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ALLIANCE SORBONNE UNIVERSITÉ | utc Université de Technologie Compiègne

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Interactions

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FROM THE PRESIDENT'S DESK

National and corporate levels of competitiveness depends on a number of factors, including production costs, but above all on non-price related competitiveness, also known as structural competitiveness, based on quality, innovation and adaptability. Efficient basic research, followed by fruitful applied research and major innovations, are essential to differentiate our offer, to meet the growing expectations of consumers, and to position ourselves sustainably in the world markets.

In an international context where most nations are seeking to reduce their excessive dependence, established since the 1980s in many industrial sectors, while at the same time reorienting their industries in an environmentally friendly way, France is also striving to meet these challenges. The €54 billion France 2030 investment plan aims to close the country's industrial gap, to invest massively in innovative technologies and to support the ecological transition by developing more energy-efficient technologies and factories.

On its own academic scale, UTC - with its recognised skills and expertise, has many assets to offer, serving this objective. For example, it is involved in four collaborative acceleration projects, two of which are part of the Sorbonne University alliance's PostGenAI@Paris programme. It is one of the 9 winners of the national IA Cluster call for expressions of interest, the aim of which is to create world-class research and training clusters in artificial intelligence.

Many other projects carried out by UTC are guided by the principles of sustainability, predictivity and sobriety. The 'Industrie 5.0' project, for example, aims to optimise factory production by taking environmental indicators into account. Similarly, research into innovative materials, particularly for the automotive industry, illustrates this commitment. Finally, work on innovative batteries, with models capable of diagnosing the state of charge or predicting the expected life-span of batteries, testifies to the very strong importance attached to these issues.

Thus, UTC, wit-Compiegn, its recognised expertise and its commitment to cutting-edge projects, is playing a key role in contributing to the development of innovative and sustainable solutions that will strengthen France's competitiveness on the international stage.

Claire Rossi,
President

PORTRAIT

Boosting the establishment's TEES policy

Isabelle Cailleau is a lecturer-cum-research scientist in Information and Communication Sciences in UTC's TSH department; she teaches and conducts research in digital literacy. She has been a member of the Academic Board since 2021 and, since June 2023, is Director of Ecological Transition and Societal Engagement (TE&ES).

For several years now, UTC has been evolving in order to meet societal challenges, including those of ecological transition. 'In 2022, a consultation was launched. Working groups on different themes were set up to define the actions to be taken. After her appointment as head of the university, Prof. Claire Rossi wanted to extend this approach by creating a functional department dedicated to TE&ES. My main motivation for applying was to contribute to UTC's TE&ES policy by involving the whole community,' she explains.

It is an eminently cross-disciplinary mission which "involves coordinating everything to do with TE&ES, both internally, by mobilising all of UTC's entities on the subject, and externally with partners such as the UT group or the Sorbonne University Alliance, for example. It is also cross-disciplinary, covering governance, teaching and training, research and innovation, campus life and social policy', she adds.

It's an ambitious mission that Isabelle Cailleau and others at UTC have taken on. 'I had the opportunity to recruit a permanent project manager. In addition, three colleagues have been appointed for four years to work on the most demanding subjects: education, research-innovation and UTC's interaction with Society. We have also chosen to have representatives from all the entities, people chosen by the functional directors or the directors of support services, for example, so that they can participate in the TE&ES approach. For my part, I started with an immersion phase to find out more about what is being done internally, and also to establish the external network', she assures us.

Among the projects currently underway? 'Since February 2024, we have launched a major project, the Sustainable Development and Environmental and Social Responsibility (SD&ESR) master plan, the aim of which is to structure and expand UTC's TEES approach for the period 2024-2028. In fact, since June 2023, the Ministry has provided all higher education establishments with a set of specifications in the hope that they will adopt an SD&RSE master plan. Nearly 120 people are involved in the construction of this master plan around eleven themes, including responsible purchasing, the institution's interactions with Society, teaching and training, research-innovation, reducing the environmental footprint, sustainable mobility, etc.,' concludes Isabelle Cailleau. ■ **MSD**

INAUGURAL LECTURE

Living a thousand lives in one

Michael Pitiot was never an engineer. Notwithstanding, this graduate who majored in computer engineering, before becoming a documentary film-maker has never forgotten the lessons he learned at UTC. On August 27, 2024 he came to the University to deliver an inaugural lesson to the students. His motto for this future generation of engineers? «Live your Dream!»

« Today, ecology is often seen as a set of constraints, whereas it provides, in fact, a set of opportunities. We now need to move away from our fears to embrace desires, and that, for me, typically represents the mindset of engineers and entrepreneurs »

Even before he was admitted to UTC, Michael knew he probably wouldn't be an engineer: «but I didn't want to commit myself to studies that would prove meaningless to me. So what in fact drew me to enrol at Compiègne was that I'd been told it was a school that trained humanist engineers,» he adds. During his studies at UTC, he always wanted to go further afield, so he became involved with the NGO "Ingénieurs sans frontières". «I learned that they were carrying out missions in Zaire, planning to make a short film for their patrons. A perfect opportunity for me! So I offered to make the film and they accepted. For three months, we stayed in an extremely isolated place, with no electricity or roads and everything had to be done on foot. It was an incredible human experience!

After graduating, there was no question of Michael shutting himself away in an office, so he became an image hunter-reporter. «I went to countries that were a bit hot, like Chad, Somalia and Lebanon. But I soon realized that it wasn't quite what I was looking for, or what I wanted to do. So I went to Vietnam as an audiovisual attaché, where I worked on a number of feature films. I even worked for Vietnamese television, notably on the creation of the country's first TV game show. It may seem a long way from engineering training at first glance, but in fact, it is also akin to project management.»

After six years in Vietnam, Michael embarked on a somewhat crazy challenge: to build a 60-ton Chinese junk and sail it from Hô Chi Minh-Ville (formerly, <1975, Saigon) to Saint Malo. I started building the boat when I was 26, in 1996,» recalls Michael. My engineering background training proved useful, as I was more at ease with the construction of the ship and the mechanical aspects of these old boats. This became the Saomai expedition (morning star in Vietnamese), and the documentary was broadcast in prime time on French TV, France-2. It was an extraordinary two-year voyage, 1998 and 2000, with a crew of six to ten people taking turns on board. Remember that a junk is a boat without a motor, so we go where the wind takes us!

No sooner had he arrived in France, that Michael who felt he was an «extraterrestrial alien" set up a new expedition, «Portes d'Afrique»[Gateways to Africa]. "We spent two years exploring Africa's major ports with writers and journalists,» he explains. "We went in search of human stories, another view of this continent that was ill-known and barely loved.»

Michael then went on to produce films for the Tara project (the scientific exploration ship). A revelation for him: «And that was the moment I understood for the first time that the world was changing, while filming the scientists in front of me. And I said to myself that I personally had to offer something to the world. I set about securing prime time slots on the major TV networks, to reach people who didn't care much about it, at first. Then I crossed the tracks of Yann Arthus Bertrand and produced ten films for him."

This life record endowed Michael with an ecological awareness that has never dimmed his enthusiasm for the future, on the contrary: «Today, ecology is often seen as a set of constraints, whereas it provides, in fact, a set of opportunities. We now need to move away from our fears to embrace desires, and that, for me, typically represents the mindset of engineers and entrepreneurs. I see engineers as dreamers, a profession that predisposes them to this. When filming, I see people full of the desire to create, to think! Right now, I'm working on a project for France-2, where we'll be asking the question of what France might look like in 100 years' time and I can assure you don't see a bleak future at all!»

While he places all his hopes in the engineering spirit, Michael has never regretted not becoming one: «My job is fabulous, you live a thousand lives by proxy, you get to meet some incredible people,» he smiles. "Two years ago, I was filming Pope Francis, and one fortnight later, I was in Bangladesh filming children cutting up scrapped ships on the shop-breakers' beaches. A sight full of humanity, with so much to tell!» ■ **MB**

SELECTIVE FILMOGRAPHY

2001: The Sao Mai Odyssey

2004-2005: Rivages d'Afrique, Côte Est, Rivages d'Afrique, West Coast (documentaries from the «Portes d'Afrique» project)

As of 2008: series of documentaries on the Tara Oceans mission: Voyage au cœur de la machine climatique; Le monde secret; Le Climat, les hommes et la mer [The secret world ; Climate, Men and te Sea]; Planète Océan (film co-directed with Yann Arthus Bertrand)

As of 2013: Films co-directed with Yann Arthus Bertrand: Méditerranée; Algérie vue du ciel; Terra; Maroc vu du ciel |Morocco from the sky]; Egypte vue du ciel |Egypt from the sky]; Legacy

2021: France, le Fabuleux Voyage [the Fabulous Journey]

A UTC TORCHBEARER FOR THE OLYMPIC GAMES, PARIS 2024

Ice hockey goalkeeper Benoît Demazier joined the Amiens Hockey Elite training centre in 2021. Last January, he was selected to carry the Olympic Flame in the city of Amiens for the Olympic Games, Paris 2024, an opportunity that only comes only once in a sportsman's life! He agreed to answer our questions:

Can you introduce yourself?

My name is Benoit Demazier, I am registered for the Basic Core programme at UTC, and I'm following the elite sports pathway, as an ice hockey goalkeeper.

As an elite sports student, what are your days like?

Since I was admitted to UTC for the fall 2022 semester, I decided to stay in Amiens to continue my sports training and to use the train that links the two cities. The elite sport option allows me to enjoy this situation; my semester loads are lightened and arranged according to my training needs so as to efficiently reconcile studies and sports activities. During my first year of Common Core, I was called up to play for the club's first team in the Ligue Magnus, France's leading ice hockey league. Despite my numerous absences due to training and matches, my semester results are satisfactory. You need to apply good time management and efficient organization to keep up with both the demands of UTC and the rigours of a sports team.

Why were you chosen to carry the Olympic flame in Amiens?

In 2021, I was lucky enough to join the Amiens Hockey Elite (AHE) sports training centre, an institution renowned for its excellence and which operates at national level. Alongside my career as a goalkeeper, I am actively involved in the field hockey community, refereeing matches for younger players at the Amiens club. This career path earned me the honour of being selected last January by the Paris 2024 jury to carry the Olympic Flame in Amiens and to take part in this great celebration of the Olympic Games! Photo credits: Paris 2024 / Thomas Boivin / SIPA PRESS. ■

Photo credits: Paris 2024 / Thomas Boivin / SIPA PRESS.

