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# Tales of WOMEN ENGINEERS

Portraits of ALTEN's women consultants



ALLEN

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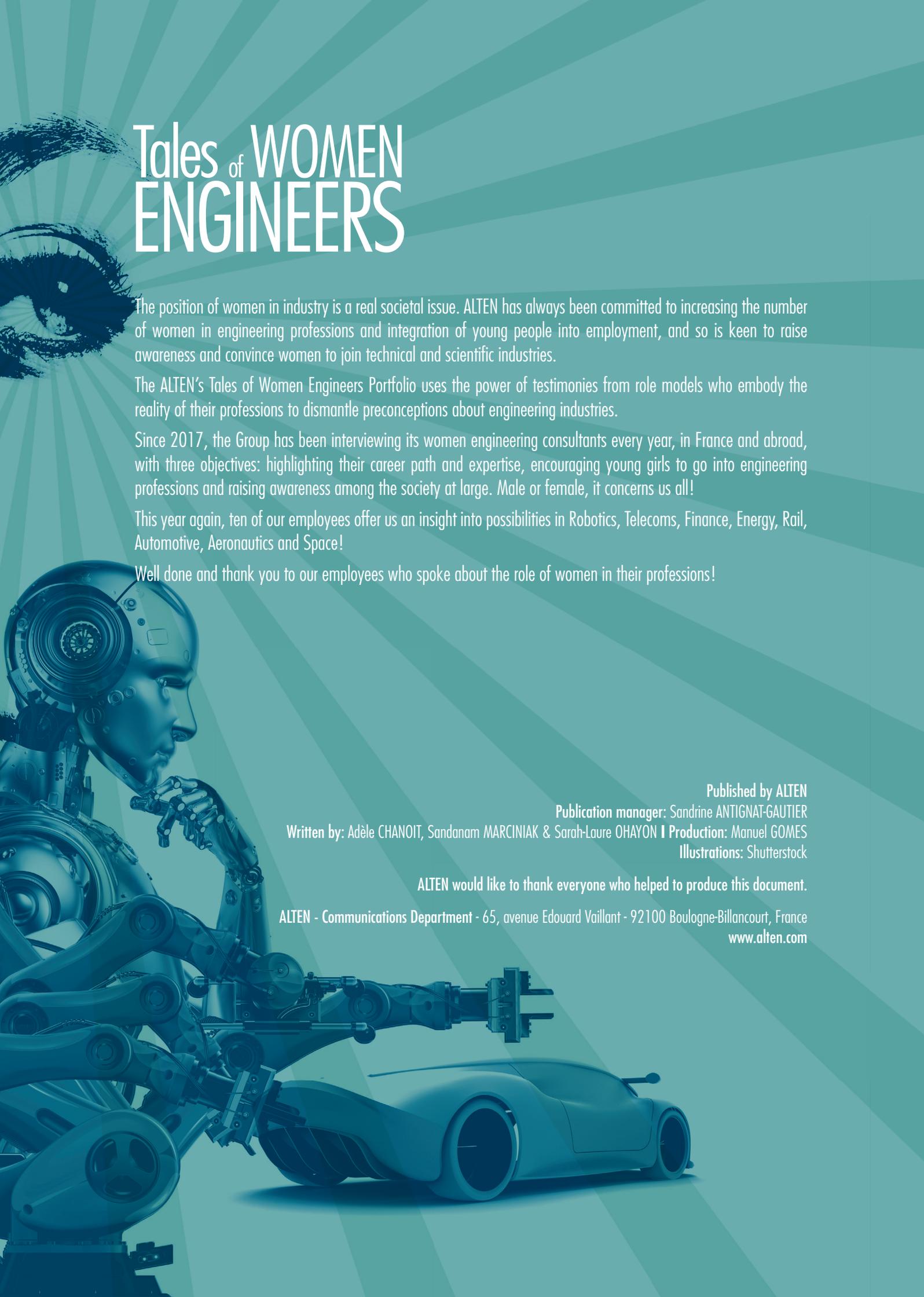
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# Tales of WOMEN ENGINEERS

The position of women in industry is a real societal issue. ALTEN has always been committed to increasing the number of women in engineering professions and integration of young people into employment, and so is keen to raise awareness and convince women to join technical and scientific industries.

