve afloop, waardoor ik nu dit artikel mag schrijven.

Als ik heel eerlijk ben, moet ik toegeven dat ik vóór mijn sollicitatie slechts vaag over UMONS gehoord had, maar mijn eerste indruk tijdens

mijn eerste bezoek aan de Universiteit was zeer positief. En deze indruk werd alleen maar bevestigd en versterkt tijdens latere bezoeken en gedurende de eerste maanden die ik hier nu werk. Ik leerde de universiteit, de faculteit FPMs en de dienst *Thermique et Combustion* kennen als zeer open, waar zeer gepassioneerde en vriendelijke collega's werken, die steevast klaarstaan om mij met zowel de grote als de kleine problemen te helpen, wat maakt dat ik, ondanks de verre verplaatsing en het vroege opstaan, elke dag met een glimlach kom werken.

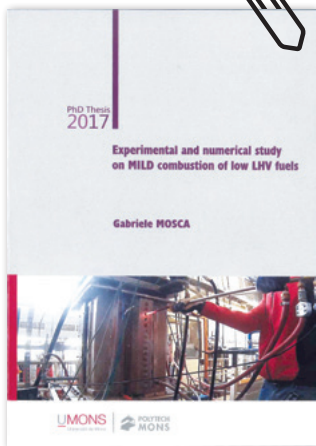


Foto van de omgebouwde microturbine aan de VUB, waar ik menige uren aan gependereerd hebt.

Conseguí un puesto de diseñador de chips en Freescale Semiconductores en Brasil. Conocí el lado corporativo de la microelectrónica. Entendí la diferencia entre diseñar un prototipo de laboratorio y un producto robusto. Aprendí a respetar estrictamente los tiempos impuestos por el cliente, propietario absoluto de tu vida a la hora de hacer un 'tapeout'. Pero lo más importante fue la experiencia de trabajar en un equipo sólido, donde la suerte de cada uno dependía de la de los otros. No pensaba quedarme para siempre en la industria. Pero el despido llegó antes de lo esperado. La crisis del 2009 me reveló la ausencia de 'alma' del mundo empresarial. Sin embargo,

como mi nombre lo indica, fui un afortunado. Tuve varias propuestas de trabajo, entre las cuales la de integrarme a la UMONS como profesor. Me encantaba la propuesta de volver a la academia... siempre me gustó enseñar... y esta vez en Bélgica! 'Mon petit paradis' de mis tiempos de doctorando. Idea descabellada... pero después de todo 'quien quiere perlas, se lanza al mar'. Jueves 16 de Julio del 2009, 4 de la tarde, 35°C, estaba ya en la Polytech frente al jurado, último candidato. Supongo que más de uno se habrá preguntado cómo desembarqué aquí?... y justo una hora antes de sus vacaciones?... Al día siguiente el decano me llamó: 'Felicitaciones... ¿listo para venir?'

Mi respuesta: 'ya estoy aquí'. No lo dudé ni un instante. Empecé en Diciembre. La acogida de mis colegas fue calurosa y cordial, al igual que la de mis estudiantes que se topaban, tal vez por primera vez, con un profesor latino. El dinamismo para enseñar y aprender en la Polytech no deja de sorprenderme. Tuve que aprender a andar más rápido, pero no fue difícil... el buen ambiente me ayudó. Me fascina la pedagogía por proyectos que distingue a nuestra facultad. 'Créer et se créer', idea clara y contundente de la formación Polytech, que conduce a generar ingenieros de Ciencia, Conciencia y Compromiso. Ésta es mi misión en la UMONS. Y ésta la Universidad con 'alma' donde anhelo terminar mi carrera.