LOOKING BACK OVER UTC'S OLYMPIC MONTH

UTC's Olympic week was epic! 224 UTC students and 64 staff 'outperformed' themselves on sports nights. Basketball, volleyball, badminton and Zumba ... there was something in it for everyone. Competition, fun, challenge, goodwill, we can proudly speak (despite a few crushed shins) of a great success! So thank you, the UTC Sports and the Sports Department for these magnificent tournaments, to Cheer UT for its grandiose figures, to the PicsArt photographers for their great shots and to all the participants for showing their sporting skills. See you next year! ■ Garance de La Brosse, étudiante

INTERNATIONAL

UTC and the SUNRISE alliance among the winners of the 5th call for European university projects

The European Union has selected 14 new European university alliances following the 5th Erasmus+ call for proposals and it is in this framework that UTC and its 8 partners were chosen for the SUNRISE alliance. The alliance will receive €14.4 million funding over four years. These funds will be used to implement an ambitious plan aimed at strengthening several key areas: research, teaching, innovation and partnerships with the local, European and international socio-economic world.

The challenge for the SUNRISE alliance project (Smaller Universities Network for Regional Innovative and Sustainable Evolution) is crucial, as Prof. Claire Rossi, President of UTC, explains: "SUNRISE is an alliance of European universities that highlights the role and actions of small universities occupying strategic positions. They work for development, innovation and sustainability, at the heart of various European regions, in close collaboration with local businesses». Thanks to this new European university alliance, UTC will strengthen its impact at the heart of the Hauts-de-France region. Small universities, located in medium-sized towns, face major challenges such as the «brain drain», reduced attractiveness compared to large city establishments, limited resources and competition from larger institutions. However, they play a fundamental role in the attractiveness of their regions and form an essential link between the academic world and society, interacting directly with the socio-economic environment of their territories.

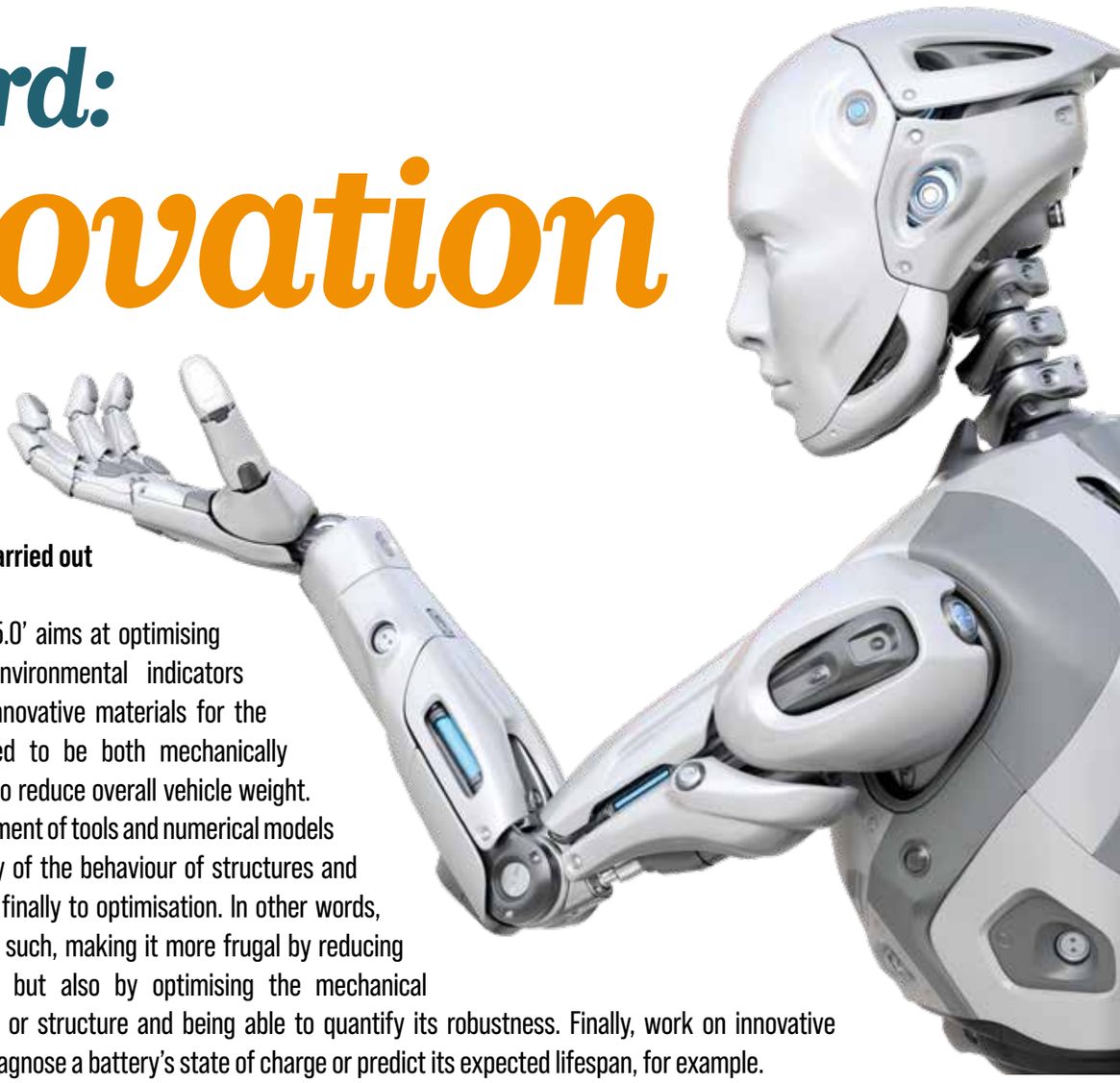
The SUNRISE alliance strengthens collaboration between academia and industry aimed at creating symbiotic and innovative models in partnership with regional companies. This initiative aims to foster local economic development while encouraging cutting-edge research and industrial innovation. It also focuses on international education by introducing innovative curricula and encouraging student mobility, all of which constitute fundamental elements for UTC.
SUNRISE partners play a key role in the transformation of territories, making them more attractive and competitive while tackling environmental, societal and digital challenges with local players. They are also committed to animating a European research network, designed to strengthen links and exchanges of ideas based on European values, to encourage innovation, technology transfer and to establish a common network of stakeholders.

Thanks to this call for projects won by the alliance partners, exciting new prospects in Europe have opened up for UTC! This success testifies to UTC's ability to innovate and adapt to contemporary challenges, while reinforcing its academic and scientific influence on a European scale. ■ **MB**

THE FOUNDING MEMBERS OF THE SUNRISE ALLIANCE PROJECT

Ilmenau University of Technology, Germany (coordinator); Université de technologie de Compiègne, France; the Free University of Bozen-Bolzano, Italy; the University of Information Technology and Management in Rzeszów, Poland; the European University Cyprus, Cyprus; Mälardalen University, Sweden; the Università Politecnica delle Marche, Italy; «Džemal Bijedić» University of Mostar, Bosnia-Herzegovina; Polytechnic University of Viana do Castelo, Portugal. Cranfield University, UTC's long-standing strategic partner in the UK, is also an associate member of the alliance.

Keyword: innovation



The principles of sustainability, 'predictivity' and sobriety guide many of the research projects carried out in UTC's Roberval laboratory.
For example, work on 'Industry 5.0' aims at optimising plant production by taking environmental indicators into account. Others focus on innovative materials for the automotive industry, which need to be both mechanically precise and lightweight in order to reduce overall vehicle weight. Others again concern the development of tools and numerical models dedicated, inter alia, to the study of the behaviour of structures and materials, but also of fluids, and finally to optimisation. In other words, the optimisation of simulation as such, making it more frugal by reducing calculation times, for example, but also by optimising the mechanical performance of a given material or structure and being able to quantify its robustness. Finally, work on innovative batteries, with models that can diagnose a battery's state of charge or predict its expected lifespan, for example.

Enterprise in the age of Industry 5.0

Professor Julien Le Duigou is the titular chair-holder for Mechanical Engineering and a research scientist at UTC's Roberval laboratory. In particular, he is responsible for the department's «Integrated Production and Logistics» programme and, I particular, for the "4.0 technologies" course.

Among the course's aims? «The main objective is to train mechanical engineers with a focus on industrialization, production management and the supply chain, as well as on continuous improvement and implementation of so-called 4.0 technologies. This training provides undergraduates with skills ranging from those used in a methods office which is responsible for defining how to manufacture and industrialize a given product, to actual production in factories and finally distribution of the product to customers», he explains.
First introduced in 2011, the concept of Industry 4.0 concerns the integration of new technologies in the factory. «We've been able to inter-connect machines and allowing them to exchange information thereby speeding up decision-making in production. The introduction of new technologies in factories, notably artificial intelligence, augmented reality, the Internet of Things (IoT), digital continuity, the use of Big Data, robotization with Cobots equipped with sensors enabling them to collaborate with an

operator, or new production technologies such as metal additive manufacturing, had as its main objective the improvement of the factory's overall economic performance», he assures.

Industry 5.0

At the time, this was referred to as the 4th industrial revolution, following mechanization, electrification and automation. Today, we speak of Industry 5.0, «more an evolution of the previous phase than a revolution per se. Encouraged and enhanced by the European Union in 2021, this concept aims to redirect the way factories operate. Of course, these technologies will continue to be used, but the emphasis will now concentrate on three aspects. Sustainable development, by using these technologies to facilitate companies' ecological and energy transition; resilience, or the ability to adapt to hazards such as breakdowns, supply disruptions and market variations, etc.; and lastly, refocusing on the human element, whether in relation to society at large or to the company's own employees, by putting operators back at the heart of these technologies», explains Julien Le Duigou.

Is there any concrete research work related to this Industry 5.0 theme? «In particular, we are working on optimizing plant production by taking environmental indicators into account. Our work focuses on the impact of a production system, in order to define an optimal mode of operation in terms of energy consumption, for example, and, more generally, environmental or societal impact. The choice of a product's manufacturing process, the machines on which it will be made and the order in which it will be assembled are all optimized according to cost and lead-time indicators, as well as environmental and societal indicators. We are also working on the theme of the circular economy. In our case, this means helping companies to recycle or even reuse, as far as possible, the parts of end-of-life products by helping them to disassemble them. This is called "Remanufacturing", and involves recreating new products from old ones. We also work on product quality: how to improve it so as to minimize scrap, rejects and so on. To this end, we use computer vision to detect defects in product appearance using machine learning. Finally, we are working on predictive maintenance, which involves detecting the probability of a machine failure before it happens», he describes.