The ALTEN's Tales of Women Engineers Portfolio uses the power of testimonies from role models who embody the reality of their professions to dismantle preconceptions about engineering industries.

Since 2017, the Group has been interviewing its women engineering consultants every year, in France and abroad, with three objectives: highlighting their career path and expertise, encouraging young girls to go into engineering professions and raising awareness among the society at large. Male or female, it concerns us all!

This year again, ten of our employees offer us an insight into possibilities in Robotics, Telecoms, Finance, Energy, Rail, Automotive, Aeronautics and Space!

Well done and thank you to our employees who spoke about the role of women in their professions!

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# Robotics: when innovation goes hand in hand with wellbeing



*Marina,* ALTEN Nederland Software Developer for Smart Robotics

Challenge is what drives Marina! This engineer who specialises in robotics and automation did not hesitate to leave Spain, her country of birth, to go and study in the Netherlands. There she finished a Master's in engineering in the prestigious Delft University of Technology. This led to her meeting the ALTEN teams at a professional forum where she was offered a first project in the Netherlands: a professional and personal experience full of new challenges. Marina therefore set out to not only learn Dutch but also to develop robots, fascinating technological objects with so much to learn about their complexity and perfectibility.

## **Coding a robotic arm and reassessing human activity**

"The project I am working on aims to create flexible solutions for the logistics industry. Our developments enable robotic arms to sort products, and organise stock and deliveries for e-commerce companies. As a Software Developer, my job is to programme new functions to implement in these robots". Marina is thus one of the human intelligences behind the behaviour of all these robots that correctly prepare and dispatch orders placed online to their recipients. "Together with the teams, our mission then involves testing them and deploying them at client sites. When we talk about new functions we mean teaching the robot how to behave in the presence of humans, to make this movement, to grab this product, to put it on this conveyor to

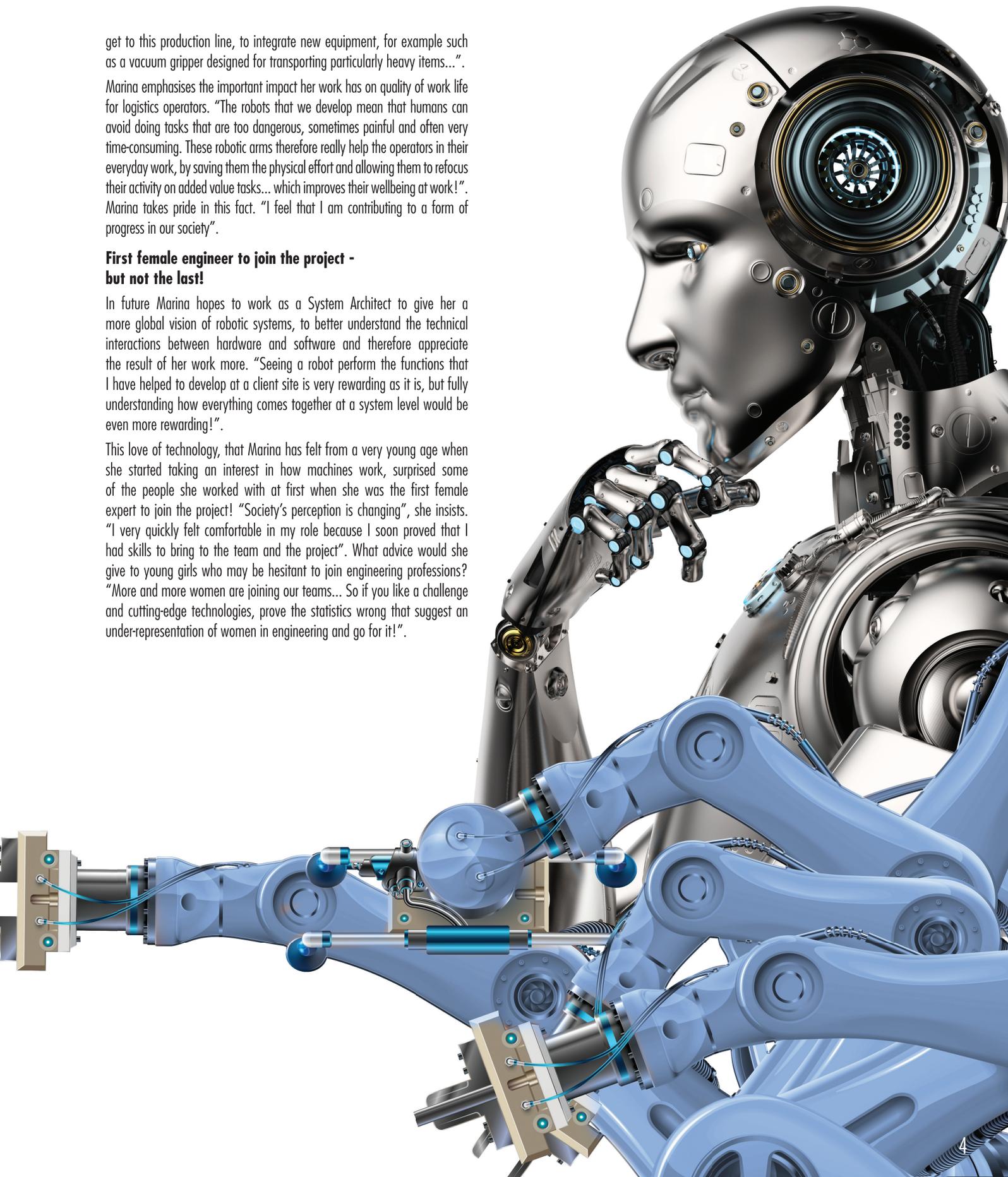
get to this production line, to integrate new equipment, for example such as a vacuum gripper designed for transporting particularly heavy items...”.