Experimental and numerical study on MILD combustion of low LHV fuels

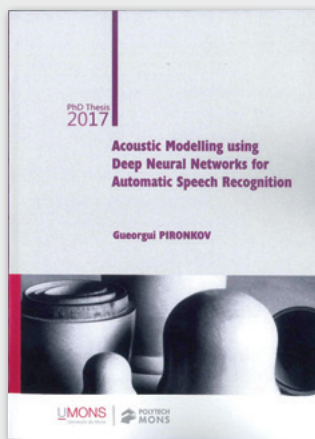
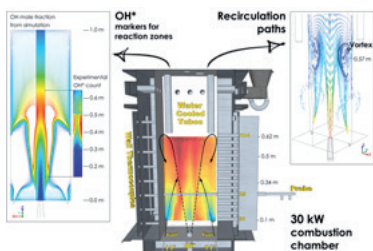
☒ NAME: Dr Gabriele Mosca
 UNIT: Thermal Engineering and Combustion
 SUPERVISOR: Prof. Paul Lybaert

In a world where the climate is drastically changing, energy savings and increased efficiency are key parameters to achieve the fundamental targets of modifying energy systems, in a cost-effective way, and peaking global emissions.

In this context, MILD combustion is a very attractive solution. The benefits of this combustion are the virtually zero pollutant emissions, the stable working conditions with classical and alternative fuels, and the significant energy savings through high air preheating. The latter is achieved thanks to the specific configuration of air and fuel injectors, which guarantees strong recirculation inside the chamber.

Through experimental tests on a 30 kW combustion chamber able to reproduce the main features of industrial furnaces, this work investigates the complex phenomena happening during MILD combustion. It also emphasises the effect of hydrogen in reducing ignition delays, the mitigation of local peaks of temperature through the dilution by inert gases, and the well-performing combustion, even at low air preheating.

For the fuel with the lowest calorific value, the in-depth comparison, between in-furnace measurements and data from a 3D RANS numerical combustion simulation in the chamber, shows a very good agreement in the evolution of the measured species and the position of the main reaction zones. A fluid dynamic study describes, in detail, the main recirculation paths which are fundamental in this combustion regime.

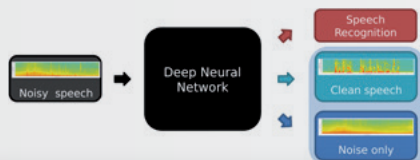


Acoustic modelling using deep neural networks for automatic speech recognition

☒ NAME: Dr Gueorgui Pironkov
 UNIT: Circuit Theory and Signal Processing
 SUPERVISOR: Prof. Thierry Dutoit

It's late at night. Your phone is ringing. An unknown number is calling you. You pick up your phone and start a conversation. While talking with this person, one of the most natural things we tend to do is to gather information about the speaker: do we know them? Are they old or young? Do they have an accent? Is there any recognisable background noise? The important point here is that we try to answer all these questions while talking to the person. More specifically, we use this additional information in order to improve our understanding of the speaker and their speech.

A large part of this thesis focuses on this observation and thus, applies Multi-Task Learning (MTL) for Automatic Speech Recognition (ASR). The goal of MTL is to train a single system to solve multiple different, but related, tasks simultaneously. Our main task here is recognising speech, while showing that different auxiliary tasks might improve the main ASR task results. For instance, as auxiliary tasks, we increase the 'speaker-awareness' by training our system to recognise the speaker, or improve speech recognition in noisy conditions by regenerating the noise only. Deep neural networks are used for training, and several other tasks and deep architecture are also investigated in this thesis.



Study of microwave plasma-assisted CO₂ conversion by plasma catalysis

☒ NAME: Dr Guoxing Chen
 UNIT: Materials Science
 SUPERVISOR: Prof. Marjorie Olivier and Prof. Marie-Paule Delplancke (ULB)



Étude de systèmes de production et de stockage de chaleur en vue de concevoir des bâtiments zéro-énergie

☒ NAME: Dr Tangi Le Berigot
 UNIT: Thermodynamics and Mathematical Physics
 SUPERVISOR: Prof. Marc Frère



A new corrosion protection approach for aeronautical applications combining benzoxazine resins applied on sulfo-tartaric anodized aluminum

☒ NAME: Dr Thuy Duong Nguyen
 UNIT: Materials Science
 SUPERVISOR: Prof. Marjorie Olivier