Genuine interest shown by manufacturers

These are themes which, quite naturally, are of interest to a number of manufacturers. «We work with production line manufacturers such as ALFI Technologies, software publishers such as PTC and manufacturers such as Renault and Safran,» he adds.

But it's not just the large companies who are affected by Industry 5.0. SMEs and ETIs are also impacted by new technologies. «For example, we have a future industry platform project entitled «Quatrium» with the Centre Technique des Industries Mécaniques (CETIM). Its aim? To be able to help SMEs and ETIs in the Hauts de France region to accelerate their ecological, energy and digital transition. In this project, the aim is first and foremost to popularize these concepts among companies and then to take action to help them assimilate the various technological building blocks. Hence the development of a platform, part of which is located at UTC, enabling them to see the technologies operating in situ and to test them in real life», concludes Julien Le Duigou. ■ **MSD**

Innovative materials and processes

A lecturer-cum-research scientist in the Mechanical Engineering department at UTC's Roberval Laboratory, Julie Marteau is also in charge of the «Materials and Technological Innovations» course, one of the main objectives of which is to support the development of innovative materials and processes.

Another of the Department's objectives is to identify technical solutions to the various modes of degradation of materials, depending on their life expectancy and to master the choice of materials and processes, taking into account technical, economic and environmental constraints, in order to design innovative products.

Julie Marteau's research focuses on two main areas. «The first area involves characterising the relationship between a material's microstructure and its local mechanical properties. In other words, different experimental characterization techniques are combined to investigate the impact of using a specific process or the effects of mechanical stress. The aim is to study not only the surface, but also the core of the material. The second area involves understanding functionality, in the broadest sense, by characterising the topography of a given material», she says.

Research aimed at understanding the synergy of local phenomena to produce a product with the targeted functionality. These research themes are of interest to a number of academic and industrial partners. Partners include Cetim, Railenium and companies such as ArcelorMittal, Airbus, RATP and BritishSteel.

Among the projects devoted to the interrelationships between a material's microstructure and its mechanical properties? «For example, a thesis as part of FuseMetal, a joint laboratory between Roberval and ArcelorMittal, on the description

of the microstructure generated by welding sheet metal to understand how this will modify the base materials and how these will behave in terms of mechanical post-weld properties, to see how the material's behaviour evolves after welding. In this particular case, the aim is to produce a material with high mechanical resistance and a certain lightness to reduce vehicle weight. We are also working on the problem of mechanical stress. For example, we have examined the evolution of the microstructure of rails taken from railroad tracks, after numerous train passages. This enables us to understand and then predict track wear processes, always with a view to ensuring that the material has the longest possible service life. Finally, a project carried out in partnership with Cetim and supported by the Region, in which a PhD thesis is in progress, is devoted to the influence of a new additive manufacturing process of friction/kneading on the microstructure. The aim is to print different parts in a titanium alloy, varying the process parameters in order to understand the impact of these variations on the microstructure generated, and to establish the link with the resulting mechanical properties. This new process belongs to the additive manufacturing family, but is based on solid-state deposition, which enables rapid deposition and therefore greater cost-effectiveness», explains Julie Marteau.

Other projects focus on surface topography, again always with a link to functionality. «In this case, for example, we analyse the effect of a surface treatment such as shot-blasting or polishing on the surface finish, and study the consequences for a given function. This could be a change in the material's hardness or gloss,» she assures us.

Among the projects linked to this very issue? «We have a project with the Muséum National d'Histoire Naturelle on "traceology" applied to archaeology, which involves helping them to identify the wear and tear of certain prehistoric flint tools: how the tools analysed may or may not have been used and under what conditions? It's then up to scientists to translate the results: uses, gestures... to enrich our understanding of prehistoric times. We also have a project, conducted in partnership with Cetim, which concerns the qualification and quantification of "facies seizure wear «, she concludes.

Finally, a thesis on the environmental assessment of the implementation and industrialization of additive manufacturing processes, co-directed by Julie Marteau, Benoît Eynard and Raoudha Gaha Elkamel, has begun recently. ■ **MSD**

Digital methods and simulation

Delphine Brancherie is a lecturer-research scientist in the Mechanical Engineering Department at UTC's Roberval Laboratory and is also in charge of the digital mechanics team, one of the laboratory's five teams with eleven lecturer-research scientists.

Among the team's research priorities? If we combine the skills of all the team's research scientists, our activities cover all elements of the digital simulation chain. For example, we are working on test-calculation dialogue, i.e., how to make the best use of information from mechanical or physical characterization upstream of simulation, in order to determine the best models and associated parameters to use in simulations. An important part of the team's research activities consists in developing models and numerical resolution strategies dedicated to the study of the behaviour of structures, materials and fluids. We also work on optimization-related topics. Optimization of simulation as such, by making it more frugal by reducing calculation times, for example, but also optimization of the mechanical performance of a given material or structure, possibly taking into account sources of uncertainty in order to quantify robustness. Research that leads to the development of innovative numerical methods and perpetuates the historical heritage of the numerical mechanics team, among the first to deploy the finite element method in France», she adds.

Research at the crossroads of applied mathematics and mechanics has led Delphine Brancherie to take a particular interest in cohesive interfaces as a means of predicting fracture phenomena in materials and structures. «The aim is to develop numerical tools that can describe the behaviour of materials and structures from their healthy state right through to failure. In other words, to develop numerical methods that can reproduce the mechanical damage processes that lead to the failure of part structures, taking into account their architecture or microstructure», she explains.

But since then, Delphine Brancherie has extended her research to so-called coherent interfaces. In concrete terms? «These coherent interfaces are the result of modelling the local phenomena that take place on small scales when studying the behaviour of nano-reinforced materials. Recently, we have also become interested in issues involving multiphysical parameters. For example, we have been working with Anne-Virginie Salsac from UTC's BMBI (Bio-Mechanics & Bio-Engineering) Laboratory on the conditions for microcapsule rupture in fluid flow situations. We have also

recently been working with Ludovic Cauvin on modelling thermomechanical couplings in nano-reinforced materials», she points out.

Concrete projects in progress? «I'm currently working on an ANR project entitled «Influe», involving Cerema in Compiègne, the Pprime Institute in Poitiers and the Établissement Public Territorial du Bassin Saône et Doubs (EPTB), which is responsible for water management in the Saône watershed. The aim of this project is to develop experimental and digital tools to understand the impact of increased river traffic on navigable infrastructures as such. Pprime is mainly in charge of the experimental part, while UTC and Cerema are concentrating on the digital part. We're working on this project with a colleague from Cerema, who is a fluids mechanics "computationalist" and has a very good command of the tools needed to predict the hydrodynamics associated with the passage of barges, while I'm contributing my skills in solid mechanics to understand and therefore anticipate the impact of these passages on the porous material of the canal/river banks. What we're particularly interested in is the effect of increased river freight traffic on bank stability, with the aim of making bank protection as natural as possible. The aim is to provide answers to questions such as: are riverbanks and infrastructures threatened in their current state? What preventive measures can be implemented to avoid excessive damage? And finally, what type of naturabank protection should be put in place, and how should these protections be qualified,» concludes Delphine Brancherie.
This project has just commenced and should culminate in the launch of a PhD thesis in the coming months. ■ **MSD**

Electromobility and innovative batteries

Christophe Forgez is a university professor and research scientists at UTC's Roberval Laboratory. Until July 2024, he headed the «Mechatronics, actuators, robotization and systems» Department. His research focuses on innovative batteries for electric vehicles.

Christophe Forgez was recruited as an automation engineer at the Compiègne Electromechanics Laboratory (LEC), which merged with the UTC Roberval Laboratory in 2018. Among his research activities? «One of the aims of my research is to establish diagnosis laws. Initially, it was for electrical power units, in particular starter-alternators, as part of a joint laboratory organised between Valéo and LEC. In a way, we were already working on the beginnings of hybridization. For me, it was a matter of monitoring the core temperature of these units to avoid them being damaged. The LEC drew on several areas of expertise: one was in the design of electrical machines and their specific controls and another was in power electronics. We specialised in on-board electrical energy systems, in particular electric power-trains for vehicles, but lacked the battery component as an energy source. Therefore, it was quite natural for me to take an interest in this area,» he explains.

It's an area of research he's been developing since the 2000s. «Since the early 2000s, I've been developing models that I initially used for diagnostic functions. In other words, to ensure that the electronics and IT used around the battery can monitor and ensure its proper functioning. These algorithms are embedded in a BMS (Battery Management System), which is essential for all lithium-ion batteries, and is responsible for checking that there is no risk of overheating or explosion. We are also working on subjects such as ageing, in order to be able to predict a battery's life expectancy. This is a topic designed to meet the business plan of a company wishing, for example, to electrify a power-train, and which would therefore like to know the size of its battery pack according to the targeted application, as well as the lifespan of the batteries. In conventional use, for example, manufacturers would aim for batteries and vehicles to have the same service life,» emphasizes Christophe Forgez.

With the rise of electromobility, these themes are of interest to a large number of players in both academia and industry. «UTC is a member of the «Commutes» consortium, which includes the CEA, IFPEN, the IMS laboratory in Bordeaux, the Gustave Eiffel University in Lyon and EIGSI, an engineering school in La Rochelle. The aim of the consortium? The aim is to pool our testing resources and offer industrial partners one-year test campaigns to try and understand how batteries become degraded under certain conditions, so as to build up databases that can be used to produce more robust models. For example, we've been working on cold charging to see how batteries behave in extreme cold, so as to define charging protocols. I also have direct, recurring partnerships with manufacturers such as Renault and Safran... This enables me to fund theses for three years on a problem framed in consultation with the company», he explains.