Marina emphasises the important impact her work has on quality of work life for logistics operators. “The robots that we develop mean that humans can avoid doing tasks that are too dangerous, sometimes painful and often very time-consuming. These robotic arms therefore really help the operators in their everyday work, by saving them the physical effort and allowing them to refocus their activity on added value tasks... which improves their wellbeing at work!”. Marina takes pride in this fact. “I feel that I am contributing to a form of progress in our society”.

### **First female engineer to join the project - but not the last!**

In future Marina hopes to work as a System Architect to give her a more global vision of robotic systems, to better understand the technical interactions between hardware and software and therefore appreciate the result of her work more. “Seeing a robot perform the functions that I have helped to develop at a client site is very rewarding as it is, but fully understanding how everything comes together at a system level would be even more rewarding!”.

This love of technology, that Marina has felt from a very young age when she started taking an interest in how machines work, surprised some of the people she worked with at first when she was the first female expert to join the project! “Society’s perception is changing”, she insists. “I very quickly felt comfortable in my role because I soon proved that I had skills to bring to the team and the project”. What advice would she give to young girls who may be hesitant to join engineering professions? “More and more women are joining our teams... So if you like a challenge and cutting-edge technologies, prove the statistics wrong that suggest an under-representation of women in engineering and go for it!”.



# Need for speed

*Hakima*, ALTEN Project Manager for Orange



After starting out on a scientific path as a Chemistry Lab Manager in Italy, Hakima soon turned her attention to the world of new technologies, not knowing that she would never look back.

She came to France to learn the language, continue her studies and study for a Master's in Renewable Energies. During an internship at a nuclear power plant, Hakima developed algorithms to analyse the radiation output. This insight into new technologies convinced her to go down a whole new path.

On her own initiative, Hakima trained in Java, joined a consulting firm and began a first iOS mobile app project at Schneider Electric.

After two years as a Web Developer, her potential as a Manager was noticed and she became a Scrum Master.

## **Telecoms, a constantly evolving sector**

She then joined the ALTEN teams for Orange as a Project Manager. For the last year Hakima has been leading a project to overhaul the ecosystem for managing prepaid offers in preparation for 5G.

"Working in the Telecoms sector, with technology that is such an integral part of our lives, means I can help to improve users' everyday experiences. This is rewarding and motivating" she says.

Digitalisation professions are constantly evolving, there is always some new technology, something new to learn. This idea of the unknown and constant intellectual stimulation fit perfectly with Hakima's curious and determined personality.