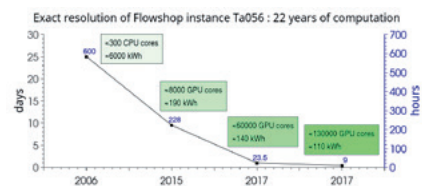


Heterogeneous cluster computing for many-task exact optimisation – Applications in permutation problems

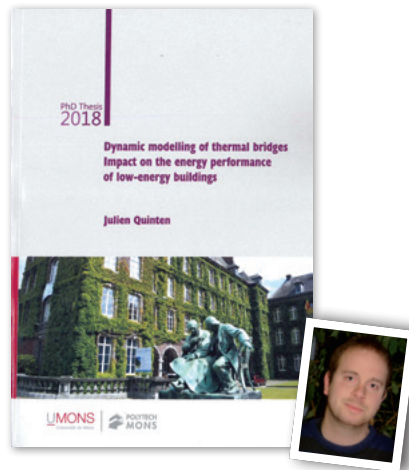
☒ NAME: Dr Jan Gmys
 UNIT: Mathematics and Operational Research
 SUPERVISORS: Prof. Daniel Tuytens (UMONS) and Prof. Nouredine Melab (INRIA Lille-Nord Europe, France)

In various economic and industrial applications, we are looking for an optimal arrangement of objects (a permutation). Even for a seemingly small number of objects, the task of identifying precise optimal permutations is like looking for all the needles in a haystack. Indeed, the number of possible arrangements for 50 objects is greater than the number of atoms on earth!

The Branch-and-Bound (B&B) algorithm implicitly enumerates the search space by generating and exploring a tree, composed of a huge number of highly irregular sub-problems. Tremendous advances in supercomputing technology over the last decades have increased available computing power, providing the massive parallel processing capabilities which are needed for efficiently solving larger problem instances. Harnessing this computing power can be very challenging, especially for irregular algorithms like B&B, so the profound rethinking of our algorithms is required. This Ph.D. thesis, revisits the design and implementation of B&B for heterogeneous high-performance computing platforms.

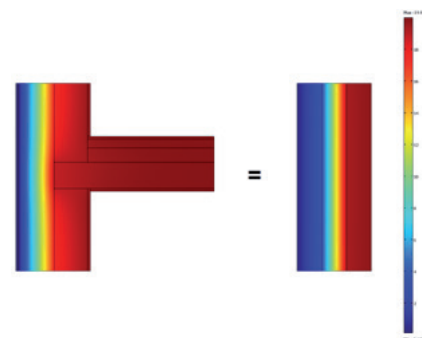


The proposed approach allows problem instances, that could last for days, or even years, to be solved practically on a sequential computer, from multi-core CPUs and GPUs to large, distributed clusters, as different levels of parallelism are efficiently exploited.

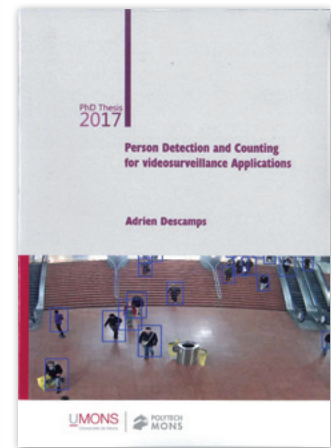


Dynamic modelling of thermal bridges: Impact on the energy performance of low-energy buildings

☒ NAME: Dr Julien Quinten
 UNIT: Thermal Engineering and Combustion
 SUPERVISOR: Prof. Véronique Feldheim