Innovative batteries

Until now, the aim of this research work has been to make batteries more reliable, more robust and also more durable. «Today, we're trying to go further by developing innovative batteries. The aim is to determine different ways of using batteries. How, for example, can we speed up charging? At present, a 5-minute charge is not possible, but we're working in this direction. The idea is to validate our models so that they are sufficiently reliable. Experimentally, we currently know how to charge a battery cell in 10 minutes at zero degrees, without damaging it. This control law can be transposed to the vehicle scale to monitor the smooth running of charges lasting around 20 or 30 minutes, and to ensure that at no point does this rapid charge lead to premature degradation», concludes Christophe Forgez. ■ **MSD**

A mark of distinction for UTC

Led by Sorbonne University, in an alliance with UTC, the PostGenAI@Paris programme is one of the 9 winners of the national 'IA-Cluster' call for expressions of interest (CEI). Endowed with 35 Meuros over 5 years, this cluster will contribute to France's strategy in artificial intelligence (AI), by creating an international centre of excellence specifically dedicated to post-generative AI.

This funding will be used to support research projects, to develop training programmes and to unite the academic community. In addition to this public funding, industrial funds will be used to strengthen partnerships within collaborative acceleration projects (CAP).

As a mark of recognition and a distinction for UTC and its skills and expertise, the university is involved in four CAPs and is leading two of them. One by Véronique Cherfaoui for UTC-Heudiasyc (UMR-CNRS 7253) and its associated joint laboratory SIVALAB with Renault Group, the CAP 'Twinning' aims to study shared driving between a driver and a vehicle capable of autonomy, in particular by studying the interactions between the driver and the vehicle to enable autonomous, cooperative and safe travel on open roads.

The second CAP, 'Industry', is co-directed by Alexandre Durupt for UTC-Roberval and Yves Grandvalet for UTC-Heudiasyc, and also involves the joint DIMEXP laboratory with UTC-Roberval and DeltaCAD.

And among the aims of this PAC?
'The emergence of societal issues, in particular the ecological question, which is encouraging industry to be more efficient and more environmentally virtuous. Hence the importance of developing methodologies for error detection and predictive maintenance of industrial systems. At present, all the recent AI technologies, and in particular the advent of Deep Learning, have made it possible to develop more effective fault detection technologies, with 'false positives' or false alarms needing to be as low as possible,' explains Alexandre Durupt.

Finally, the last two CAPs are supported by Sorbonne University.
The first, with which the Biomechanics and Bioengineering research unit (UTC-BMBI, UMR-CNRS 7338) is associated with Anne-Virginie Salsac, and steered by Isabelle Bloch of Sorbonne University, involving clinical partners as well as numerous industrial partners. 'We have established a very strong partnership with ANSYS France, which specialises in multiphysics digital simulation. Our objective at UTC is to further develop digital models of intra-cardiac blood flow and valve and vessel wall movements in order to create digital twins of the heart. They must be biofidelic, i.e., must reproduce both physiological reality and certain pathologies, in order to be able to test medical devices. We will also need to collect the most complete data possible from clinicians. The use of AI will enable us to speed up calculations and obtain results in a timeframe that is compatible with clinical and industrial reality', assures Anne-Virginie Salsac.

The second project, also supported by Sorbonne Université, involves the LMAC laboratory for UTC, a laboratory renowned for its methodological contributions. 'This CAP concerns energy storage. The aim is to carry out multi-scale modelling in the design of Li-ion batteries in order to optimise their performance and maximise their lifespan. The methods used to design batteries of different sizes are not the same. The idea in this CAP is to use applied mathematics and, in particular, partial differential equations, to build models that favour reliable predictive approaches that offset the high cost of generating experimental data', explains Salim Bouzebda. ■ **MSD**

40 YEARS OF EDUCATIONAL SCIENTIFIC AND TECHNOLOGICAL INNOVATION IN THE SERVICE OF INDUSTRY

In the mid-80s, educational and scientific work on what was then known as "productics" (production-computing-automation) was carried out at university sites in France.
The AIP (Ateliers Inter-établissements de Productique) network was set up in 1984 at the instigation of the French Ministry of Higher Education and Research to promote and deploy new automated production technologies on academic campuses. At the end of the decade, CADAS, the future Académie des Technologies, of which UTC President Michel Lavalou was a member, decided to give new impetus to training in engineering sciences and industrial technologies, by mobilizing all the then-emerging IT solutions such as computer-aided design (CAD) and computer-aided manufacturing (CAM).
It was under the leadership of Jean-Louis Batoz, head of the digital mechanics research team at UTC, that the technologies and resources required for structural calculation were brought together in the 1991 creation of the national PRIMECA plan: Pôle de Ressources Informatiques pour la MECAnique.
In 2001, AIP and PRIMECA merged to offer shared technological resources for research and teaching, in the form of a scientific interest group supported, once again, by the French Ministry of Higher Education and Research. Between 2012 and 2020, UTC was responsible for the general management of the GIS S.mart, renamed Systems.Manufacturing.Academics.Research.Technologies in 2015.
After 40 years, the ambition of GIS S.mart is still to develop and share academic resources and expertise in training, research and innovation in the field of the Industry of the Future.

TRANSITION ÉCOLOGIQUE

UTC's major energy renovation plan

The university of technology of Compiegne (UTC) has been deploying, over the past several years, an active policy of building works to reduce its energy consumption and at an accelerated pace since the "France Relance" plan in 2020 and the "Sobriety plan" in 2022. This is compliant with regulatory requirements, but also with the engineering school's proactive policy of actively engaging in the threefold: ecological, societal and digital transitions.

Reducing UTC's carbon footprint is one of the objectives of the strategic roadmap adopted by UTC's Academic Board of Directors last May. And building can make a major contribution. As a reminder, the building sector accounts for 44% of energy consumption and almost 25% of CO2 emissions in France (source: Ademe); the French government is therefore insisting on the need for its assets to set an example, by encouraging universities to carry out renovation work. Such work also helps the institution to contain rising energy bills, which impact heavily on their budgets. «The aim is to identify opportunities for energy savings, both in terms of building performance (by insulating buildings, for example) and in the day-to-day use and operation of the establishment. As part of the Sustainable Development and Corporate Social Responsibility Master Plan currently being drawn up, we are working on all these areas, with a particular focus on raising user awareness so that they learn about and adopt energy-saving behaviours on the premises. The aim is not just to reduce energy consumption: we are also working to ensure that the work carried out improves user comfort,» explains Emmanuelle Hardy, Director of Heritage and Logistics at UTC. In view of the efforts required to improve the energy performance of its buildings, the UTC finances some of the work itself, but also takes advantage of the opportunities it is given to achieve this by responding to various calls for projects, such as the recent Ecological Transition 2024 call for projects, carrying funding of €878 267.


EMMANUELLE HARDY

ARNAUD FRANÇOIS

Focus on the Ecological Transition 2024 call for projects

Work on this call for projects is concentrated on the Benjamin Franklin and Centre de Recherche sites, which are both the largest and oldest sites on the UTC campus. These two sites account for two-thirds of the UTC's surface area and are characterized by their poor initial energy performance. At the Research Centre, the work will involve repairing and reinforcing the insulation of the heating pipes, which carry water at temperatures of up to 80°C. At Benjamin Franklin, all the floors facing the exterior will be insulated. This work will be 95% complete by 2024. «We expect to save several hundred MWh per year and improve user comfort.

Inventory of UTC sites

The Benjamin Franklin» building, accounting for 15 400 m² of gross floor area (GFA), dedicated to core programme teaching and student activities, was built in 1975, with low thermal insulation because it was built before the second oil crisis and with some stringent architectural choices. Located in the heart of downtown Compiegne, the building is highly protected in terms of architectural standards, making it particularly difficult to work on. The UTC Research Centre, with 29 300 m² of floor space for research and specialized teaching, was built in 1978. It has been the main focus of energy renovation investments in recent years, but it is also architecturally protected due to its proximity to the Royallieu Abbey, making it very difficult to work on the building itself. For the Pierre Guillaumat building and its 11 200 m² of GFA, built between 1996 and 2006, the thermal insulation is satisfactory. Here, few investments have been made in energy savings, as the buildings are recent. As for the Site de l'Innovation, with several buildings built in 1991, 1996, 2014 and 2015, the latest buildings have high energy performance levels.

Since 2021, over 5 million euros worth of work has been carried out to improve energy performance and summer comfort at the Research Centre and Benjamin Franklin building, thanks in particular to the France Relance plan.

More than 5 million euros worth of work has been completed since 2021

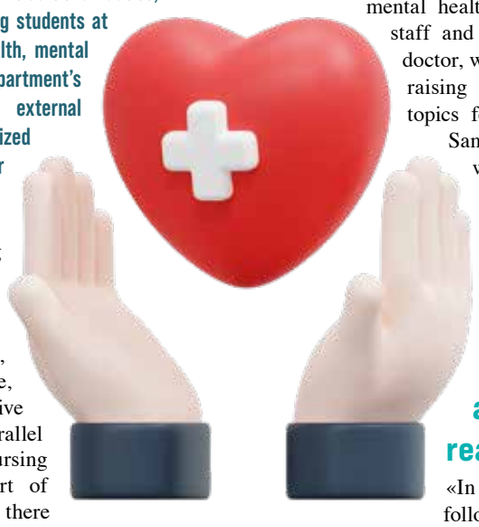
For several years now, UTC has been working to improve the energy performance of its buildings, with emblematic projects such as the connection of all its buildings to the district heating network, which since 2021 has been more than 65% powered by biomass (wood) rather than by gas; the complete renovation of the wing of one of the Research Centre buildings (Building H), resulting in an energy saving of more than 60% after the rehabilitation work was completed; likewise for the insulation of all floors facing the outside of the Research Centre. Since 2021, over 5 million euros worth of work has been carried out to improve energy performance and summer comfort at the Research Centre and Benjamin Franklin building, thanks in particular to the France Relance plan. «Other actions were added, such as lowering the winter indoor reference temperature to 19°C, purchasing electric service vehicles and installing recharging stations, setting up an energy performance contract with the heating operator, or the installation of an adiabatic cooling system in the Sports Hall, which is more virtuous than air-conditioning and very useful in periods of high heat, particularly during exam sessions» adds Arnaud François, in charge of the Building and Energy Renovation operation. UTC is therefore truly committed to a continuous improvement approach, particularly in terms of thermal performance and the use of bio-sourced materials wherever possible. ■ **KD**

STUDENT LIFE

Health and preventive medicine, the strength of a team

At UTC, student health and preventive medicine are taken very seriously. In fact, there is a dedicated service staffed with health professionals constantly available and accessible free of charge. They include a nurse, a psychologist, a general practitioner and a student health relay coordinator.