## **New-generation versatility**

Hakima talks about her enthusiasm for working as a Team Manager, with the interpersonal aspect being essential in her view. "It is not enough simply to have skills, we need to know how to use them wisely and understand that our interpersonal skills make all the difference," she states. Hakima is sure that her closeness to people has helped her to easily integrate into a team where most people have around twenty years of experience.

"To be an Engineer you need to be able to adapt, be versatile and constantly be learning. We can take specific actions for the advances of tomorrow". Hakima advises young women, and anyone who likes a challenge and new developments, to embrace their desires. They would certainly be able to fully satisfy their needs and ambitions.

It has been three years since Hakima changed career path and she has no regrets. The possibilities for progress are endless, just like the advance of new technologies. She is absolutely convinced that this environment will present her with new opportunities throughout her career.



# From Biology to IT

*Anna,* ALTEN Service Centre Manager for Natixis



After starting out on a scientific path as an R&D Neuroscience Engineer and with a PhD in this discipline, Anna was hesitating between moving towards innovation engineering or becoming a university lecturer. After 3 months of training she discovered the COBOL computer programming language which is used particularly in the field of insurance and banking. She worked first as a Development Engineer for a banking client before becoming an ALTEN Application Manager for Natixis and then a PMO (Project Management Officer) as a Service Centre Manager.

## **Management, Performance and Interpersonal Skills**

As Service Centre Manager and ALTEN Site Representative, Anna is responsible for the performance of her department and pays careful attention to client feedback with a view to continuous improvement.

"I am the point of contact for clients and I am the link between them, their projects and our consultants," explains Anna. She works in five different areas with multiple application projects. This involves collecting incoming requests from clients, analysing the expected technical response and the time needed to achieve it. "The interpersonal aspect requires particular agility". Anna's role is very strategic in ensuring that the mission is in line with the skills of the consultants and that they will be able to fulfil the

client's expectations. "We regularly set aside time for discussion which helps me to understand the consultants' expectations and issues". Over the years Anna has found ways to better adapt her management style according to the people she is working with.

## **Behind the scenes of banking apps**

"I have an appetite for learning, and better understanding certain general-use technologies is what drives my everyday work," explains Anna. Her teams do a lot of work on Natixis Payment solutions or management of currencies and their fluctuations in order to update data in real time.

Another area that she works in is in factoring by means of solutions that facilitate the processing of bank invoices and accelerate the sharing of information with the client. Anna has always liked innovation, and managing multiple projects as a PMO constantly satisfies her curiosity.

There are several options open to Anna as she continues her career such as becoming a Project Director, possibly in a new sector such as Aeronautics or Telecommunications. It is thanks to her perseverance that she is currently doing the work that she enjoys. "You need to believe in yourself and your skills if you want to achieve your goals," states Anna. She says there is no greater work than helping society to progress.

*"I have an appetite for learning, and better understanding certain general-use technologies is what drives my everyday work".*

# On the right track

*Cécile*, ALTEN Project Manager



While studying for a Master's in International Project Management, which included work experience at TOTAL and an events agency in the pharmaceutical industry, Cécile also worked for her university's consulting firm. With a strong combination of marketing and consultancy skills, she joined ALTEN two years ago as a Project Manager for a parts manufacturer in the railway industry. "Being an Industrial Project Manager means acting as the link between the Project Managers, the engineers and the client", she explains.

Cécile has many responsibilities as she coordinates the construction of trains that will make up an additional fleet to provide more frequent, faster and more comfortable journeys for passengers on the Birmingham-London route. "I participated in the design of the trains, the definition of the stages of their journey, their construction and testing phase. It is important to be versatile and reactive".

## **Targeting priorities, the key to agility**

Ensuring that engineers meet specifications, reporting to the Senior Manager about the project stages, organising the planning of tasks while also ensuring deadlines are met when changes occur regarding delivery of trains are the many things Cécile needs to manage in her everyday work.