The energy consumption of new buildings is getting lower and lower, and building energy simulation software packages are used to predict, evaluate and improve energy performance. Quite a significant part of heat loss from buildings (5% up to 40%) can be due to thermal bridges (2-D or 3-D details reducing the local thermal resistance), and their impact increases with the insulation level. However, most building energy software cannot take into account the dynamic effects of thermal bridges, since they consider the heat flux as being 1-D to simplify the calculations. My thesis focuses on the required improvement of the dynamic modelling of thermal bridges in low-energy building simulations. I have defined a particular method which can allow us to determine a 1-D equivalent wall having the same thermal behaviour as a 2-D or 3-D detail. In this work, the studied thermal bridges are well-insulated and the heat flux accuracy of their equivalent walls has been proven in various indoor and outdoor conditions, which is better than for a classic static consideration. The impact of using equivalent walls for the energy performance evaluation of a passive wooden-structure house is analysed, in comparison with a classic consideration of thermal bridges. This method of model reduction can also be adapted to simplify all problems of multidimensional unsteady heat conduction where only heat fluxes at boundaries are of interest.



Person detection and counting for videosurveillance applications

☒ NAME: Dr Adrien Descamps
 UNIT: Circuit Theory and Signal Processing
 SUPERVISOR: Prof. Bernard Gosselin

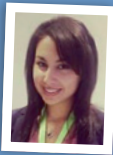
Vers une nouvelle génération d'outils d'aide à la décision s'appliquant à la prévention des risques lors de la prescription des antibiotiques. Combinaison des technologies Web sémantique et de l'aide à la décision multicritère

☒ NAME: Dr Souhir Ben Souissi
 UNIT: Mathematics and Operational Research
 SUPERVISOR: Prof. Philippe Fortemps and Prof. Mourad Abed (Université de Valenciennes et du Hainaut-Cambrésis – France)

Mesure distribuée résolue en fréquence appliquée à la génération du supercontinuum dans les fibres optiques

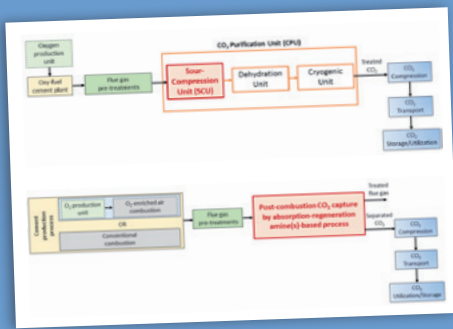
☒ NAME: Dr Régis Hontinfinde
 UNIT: Electromagnetism and Telecommunications
 SUPERVISOR: Prof. Marc Wuilpart

CO₂ capture and purification processes applied to flue gases derived from the cement industry



✉ NAME: Dr Sinda Laribi
 UNIT: Chemical and Biochemical Process Engineering
 SUPERVISORS: Prof. Diane Thomas and Prof. Guy De Weireld

This work was carried out within the framework of the ECRA Academic Chair considering Carbon Capture and Storage or Utilisation (CCSU) applied to flue gases derived from the cement industry.



A CO₂ de-SO_x and de-NO_x unit, called Sour-Compression Unit (SCU), was simulated in Aspen Plus™ by means of water scrubbing in pressurised systems applied to flue gases derived from full oxy-fuel combustion. The elucidated, comprehensive and realistic chemical mechanism provided satisfactory results with a two-column configuration of the SCU. A single-column process was also investigated with the purpose of process optimisation (decrease of installation costs and energy requirements). An alternative solution for capturing CO₂ from flue gases derived from an O₂-enriched air combustion, called post-combustion capture, was also investigated. A screening of simple and blended amine-based solvents was conducted by experimental and simulation tests, with the best solvents allowing a compromise between high absorption ratios and low energies of regeneration. The solvents' regeneration energies were shown to beneficially decrease when the CO₂ content in the gas being treated increased. Evaluations of the energy necessary for the oxygen production in the Air Separation Unit (ASU) and economic evaluations (capital (CAPEX) and operating (OPEX) costs) were conducted for both CO₂ treatment technologies.