Alice Hoogendoorn-Marichez is a general practitioner at UTC. As a part-time doctor in the preventive medicine department, she has a number of roles to fulfil in addition to her traditional duties, such as receiving consulting students at their request (physical health, mental health, referral to the department's psychologist or to external psychologists, specialized interviews for advice or guidance (diet, sexuality, STIs, sleep, etc.). «I take charge of providing medical advice following treatment and referral by the department's nurse, Dominique Albanese, as well as preventive medical visits in parallel with preventive nursing interviews. At the start of each academic year, there are slots dedicated exclusively for consultations, in connection with requests for certificates of non-counter-indication in regard to the practice of leisure sports. I'm also an certified CDAPH (commission for handicapped persons) doctor, providing medical advice on special exam arrangements for students with disabilities. I'm also a member of the UTC's unit fighting sexist and sexual violence against students and I also provide mental health first aid training for staff and students,» explains the doctor, who also runs awareness-raising modules on certain topics for the Etudiants Relais Santé (ERS Health Relay), who play a key role in prevention by and for peers, and act as a link between the preventive medicine service and students.



Drugs, alcohol and virtual reality

«In 2023, we also tendered following an ARS call for projects on the prevention of addictive behaviours among students. We chose to work on alcohol, cannabis, cocaine and nitrous oxide, with the help of an addictologist and a graphic designer. From September onwards, we shall be presenting students with a campaign to raise awareness of the harmful effects of alcohol, using shocking virtual reality videos,» says ERS coordinator Sandra Morineau, who is also working with students on an escape game on the subject of nitrous oxide and on the preparation of a party-goer's kit, to be handed out during matriculation induction, which will include glass protection and breathalysers. «To broaden our preventive actions, we are fortunate enough to benefit from student jobs financed by the Hauts-de-France region: Student Health Relays, supervised by the ERS coordinator, under the responsibility of the preventive medicine department. Through the ERS, a collective prevention approach has been developed over time. For harm reduction, we already have links with external structures such as SATO, cf. sato-picardie.fr) and the French national addiction association.

The "MPSL" (Master plan for improving student life at UTC, 2024-2028) as a guideline

Alice Hoogendoorn-Marichez naturally took part in the preparatory meetings and working groups to draw up the MPSL "master plan for improving student life". She was appointed pilot for ambition 1-1 of axis 1, entitled «Improving prevention and access to care, and helping students to take charge of their own health», and all the members of the preventive medicine department are co-pilots for other points of the MPSL, physical and sports activities, or the promotion of equality, respect and inclusiveness in all aspects of student life,» stresses the doctor, for whom each member of the department has a particular role to play in student life, and therefore likewise in the MPSL. One of its objectives is to emphasize «the importance of taking care of oneself» in a general sense and thereafter to focus on more specific subjects such as addiction prevention and harm reduction in party-going environments. ■ **KD**

MENTAL HEALTH TAKEN INTO ACCOUNT APPROPRIATELY

Mental health has always been an important issue at UTC, even before the introduction of the MPSL - which will help to raise the profile of what already exists, and also enable the development of other projects around students' mental health, such as the presentation of the department's psychologist and the medical department at the start of each academic year. The psychologist provides free, confidential consultations, with the possibility of telephone interpretation to overcome language barriers, plus remote follow-up when students leave Compiegne for internships or abroad, so as not to interrupt follow-up. She also provides various psychological assessments, which are costly if carried out in private practice, and 'assertiveness' workshops. These are full-time consultations for the clinical psychologist, with over 1 200 appointments each academic year. The aim is also to facilitate direct access to the psychologist for students, thanks to the Doctolib internet platform and the possibility of setting up in-house psychotherapy by the psychologist too. «The student can consult the university psychologist for any type of difficulty: malaise, stress, personal or family problems, anxiety... There is also extensive liaison work with other mental health structures or general practitioners, psychiatrists and neuro-psychologists for sometimes duplicate follow-ups. At the start of each semester, the ERS also provides training on stress and the helping relationship, to give peers the keys to directing students in difficulty towards a health professional,» points out psychologist Catherine Carpentier, who also works with the local mental health committee of the Compiègne conurbation and the Centre Médico Psychologique.

SOCIETAL RESPONSIBILITY

When singularities are taken into account as a guarantee of success

At UTC, there are no impossible paths to achieving your goals. **Inclusion, commitment, innovation and adaptation to profiles, specific needs and unique student backgrounds, the university of technology at Compiègne enables everyone to achieve their personal potential.**

Pugnacity, positivism, resilience... There are students who stand out for their ability to achieve their goals. With her degree in computer engineering in hand, Marion Durand left Compiègne to return to her native Marseille, where, freshly hired since September, the 24-year-old graduate has joined the team at Biblibre, an innovative and socially responsible company specialising in open-source software and services for libraries. «I did my mid-course placement there (TN09). Everything went really well. They finally hired me, says Marion Durand, who didn't hesitate to invest an extra year of study in order to obtain a master's degree in health engineering at UTC after her engineering diploma. For Marion Durand, UTC was an obvious choice:

« UTC was one of my choices because it meets the specific needs of students and finds solutions adapted to atypical profiles.

«The engineering school was one of my choices because it responds to the specific needs of students and finds solutions adapted to atypical profiles, such as exam arrangements. Some institutions don't invest as much as UTC. Both dyspraxic and dyslexic, Marion Durand has been using computers and software to take notes, adapt fonts, use editable documents and accumulates solutions as she learns. Computers are an integral part of the profile and life of the now computer engineer:
«Without a computer, I would never have hoped for more than the baccalauréat or a BTS. The UTC's student disability office was very attentive, just as the teaching staff were committed and willing to understand and find solutions. Since my arrival, I've been very well supported and I've never felt alone or isolated. At UTC I was able to choose every course I wanted to take.

'Adaptation is à la carte'.

To make everyday life easier and improve independence for everyone, UTC has put in place a multitude of solutions to adapt to the needs of each individual and to offer the best possible conditions for welcoming everyone. «There is no single solution. That's the very essence of UTC,' emphasises Virginie Leviel, the university's student disability officer, who this year is supporting 141 students through to their professional integration. From human assistance to organisational or technical help, the student disability liaison officer identifies and analyses the specific educational needs for adapting studies and examinations: help with notetaking for lessons, tutoring among students, provision of materials and equipment, extra time allowed for exam composition, adaptation of subjects, adjustment of the timetable, etc. The educational adaptation is done on an à la carte basis. Organisational assistance is also taken into account through cross-disciplinary and interactive work with the school, the resources made available, travel and even preventive medicine. Inclusive, UTC is constantly adapting and progressing in all areas! ■ **IL**

WORK AND PEDAL !

ZERO STRESS !

UTC is one of the first higher education establishments in France to have acquired this sort of equipment. The installation of desk bikes and dynamic stools in the library on April 15 is part of the promotion of physical activity among all students, as set out in the master plan for improving student life at the UTC. Co-financed by the Contribution de vie étudiante et de campus (CVEC) and the UTC's disability relay, this equipment benefits everyone. «The stool requires you to sit up straight to avoid musculoskeletal disorders, while the desk bike consists of a height-adjustable table adapted to a pedalling system. It makes it easier for students with attention problems to concentrate, reduces stress and makes a sedentary activity more dynamic,' explains Véronique Hédou, a teacher-researcher in applied mathematics in charge of student life. Many students need to do something else while they work'. As soon as the equipment was installed, students were enthusiastic about it, and it could eventually be found at other UTC multi-activity sites. In conjunction with the students, the university is also considering the introduction of challenges such as the number of steps to be completed or the number of steps to be climbed, where possible. Véronique Hédou adds: 'In the near future, we're going to open an isolation room where you can "recharge your batteries". This is something that students have typically asked us for, as is the installation of a weight-lifting room in the Crous residence. With more than a hundred actions included in the master plan for improving student life to be implemented by 2028, the UTC has no shortage of means or resources, let alone ambitions for optimal study conditions.

CONCOURS

Three minutes to convince

Augustin Brassens, a first-year doctoral student in the Engineering Sciences doctoral school at UTC, won the Internet users' prize at the My PhD in 180 seconds, abbreviated top "MT180"with the final held at the Sorbonne University Alliance premises on March 25.

Stopping the use of animal models such as mice thanks to tissue engineering, microfluidics and organ-on-a-chip studies is what is at stake in the research on this promising technology carried out at the UTC's Biomechanics and Bioengineering Laboratory (BMBI) by Augustin Brassens, co-supervised by Rachid Jellali, member of the "Interactions fluides structures biologiques" (IFSB) team, and Éric Leclerc, CNRS research director at UTC's BMBI Laboratory. Explaining in 180 seconds the development of an adipocyte model on a chip to study liver-tissue interactions during the progression of non-alcoholic fatty liver disease is the challenge engaged by this 28-year-old PhD student from Nîmes, who arrived at Compiegne earlier this year. Winner of the Internet Users' Prize at the Alliance Sorbonne-Université's "Ma thèse en 180 secondes" final on March 25, Augustin Brassens stood out brilliantly from the 18 candidates in the running. The aim of his project: «To find medical solutions that are as close as possible to the functioning of the human body,» he explains. The ambitious outcome would be to transpose the human being onto a chip, to push the model to a realistic level.» For the doctoral student, the competition proved to be a formative and enthusiastic experience: «A good exercise in popularizing science, very encouraging for the continuation of my thesis. From an innovation point of view, the TedX conference format could be a new challenge.»

Congratulations from strangers and messages of support have since poured in on his social networks like LinkedIn. I'm surprised by the visibility MT180 has given me,» says Augustin Brassens. I was able to capture the attention of listeners and expand my circle of friendly and professional acquaintances. The teams at UTC are incredible. The people in charge of theses and the UTC management are very attentive and have a real ability to promote what they do. When I arrived here, I couldn't have dreamt of anything better.»