*"Male or female, it makes no difference. Your skills, motivation and ability to work in a team are all that matter".*

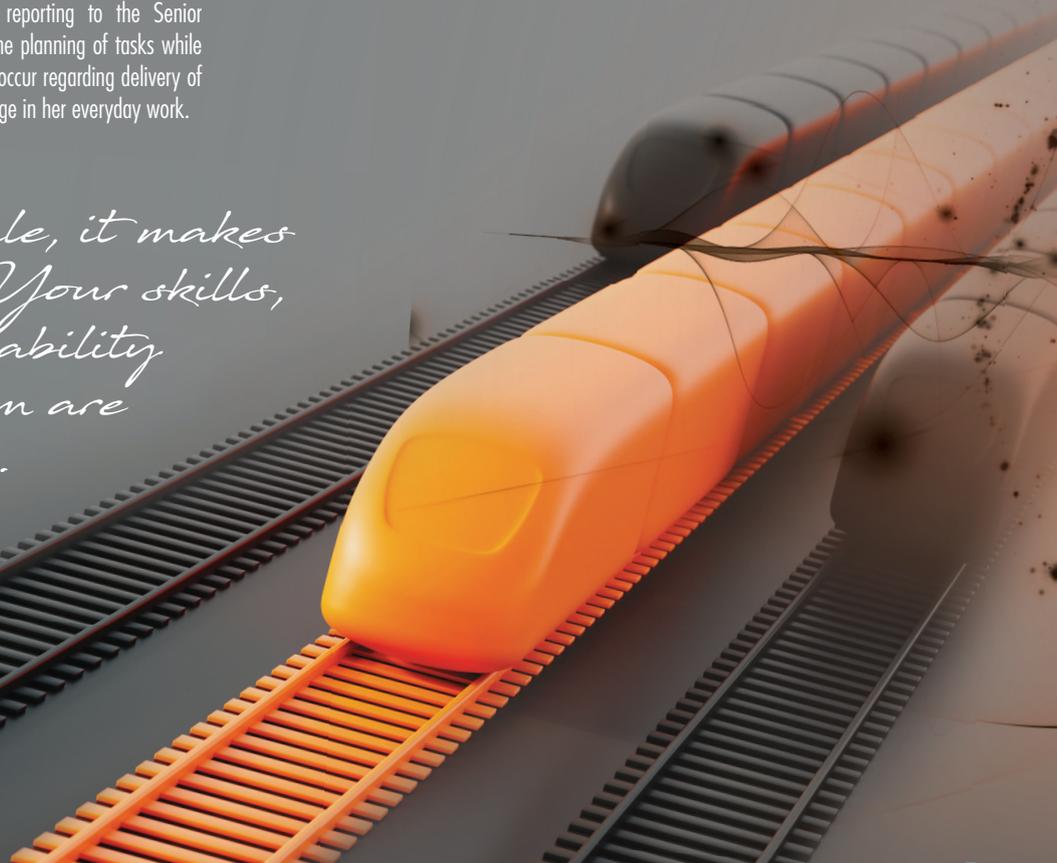
Versatility and priority management are essential skills in the industry. This experience enables Cécile to combine technical knowledge (life cycle of a train, construction stages, jargon) and global vision of project implementation in all its aspects, whether from a business, legal or marketing perspective.

The relational aspect also becomes very important when you work with internal and external stakeholders who have different expectations. "You need to be a driving force and have interpersonal skills that make others want to be involved in the project: being proactive, dynamic, trusting, communicating and listening, while also being capable of taking a step back when necessary," Cécile explains.

## **A strategic role in the industrialisation of trains**

As an ALTEN Project Manager for a railway manufacturer, Cécile did not expect to have such a strategic position. "Male or female, it makes no difference. Your skills, motivation and ability to work in a team are all that matter" she explains.

She has found the experience to be very formative as it has given her an interest in technical aspects that she has learned to master. "Being part of the development of a train has been very satisfying," Cécile concludes.



# Energy and a promising start

*Agathe*, ALTEN Project Manager for Thermodyn



© Sandrine Marchand, Le Creusot

"I have a curious nature and am always interested in many different technical topics. I enjoy this diversity in my everyday work life". Agathe is always very active and since the start of her career has worked in very different environments, both technically and geographically. "My curiosity has led to me moving around a lot! I graduated from Nevers with a degree in Engineering, specialising in mechanics/purchasing. I then did an apprenticeship in automation with an automotive manufacturer between Paris and Valenciennes before joining ALTEN as a purchaser for a producer of special machines for plastic parts for the automotive industry in Rennes... And I am currently working with a client who specialises in turbines and compressors in Le Creusot in Burgundy!"