Design of a photocatalytic process for drinking water treatment plants

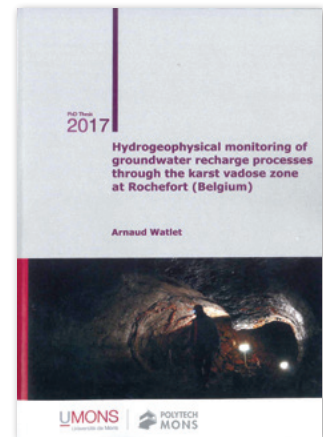
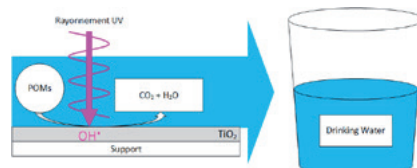
✉ NAME: Dr Julien Gervasi
 UNIT: Chemical and Biochemical Process Engineering
 SUPERVISORS: Prof. Diane Thomas and Prof. Anne-Lise Hantson

Increasing anthropogenic activities involve more health and environmental risks. That is the case, for instance, for groundwater and surface waters, which are polluted with persistent organic micro-pollutants (POMs) (µg.L⁻¹) which have toxicological effects, such as endocrine disruptor effects. In Wallonia, 80% of the tap water comes from groundwater after a potabilisation process, and this process cannot sufficiently reduce all the POMs.

This thesis is aimed the implementation of a heterogeneous supported photocatalytic degradation process in a drinking water treatment plant. By using TiO₂ immobilised on a support and UVC light, oxidoreduction reactions lead to the production of a strong radical oxidant (OH[•]) able to degrade pollutants.

Three pesticides were selected on the basis of the literature and toxicological assays. These compounds underwent preliminary tests, evaluating the photocatalytic activity of different photocatalytic formulations sprayed onto supports. Further experiments were carried out on a photocatalytic installation, inspired by a UVC sterilisation unit, to determine the photodegradation efficiency. Various operating parameters were tested with the purpose of increasing the overall efficiency of the process.

The laboratory apparatus was modelled to determine kinetic parameters from specific experimentation, allowing to scale up the photoreactor for a drinking water treatment plant. The results show the potential of photocatalysis degradation as a complementary treatment.



Hydrogeophysical monitoring of groundwater recharge processes through the karst vadose zone at Rochefort

✉ NAME: Dr Arnaud Watlet
 UNIT: Geology and Applied Geology
 SUPERVISOR: Prof. Olivier Kaufmann



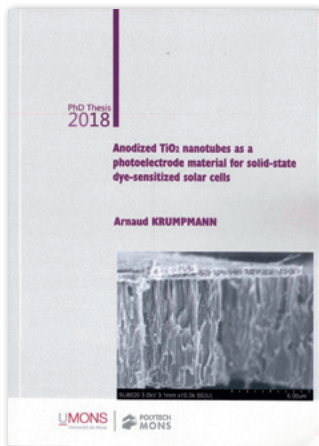
Reconnaissance et recherche de données multimédia par les réseaux de neurones profonds

✉ NAME: Dr Omar Seddati
 UNIT: Computer Science
 SUPERVISOR: Prof. Saïd Mahmoudi



A new corrosion protection approach for aeronautical applications combining benzoxazine resins applied on sulfo-tartaric anodized aluminum

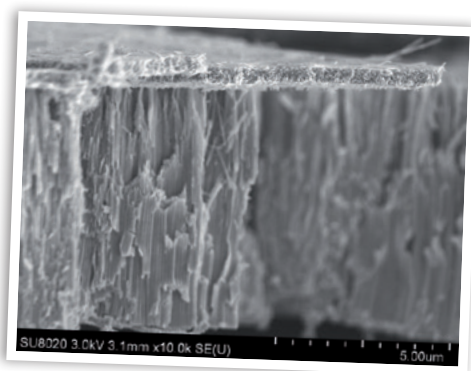
✉ NAME: Dr Alexis Renaud
 UNIT: Materials Science
 SUPERVISOR: Prof. Marjorie Olivier



Anodised TiO₂ nanotubes as a photoelectrode material for solid-state dye-sensitised solar cells

☒ NAME: Dr Arnaud Krumpmann
UNIT: Materials Science
SUPERVISOR: Prof. André Decroly

Achieving an efficient and cost-effective conversion of solar radiation into electricity is a major concern in view of sustainable energy production. Dye-sensitised solar cell technology has been developed in the pursuit of this goal. By separating the functions of light absorption and charge transport in different materials, this technology broadens the field of candidate materials for solar cell design. Initially elaborated in a liquid-state with success, dye-sensitised solar cells have expanded to solid-state devices, as the presence of a liquid phase is a consistent drawback for industrialisation, due to the risks of leakage and corrosion.