Adapting one's approach

and lending meaning to your work

MT 180 allows you to approach your subject in a different way, by getting to the heart of the matter, adapting your speech to your audience, taking a step back, getting your head out of the game and lending meaning to your work. Christine Prelle, director of the UTC's Sciences pour l'Ingénieur doctoral school, comments: «Doctoral students are focused on a scientific vision that generally doesn't speak for itself. This competition is a way of popularizing the subject and convincing them that it is interesting and important for Society. It can arouse curiosity and raise awareness among people interested in research and entrepreneurship». This highly formative competition is also highly selective. Over the past five years, out of the nine UTC finalists encouraged to take part in this type of competition, just one has been selected for the MT 180 national final. At the doctoral school, to help students talk about their subject, training courses are offered, in particular with a journalist in order to learn how to adapt one's speech and facilitate the transmission of a message to press professionals. Christine Prelle explains: «We also work with an illustrator, using visual art, collages and mobiles that speak to the public. In 2023, for example, we exhibited the work of doctoral students, which captured the attention of the youngest visitors. Popularization is a successful gamble. ■ **IL**

AN EYE-WITNESS

Louis learns life, hands-on

My name is Louis and I'm currently studying process engineering at UTC. During my studies, I had the chance to chair the Pôle Vie du Campus (PVDC -Campus life Pole) last semester. This experience has proved to be invaluable both personally and professionally and I hope to share some of it with you in this article.

To begin, what is the PVDC? The Pôle Vie du Campus is an association under the French law of 1901, federating some forty clubs and commissions with a wide range of activities. These include the student accommodation hostels (the famous Pic'Asso), the induction associations for new students, travel associations, foreign culture associations, board game associations, oenology associations, sewing associations, bathtub racing associations, running associations, fishing associations, charcuterie associations, etc. As president of the PVDC, I was responsible for overseeing the activities of these different entities and advising them as best I could to ensure that their activities took place with the best possible conditions. This role enabled me to develop skills in management, communication and organization. On a personal level, I've really flourished in this role, centred as it is on exchanges with students, each more motivated than the others. I'd like to make it clear that my commitment to the cluster would have been meaningless without the commitment of all the students I worked with, within the Pole, the BDE (students' union) and all the federation's clubs and commissions.

As part of the «asso élite» (elite) course, my involvement in associations was valued in the same way as that of students enrolled in the «sports» or «music élite» courses. These pathways recognize and highlight students' commitment to associative life, theoretically offering adjustments to their timetable for example. Although in my case such arrangements were not necessary, this recognition testifies to the importance attached by UTC to student involvement. This commitment has been a real school of life, providing me with valuable skills and concrete experience of teamwork and project management. I can only urge every student to get involved in the university's associations and clubs. Not only is it a great opportunity to meet exciting people and develop new skills, but it's also a great way to contribute to the dynamics and spirit of the UTC campus.

In conclusion, my experience as President of the PVDC has been one of the most formative periods of my student life. It enabled me to grow and develop, and to prepare calmly for my entry into the professional world. I'd like to take this opportunity to thank the clubs and committees of the Pole for placing their confidence in me, the members of the BDE for the warm, family-style welcome they offered and UTC for allowing this associative life to flourish. And let's not forget, there is life after school! ■ **Louis Vibert**

RESEARCH

Algorithms in the age of the quaternion

Pedro Castillo, CNRS research-scientist at UTC's Heudiasyc Laboratory, is co-leader of the Robotic Interaction Systems (SyRI) team. Specialized in automatic control applied to robotics, he is also in charge of the unit's «drones» activities.

Pedro Castillo and drones go back a long way, since he started his thesis at UTC in 2000, focussing on the automatic control of drones. In early 2004, this thesis won him the national prize for the best thesis in automatic control. In 2005, he joined the CNRS at the Heudiasyc UTC joint research unit, where he continued his research into miniature drone control. The ASER team, later renamed SyRI, was one of the first to work on the subject and was one of the first to develop an autonomous four rotor drone.

At the time, this research was carried out using very conventional methods, based in particular on one of the Newton-Euler theories. Since then, the team has changed its approach to one based on the so-called quaternion.
In concrete terms? «The quaternion is a mathematical approach that can represent the rotations of a body in three dimensions. Applied to UAVs (unmanned aerial vehicles), it enables us to develop more robust and powerful algorithms to precisely control the orientation and speed of a given UAV or object. It also enables us to design control and prediction schemes, particularly in the event of an attack on the drone. In this situation, we can make it fly at very high speed, decelerate very quickly or change its trajectory», explains Pedro Castillo.

Up to now, whereas drones navigated with inclinations of less than 10°, SyRI's researchers have succeeded, thanks to their new approach, in making them do pirouettes too. It may sound trivial, but the potential applications are real. «Imagine a madman holding a family in a house with a slightly open window. The drone can sneak in and give the police the topography of the scene, the location of the hostages and the intruder, etc., with minimal risk of being shot down, since it can accelerate or change trajectory very quickly. We're also working on a drone that can be launched like a boomerang, and which, even though its motors are not switched on, will stabilize itself in flight autonomously. It will then follow the instructions given to it by the operator, such as chasing a target, taking photos, etc. This will be very useful for our work in the field. This will be very useful for firefighters, for example,» he assures us.

The quaternion approach has enabled them to extend their research to heterogeneous cooperation, i.e., interaction between an aerial vehicle and an autonomous ground vehicle and to move from working on a single agent to multi-agent UAVs. In other words, several drones co-operating.

In the first case, the aim is to ensure that the exchange of information between the two vehicles is as precise as possible. «Take a phenomenon like an earthquake. The drone can go where the ground vehicle cannot, and vice versa. In this scenario, co-operation between the two and the exchange of precise information between the two can be vital for survivors,» he says.

«The quaternion is a mathematical approach that can represent the rotations of a body in three dimensions. Applied to UAVs, it enables us to develop more robust and powerful algorithms to precisely control the orientation and speed of a given UAV or object.»

In the second case, their work focusses on the drone/anti-drone issue, in response to a call for projects from the French National Research Agency (ANR). The call for projects was prompted by the explosion in the number of drones possessed and flown by individuals and the multiple overflights of sensitive areas such as nuclear power plants and airports. «The idea is to mobilize a fleet of drones to neutralize the unwanted intruders. Even though we didn't receive ANR funding, we continued to work on this problem. Today, we are proposing energy-based control approaches to students for the purpose of tracking the dynamic target encircling and neutralizing it. These controls turn the intruder into an «attractor» for the drones assigned this task, viz., neutralizing it, while avoiding the risk of collision. The latter can adapt both their speed and trajectory to the target's movements», explains Pedro Castillo.

Other drone-related research projects? «We are also working with Jean-Daniel Chazot de Roberval on acoustic drones. This involves equipping drones with acoustic antennae to detect a particular sound and adapt their trajectory to the source of that sound. Take the case of an earthquake. People may still be alive but buried under rubble. A drone equipped with a camera won't be of much use, but one with acoustic antennae can detect the cries of these people, enabling rescuers to get to their precise locations. This could also be useful for neutralizing Asian hornet nests, for example, which are often nestled high up in trees or under roofs, by tracking a hornet. A CIFRE thesis with CETIM is currently underway on this subject and another is due to start in the autumn,» he concludes. ■ **MSD**

Introducing an industrial woman

Please meet Géraldine Soulié, 51, General Manager in charge of International Manpower Resources and Relations at the Renault automobile Group. She is a qualified mechanical engineer with over 26 years' experience in the automotive sector, currently in charge of international social dialogue, managing and coordinating the Renault Group Works Council. How does she see the rise of women in management positions?

Since 2021, Géraldine Soulié has been in charge of the representative body for all Renault Group employees in Europe and elsewhere in the world, comprising around thirty delegates who represent some fifteen countries. Her professional career has taken her through a number of very different specialties, from purchasing to quality and engineering, via safety and HR, whose human dimension has always been a source of inspiration and motivation for this woman whose driving force is to learn and act. She is also an advocate for greater representation of women managers. «Women are still under-represented in technical and digital professions and even if the quotas imposed by the Rixain law are aimed at corporate governance bodies, it is important to continue to develop a proactive approach in this area at all corporate levels, whether it be in terms of recruitment or career building and progress, monitoring the progress of gender balance in teams and management committees enables us to pay particular attention to women managers and executives, and to oversee their development,» says Géraldine Soulié, the Renault Group always ensuring equal treatment for men and women. In any case, after more than 22 years' experience within the group, this is the conclusion Géraldine Soulié draws in terms of treatment, development, promotion and career paths.

Boosting women's careers at Renault

Numerous actions have been implemented within the Group to promote diversity and inclusion, integrating all talents so that everyone can make their contribution under the best possible conditions, for the benefit of both individuals and the company. «It is based on the Diversity & Inclusion Department's strategy, which rests on four pillars: guaranteeing fair and respectful treatment, offering an inclusive working environment, supporting integration and development and increasing the representation of diversity. These four pillars are interdependent. To guarantee fair treatment, in addition to the Zero Discrimination policy communicated to all employees and integrated into all HR processes, discrimination awareness programmes have been set up throughout the Group, including cognitive bias training for all employees, inclusive management training for all managers, surveys to measure employees' perceptions of the inclusiveness of their working environment, etc.,» explains Géraldine Soulié. As for the development of women, several specific programs have been designed to support them: mentoring, coaching and training programs to boost their career development. The Women@RenaultGroup internal network complements the actions taken by the Group to promote the visibility of women and 'sisterhood' for greater gender diversity within the company. The automotive and mobility sector is undergoing constant change, and for Géraldine Soulié, accompanying the company in its transformations offers many challenges that she is more than ever ready and willing to tackle. ■ **KD**

3 QUESTIONS FOR ...

VALÉRIE FERRAND, DIRECTOR OF MANPOWER DEVELOPMENT AND SOLIDARITY COMMITMENT AT BOUYGUES BÂTIMENT FRANCE

How has your company taken up the issue of gender equality?

The subject of gender equality is not novel to the company. To illustrate this, our first team awareness-raising initiatives date back to 2012 and Welink, Bouygues Construction's women's network, was created the same year. Since then, we have developed numerous tools to promote the place of women at all levels of the company and in all corporate functions, such as development programs dedicated specifically to women, partnerships with associations like "Elles bougent", the setting of ambitious targets for the recruitment of women, particularly in operational areas such as construction, sales or engineering, the inclusion of gender diversity criteria in the calculation of our managerial bonuses and an in-house system to combat all forms of harassment, sexism or hostile behaviour. To be effective on this subject, it's important to tackle it in a comprehensive manner.

What results have you already achieved and what are your objectives in this area within your company?

Bouygues Bâtiment France, for example, has 33% female managers in its workforce, a clear increase over the past 10 years and we set ourselves targets for progress every year. Diversity of any kind is a factor for progress, performance, innovation and attractiveness. It is also an ethical obligation, in order that everyone in the company finds the conditions to do the job he or she wants and can express their talents to the full.

What is your role in this evolution and how do you see it?

As Director of Manpower Development and Solidarity Commitment, I'm in charge of diversity and inclusion issues. I joined Bouygues Construction 27 years ago and I can see how far we've come and how much progress we've made in this area. However, there is still a lot to be done, both within companies and in Society as a whole. I dream of a day when no profession will be "gendered" and no one will be surprised to see a woman working in a "male" profession, or vice versa! ■ **KD**

SOCIETAL COMMITMENT

Women managers also in the Public Works and Construction

How does a company like Brezillon tackle the issue of gender equality? The world of building and civil engineering had already begun its transformation several years ago, but Society is moving on and building and civil engineering must also continue to evolve. Here's an insider's view by Céline Anciaux, Business Development Manager at Brezillon.

A TP04 engineer from the ESTP (national public works engineering school), Céline Anciaux initially chose to work in road construction, a field she was passionate about. For 16 years with Eurovia, a subsidiary of the Vinci Group, she learned about road materials, urban worksites and road and technical infrastructures. «I was lucky enough to work in a number of different departments, starting out on the worksite - for me, knowing the terrain is the basis of everything I do! I was able to take part in and/or manage the construction of 8 km of 2x2 lanes, the restructuring or development of entire new districts, study and analyse airport construction sites and work with my teams on the Armistice clearing in the forest of Compiègne. I joined Brezillon in 2021, with the possibility of developing my career with new skills... repairing yesterday to build tomorrow, including soil remediation, restoration of derelict sites and ecological engineering, to position the construction industry at the heart of the environment, while remaining aware of the challenges and needs of a Society that continues to advance technologically,» explains the sales manager today, which enables her to work transversely, across all departments, from the design office to construction divisions, via communication, to support customers and find a solution to their needs.

Breaking a macho tradition in the Public Works sector

According to a study conducted by IPSOS (Polling Company) for the Association des Grandes Écoles au Féminin between 2003 and 2005, in the 2000s, 62% of company directors thought that women were less available, 55% that they were less mobile and 35% that they showed less ambition. The same study showed that 88% of female graduates from top-ranking business schools work an average of 50 hours a week, 71% travel frequently and 62% define success primarily in terms of professional success. And if this study focussed on the world of work in general, women could do it too in the building and civil engineering sectors, but the males executives were still not really opening the doors.

«To tell the truth, the construction industry has a hard time breaking out of this very «strong, virile macho» vision, with its very marked patriarchy... «it sticks to safety shoes like a good coat of hot tar». And yet, if we were to look in the rear-view mirror, we can admire how much change has occurred over the last two decades! So why not ask what women bring to the construction industry? Well, quite simply what they can bring to all areas of society and the professional world: enrichment through diversity, diversity of thought, points of view, management styles, ideas and methods,» assures Céline Anciaux. The contribution made by women to public works, the building and civil engineering sectors has helped to dust off this old image, enabling the construction trades to enter a key phase: their

«I think it's certainly one of the most complex battles because it's a societal phenomenon that invites itself into the company.»

CÉLINE ANCIAUX

PARTICIPATING IN THE EVOLUTION OF THE CONSTRUCTION INDUSTRY

Céline Anciaux is taking part in the major reorganization at Brezillon, in particular to further the evolution of the building and civil engineering sector industries. As a member of the UPDS (Union des Professionnels de la Dépollution des Sols) and the UPGE (Union des Professionnels du Génie Écologique), Céline Anciaux and her colleagues are working to meet customers' needs for brownfield remediation, optimizing the reuse of soil to avoid having to evacuate and bring back materials to limit transport and to support customers who are taking over areas where wetlands have developed, with fauna and flora that have taken the decision to conquer an area abandoned by man, knowing how to respect them and build whilst taking into account the project's existing environment. «Certain abandoned or fallow lands were used to build the facilities for the Olympic Games, and I wish these post-games facilities a long life. At a time when we are reflecting on climate change, about geopolitical stability or not, about taking into account our ecosystem and our way of feeding ourselves and exploiting our land, the construction industry is a major player for tomorrow.»

transformation and evolution within modern Society. «Our sector has thus been able to see young women dare to love construction work or engineering, etc., and help create a larger talent pool with a wide diversity of skills, sensitivities and approaches that always enrich teams to design, adapt, rehabilitate or build tomorrow's world.»

A real commitment: adopting 'equal pay' policies

Equality between men and women was one of the subjects of the French pension reform law already initiated in 2010, which required companies with more than 50 employees to work towards an equality agreement or action plan. Bouygues Construction was therefore quick to work on this agreement, reviewed in 2017 and 2021 and to be reviewed every 4 years to meet the Group's gender diversity ambitions mentioned earlier. «Our HR department is now trained in equal opportunities, partnerships are created with «Elles Bougent and "We Link" the network of women managers at BY created in 2013. We are also working on equal pay, which may have existed or still exist, depending on the position and the individual's background. When I started working in 2004 in the public works sector, it was very rare to see women in construction activities and those who wanted to make a career here were sometimes redirected more towards design offices... « Because you know, the construction site is a very important job. Because, you know, building sites are tough...». That's where passion and determination make the difference! You hang in there, you find yourself in meetings where you're the only woman and they ask you to serve the coffee, «jokingly». Today, in the Bouygues Group, I've seen a real commitment to gender equality on the part of everyone involved. But if measures or actions are monitored by KPIs (Key Performance Indicators), it means that the battle isn't over and that there's still a lot to do.»

Women have a big role to play

At Bouygues, there is a real incentive to present female CVs in male-dominated fields, and vice versa. Steps are being taken both inside and outside the company to change attitudes. «I was a nice, well-behaved little girl, but I never thought that being a civil engineer was a man's job and, in fact, I never classified jobs by gender. What about the women who join the army or the fire department? If they possess and master the skills, why not? At Brezillon, Bouygues Bâtiment's environmental engineering subsidiary specializing in soil decontamination, materials recovery, earthworks and complex platforms, and ecological engineering, we now have 20% female managers and supervisors, but Bouygues Bâtiment France has set itself the target of 35% for all sectors combined,» adds Céline Anciaux, who has benefited from tutoring and mentoring systems. Last but not least, and at the heart of day-to-day gender equality, Bouygues is committed to combating sexism and harassment. «Referents have been appointed in each entity to report incidents and questions, and to combat the ordinary, everyday sexism that can destroy a person's self-esteem. I think it's certainly one of the most complex battles, because it's a social phenomenon that's invading the company,» she concludes. Over the years, I've seen young women become determined when they've made this choice, and I've also seen male attitudes evolve. And finally, when we see that it works very well as soon as employees are open and have an intelligent mind, then I think it's much simpler to apply laws and agreements.» ■ **KD**

ART & TECHNOLOGY

The virtuous circle of partnership synergies

From the organisation of exhibitions by MET as Lato Sensu proposed last May in the showroom of the UTC's Daniel Thomas Innovation Centre to the annual gala of Étuville which was held May 25 in the Domaine de Montigny, **the UTC associations develop entrepreneurial projects thanks to the economic partnerships of the area and the support, in particular of the Fondation UTC pour l'innovation.**

The Fondation UTC pour l'innovation is a strategic mechanism for the promotion and development, support and acceleration of UTC projects, and an essential tool for cooperation with players in the socio-economic world. 'Patronage and sponsorship from local companies support the development of events, initiatives and innovative and entrepreneurial projects run by our students. This broadens the spectrum of our collaborations. It's very interesting in terms of highlighting projects and accelerating their development. With partners such as Saint-Gobain, Sopra-Steria and the Crédit Agricole Brie Picardie foundation, we can quickly mobilise private funds,' says Samuel Veillerette, director of partnerships and entrepreneurship at UTC, which interacts with the socio-economic world. Associations are the cement that binds UTC together. It's part of its influence and part of the students' training. It is very instructive in the field of project management'. Associations such as MET, Étuville and Junior UTC have grasped the importance of the support that UTC, through its Foundation, can provide for the pursuit of their projects.

The example of MET and Étuville

After a first exhibition of the multidisciplinary work of UTC students and alumni from November 10 to December 2, 2023 in the Innovation Centre showroom, the MET association, which stands for 'On Monte une Exposition Temporaire', repeated the experience last May with the opening of Lato Sensu. It's a contribution to revitalising the Daniel Thomas Innovation Centre and to bringing art and technology together outside the centre,' explains Manon Garcia, founder and president of MET, which invited artists from the UT group, including the UTT (Troyes University of Technology), the UTBM (Belfort-Montbéliard University of Technology) and UTC. For this second exhibition, we have improved the efficiency of the organisation with a better distribution of roles and responsibilities. We tested new materials and refined our technical knowledge. The initiative is gaining in visibility. We'd like to broaden the scope of our activities and, why not, hold an autumn exhibition in Compiègne town centre to attract outside visitors? With the development of Corporate Social Responsibility (CSR), a fund such as the Fondation UTC can support this type of project, which has a societal impact. Interactions with UTC partners are monitored and discussed within a Copil Entreprises at UTC, which brings together all the players in the UTC ecosystem, along with the UTC Foundation, UTeam, the Alumni, Iterra and the Student Office, to ensure synergy,' explains Samuel Veillerette. The spectrum of corporate support for UTC is very broad. This enables them to develop their image and reputation.

Whether at the Château de Pierrefonds, the Chantilly racecourse or the Château de Compiègne, the UTC gala, organised every year by Étuville for the past twenty-five years, is a true professional event. The one held on May 25 at the Domaine de Montigny, which attracted more than 4 500 participants, illustrates the ambition of the projects carried out by the students. The sponsorship provided by companies to Étuville helps to encourage their initiatives,and to ensure the sustainability and professionalism of their work. Via Fondation UTC, a sponsor can also direct their donations towards entrepreneurship and the creation of start-ups,' adds Samuel Veillerette. UTC is diversifying its resources to pursue its ambitions. ■ **IL**

"ENGINERIC" TOTEMS

BY SCULPTRESS AURÉLIEN MORIZET-MAHOUDEAUX

To mark the UTC's 50 th anniversary in 2023, the Sculpture Totem art project, inaugurated last December, presents four monumental works that are eco-responsible, participative and on the scale of the architecture of the Pierre Guillaumat building, where they are coherently installed. The work of Aurélien Morizet-Mahoudeaux combines art and technology.