The design of nanostructured photoelectrodes could be a key step in the improvement of this technology. Therefore, this work is dedicated to the design, using the anodisation method, of nanotubular TiO₂ photoelectrodes with controlled properties for solid-state dye-sensitised solar cell applications. Their integration into complete devices in different configurations, the assessment and comparison of their performances, the optimisation of the nanotube geometry, and the identification of the factors limiting overall efficiency are the main concerns of this thesis.

Numerical simulation of turbulent flows with application to wind engineering problems

☒ NAME: Dr Stéphanie Zéoli
UNIT: Fluids-Machines
SUPERVISOR: Prof. Laurent Bricteux

As the demand for energy has been growing continuously over the last decades, the harvesting of wind energy produced by large wind farms and, more recently, by small wind turbines operating in urban environments, has become an alternative source of clean and renewable energy. However, the wind resources in urban environments are characterised by high turbulence and low wind speed that make the efficient positioning of wind turbines more complex than on a flat terrain.

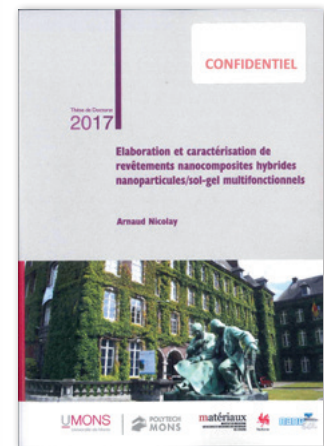
The objective pursued in this thesis is to achieve advances in numerical simulation techniques that will lead to better flow predictions for small wind turbines operating in urban environments, and to a better understanding of the interaction between a wind turbine and environmental turbulence. In this study, we first investigate the siting of wind turbines using numerical simulations that allow the prediction of only the mean flow features. Based on these quantities, the wind turbine location can be chosen to benefit from potential wind acceleration due to the presence of buildings, and to avoid areas where the turbulence levels are too high.

Then, we consider more advanced numerical simulations that are also able to capture turbulence fluctuations. It is important to predict these fluctuations as they have a significant impact on wind-farm design and operation. They increase the fatigue loading on the tower and the blades, and affect the temporal variability of the power production.



Accélération d'un moteur de bases de données relationnelles par l'utilisation du parallélisme des CPU et GPU

☒ NAME: Dr Samuel Cremer
UNIT: Computer Science
SUPERVISOR: Prof. Pierre Manneback



Élaboration et caractérisation de revêtements nanocomposites hybrides nanoparticules/sol-gel multifonctionnels

☒ NAME: Dr Arnaud Nicolay
UNIT: Materials Science
SUPERVISOR: Prof. Marjorie Olivier

Electricity markets with high wind penetration: Information sharing and incentive-compatibility

☒ NAME: Dr Lazaros Exizidis
UNIT: Electrical Power Engineering
SUPERVISOR: Prof. François Vallée



FACULTY OF ENGINEERING



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- **Specialisation** (from 1st year for architecture, from 3rd year for other fields)

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- Chemical engineering and Materials Science
 - ↳ Chemical Industry Processes
 - ↳ Materials Science and Engineering
- Computer and Management Engineering
 - ↳ Information Systems Control
 - ↳ Business Strategies and the Internet
- Electrical Engineering
 - ↳ Signals, Systems and BioEngineering (in English)
 - ↳ Multimedia and Telecommunications (in English)
 - ↳ Electrical Energy (in English)
- Mechanical Engineering
 - ↳ Mechatronics (one semester in English)
 - ↳ Power Engineering
 - ↳ Design and Production
- Geology and Mining

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