'In its progression and approach, this is without doubt my most accomplished project,' says Aurélien Morizet-Mahoudeaux, a former UTC graduate who will graduate from the Beaux-Arts de Paris in 2021. The artist's four totem poles, commissioned by UTC as part of its fiftieth anniversary celebrations, illustrate a rich dialogue and the invisibility of the boundaries between engineering and artistic creation. Inspired by the work of Sol LeWitt, François Morellet, Sabrina Ratté and Kevin Bray, Aurélien Morizet-Mahoudeaux 'transforms random noises or pseudo-random procedural textures called Perlin noises into variations of infinite shapes and colours manipulated in three-dimensional images and models. After cutting and printing, the sculptures offer the materialization of the virtual, which thus becomes embedded in the real. 'Since 2020, I've been thinking about modular installations that are adapted to the site and allow digital abstractions created on a computer to be fixed in relief. For UTC, the artist has come up with modular structures that can be dismantled and moved around, laser-cut from reclaimed wood that is unsuitable for commercial use. Paper and marine varnish were also used.

A participatory project

The project gave students the opportunity to use adhesives on wall panels at the Crous and in the Philanthrope cafeteria. 'The participative concept is interesting because it decentralises the artist's responsibility for creation'. A number of UTC departments were also involved: the carpentry department, the FabLab, the printing works, the communications department, the design workshop and the logistics and security department. Between artistic creation and engineering challenges, the UTC builds bridges.

UTC'S FOUNDATION FOR INNOVATION

Supporting student dynamics

UTC's Foundation for Innovation supports the development of UTC: supporting, enhancing, financing and promoting innovation development initiatives that serve education and campus life. It also supports a number of student associations.

The UTC model is also based on the dynamic richness of a dense community life, which offers a formative factor for students and their future professional lives. The UTC Foundation for Innovation supports this community life by providing one-off financial support for projects initiated and managed by associations in the fields of solidarity, CSR (corporate social responsibility) and technology clubs. «The Foundation is keen to ensure that projects embody UTC's values, its social and humanist role in Society and that they integrate as far as possible the pillars of sustainable development, its environmental, social and economic dimensions. For example, we support school projects such as 'Formul'UT', whose main objective is to take part in the 'Formula Student' competitions organized in 2024 in France and Italy and thus promote French engineering. We also support the academic careers of student-engineers through scholarships for excellence and international influence at British, Canadian and American universities that are strategic partners for UTC,» explains Sylvie Lemonnier-Morel, Secretary General of the UTC Foundation for Innovation. Raphaël Peyronnet, President of the Team UTéCia association, also receives support. «We're developing and building an energy-efficient automobile prototype with the aim of taking part in the Shell Eco Marathon, an international competition where the objective is to cover the maximum kilometres with one litre of petrol. The Foundation also gives us the visibility we need to find partners.»

BERI scholarships

The UTC Foundation for Innovation supports the university's levels of excellence and international outreach through a fund of Excellence and International Influence Scholarships, supported by numerous alumni donors. Damien Soufflet, 23, was a student at UTC, majoring in Mech Eng with the elective specialty PIL (Integrated Production and Logistics), from February 2029 to June 2023, when he was able to go to Cranfield University in England during his fifth academic year. «I was matriculated at the School of Management and took the MSc Procurement & Supply Chain Management, which was the next logical step after my courses at UTC. Although the BERI scholarship only covers 10% of the tuition fees for the year in the UK, it was very nice to be supported by his school via the Foundation, which is doing crucial work to enable students to dream of ambitious international projects, at a time when UTC via the DRI is developing its network of double degree partnerships,» he assures us. It's a chance to outreach internationally and take advantage of the best schools to give yourself a springboard as soon as you get your two degrees.» Damien Soufflet has been in Montreal since January, studying for a DESS in Business Administration at HEC, and also working part-time as a tactical buyer for Actoran, a consulting firm.

From solidarity-oriented grocery ...

The industrial founders of the Foundation, Saint-Gobain and Sopra Steria, were very keen to support the EPI association, the Compiègne student grocery store set up in 2013. It provides all students who feel the need with weekly access to fresh and dry foodstuffs, as well as hygiene products, in exchange for a semester subscription of 11 euros. It operates mainly with and for the benefit of UTC but it is planned to expand throughout the Compiègne commune. At present, the association has around ten members on its board, plus a dozen volunteers involved in collecting and distributing products. The grocery store's main supplier is the Banque Alimentaire de l'Oise (the Oise department food-bank), which delivers a large quantity of products to the EPI premises every Tuesday morning. «The Foundation supports our association by enabling us to expand and renovate our premises with new refrigerators to hold more fresh produce for our beneficiaries. We are counting on the Foundation, its patrons and donors, to support us in our future development, so that we can best help students. Student insecurity is a subject we hear more and more about, but it is an issue that is far from being resolved,» emphasizes Manuel Acker, President of EPI.

FORMUL'UT IN ITALY IN SEPTEMBER

The Foundation is supporting the Formul'UT association, set up in 2019 with around thirty members, with a financial contribution and a promotional campaign to find potential donors and sponsors. Its aim is to take part in Formula Student competitions between engineering schools. The aim is to design and build a single-seater racing car, and to be judged not only on dynamic aspects, but also on less performance-related aspects such as budget and project management, technical choices and so on. «The association enables us to put into practice all the knowledge we've learned during our studies, particularly for mechanical engineers but also for IT engineers and lecturers us to collaborate in an engineering context,» says Alex Charot, a member of Formul'UT. We're taking part in our first European competition from September 4 to 8, the Formula Student Italy, where we'll be competing against teams from all over Europe! We hope that the Foundation will help us in our project to switch to a 100% electric single-seater, so that we can move towards more responsible engineering with our future prototype.»

... to the development of the arts

Another example is MET, "On Monte une Expo Temporaire [We put on a temporary exhibition], an association set up in July 2023 by UTC engineering students to organize temporary visual art exhibitions in Compiègne. In these productions, members showcase a variety of forms of artistic expression: painting, sculpture, photography, video, text and any other material medium that can convey ideas and emotions. «The Foundation supported MET when we wanted to mount our first art exhibition in autumn 2023. We were supported because of our social responsibility values and because we introduce a novel vision of engineering. This spring, we had an exhibition project of a different nature, as the artists were no longer just UTC and UTT (Troyes) undergrads and "UT-Bohemians". The idea was to lay a foundation stone for a Groupe UT project and the Foundation believed in us a second time. But the Foundation's support goes beyond a simple donation. We are supported in developing our strategy to find sponsors,» explains Manon Garcia, President of the MET association, who opportunely reminds us that donations to the Foundation from companies, alumni and private individuals are tax-free. Donations that make sense towards the UTC Foundation for Innovation, a link between UTC and Society to build tomorrow's world. ■ **KD**

YOUSSEF EL BAZI

Participating in the value chain

Youssef El Bazi is manager of new projects for seat components in Forvia's Europe and North Africa region. A 2008 graduate of the Integrated Production and Logistics (PIL) program in mechanical systems engineering at the UTC, this engineer likes to see his career path match the needs of the company, and vice versa. Here's how we met!

«I've chosen a career path that is essentially and primarily in the field. I started out at Forvia-Faurecia, one of the world's leading automotive suppliers, in Kénitra, Morocco, as a production supervisor, so as to be as close as possible to the heart of the action. Then, I started working on new projects for the manufacture of "covers", i.e., the textiles and leathers that cover car seats,» explains the engineer, who is quick to point out the expertise of the teams around him. We're talking about millions of parts to be manufactured, with repeated gestures and dexterity required for each one. In 2011, Peugeot 301 and Citroën C-Elysée vehicles will be covered by this «made in Kénitra» production process. «It's a great success! It confirms that Morocco is the right partner and that Moroccan engineers have the right skills to meet any demands. In 2012, Renault launched the start-up of its second production line at its Tangier-Melloussa site, consolidating its position as Renault's leading production site in Africa. This new line will manufacture the Dacia Sandero and the Step Way. «This is an opportunity for us to manufacture more parts, such as foams and headrests. We were helped by the high degree of integration of the plant's chemical activity. We became the leading equipment supplier for the seats business,» recalls Youssef El Bazi, who also saw his plant grow with an extension in 2015. At the same time, he was appointed Production Manager for the Mégane 4 project.

BIO EXPRESS

2008: earned his engineering diploma in GSM (mechanical system engineering) – elective specialty Integrated Production and Logistics (PIL) at UTC-Compiegne

2009: started at Faurecia Group (Kénitra - Morocco) as Production Supervisor

2011: Project Manager (covers, foams and headrests)

2015 : Production Manager

2017 : Faurecia Excellence system & Quality Manager

2021 : Plant Manager

2024: New Projects Manager Europe / North Africa

From Morocco, opening up to the whole world

«There are around five hundred employees and a dozen engineers working with me to meet this challenge. The results are good and, once again we're proving our competitiveness.» In 2017, the production manager saw his scope evolve towards other missions, initially as Forvia's Excellence and Digital System Manager, then Quality Manager still within the same plant. «In 2021, I was promoted to Plant Manager in Kénitra, where I now manage over 1 600 employees, executives and managers.

At the age of 40, Youssef El Bazi, himself a native of Kénitra, has handed over to his deputy to take on the role of manager of Faurecia's new Europe and North Africa projects. «Because we have more and more customers. We need to be agile and multilingual and I'd like to thank UTC for that. This school pays a great deal of attention to general culture and languages and above all to the agility of its educational system. You have to be open to the world and, in this respect, UTC-Compiegne offers so many perspectives! ■ **KD**

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AGENDA

THE UTC AI MEETING
Friday, September 20, 2024
Daniel Thomas Innovation Centre
www.utc.fr

THE SCIENCE FÊTE
October 10- 13, 2024
Pierre Guillaumat Centre
www.fetedelascience.fr

COMUTEC'S 30TH ANNIVERSARY
October 17, 2024
Le Tigre Margny-lès-Compiègne
www.comutec.org

AGRITECH DAY
October 24, 2024
Pierre Guillaumat Centre
agritechday.com

UTC OPEN DAYS
Saturday January 18 and February 22
Pierre Guillaumat Centre
www.utc.fr