## Project management: "team spirit"

As an ALTEN Project Manager for Thermodyn, Agathe provides after-sales service for turbines (provision of spare parts, repairs and upgrades) for two clients, one specialising in nuclear energy and the other in military. "It is a very technical position and you constantly need to learn new things. Especially in sectors that require high security, reliability and quality," Agathe emphasises. "Providing after-sales service for these turbines does not mean having to know how they work in all the technical details. It means ensuring that associated projects run smoothly, from establishing the client's requirements until the part is delivered or the repair carried out".

Agathe relies on a whole network of experts and support functions, without which she would be unable to do her job. "The way I see it, management responsibilities does not mean 'being the boss of' but rather 'working with'. Working with resources is above all about working with human resources and getting the best out of the team, to get it to progress and to progress yourself," she explains.

A team spirit that Agathe values so much that she has chosen to be the ALTEN Site Representative. Agathe is responsible for team cohesion and sharing important information with Consultant Engineers working at that client site. She is a special point of contact thanks to her position as an intermediary between the Sales Manager, Engineering Manager and the client.

## Finalist of the Women in Industry "Promising Start" Award

"I have been curious about the technical side of things from a very young age when I used to take computers apart with my dad and I really enjoyed that! I have faced stereotypes and preconceptions about such an interest, especially at school. But that didn't stop me believing in myself and my plan to become an Engineer!". Keep daring, working hard, taking an interest... This has been the secret for Agathe to achieve her goals: a baccalaureate in Industrial Technology and Science, a preparation course for engineering school and then joining the Institut Supérieur de l'Automobile et des Transports (a French public engineering school specialising in smart cars, Aerospace and Transport). "Barriers based on gender in these technical professions mostly come at the entry point. Once I had joined my engineering school I could see that diversity was welcomed. This is proof that you should always persevere when you have an idea in your head!"

Agathe believes that perseverance is essential for an Engineer, as she illustrates with another example from when she began her project at Thermodyn: "I didn't know all the technical details about the turbines I was working on but this didn't put me off. Engineers should never put limitations on themselves, especially when facing the unknown, which can always be interesting for them. My general skills, supplemented by the specific skills of the experts I work with and learn from, have been sufficient for me to find my place within the teams".

This perseverance that Agathe has always shown, as a woman and as a professional in the industry, was rewarded as she was nominated in the final of the Women in Industry Awards organised by L'Usine Nouvelle (French weekly magazine about the economy and technologies in the industrial sector) in 2020, in the category "Promising Start". "I feel very proud and would like to thank all those who believed in my conviction to become an Engineer one day and to flourish in this profession".

# Construction, pharmaceutical, nuclear... a winning formula!



*Cécile*, ALTEN Belgium Project Manager for Tractebel

"I always wanted to be an engineer. I loved architecture, I wanted to make a career out of constructing buildings, this was obvious for me. When I was studying at HEI Lille to become a general Engineer specialising in Building and Public Works, I imagined myself working for leading companies in the construction sector".

But for Cécile, being an Engineer is above all about being open-minded, versatile, knowing how to apply yourself and taking on a challenge. Contrary to expectations she did not join a large construction company, but instead was drawn to the big names in the pharmaceutical and nuclear industries!

## **A thirst for knowledge**

Cécile, who loves being on site and completed all of her engineering internships on worksites, has not been disappointed by the challenges she has faced since the start of her career. Quite the contrary! In her six years of experience she has worked in highly regulated settings and positions requiring multiple skills which have satisfied her appetite for learning.

After graduating, Cécile got the opportunity to join the ALTEN Belgium teams supporting a project for a major player in global vaccine production. "I spent four years working as a Consultant Engineer for construction of whiterooms, where the environment is highly regulated and monitored as

this is essential for vaccine production. I was also Construction Lead on the construction phases of a portfolio of buildings related to Quality Control and R&D (QCR&D), for which I monitored the progress of work with the engineering companies. This is an extremely strict area because there are a lot of requirements. This is precisely what makes it such a good learning curve". Significant investments, very limited time frames on projects, quality requirements, variety of technologies used... Cécile's gamble of learning in a domain that was unfamiliar to her paid off as she started to become an expert in it.

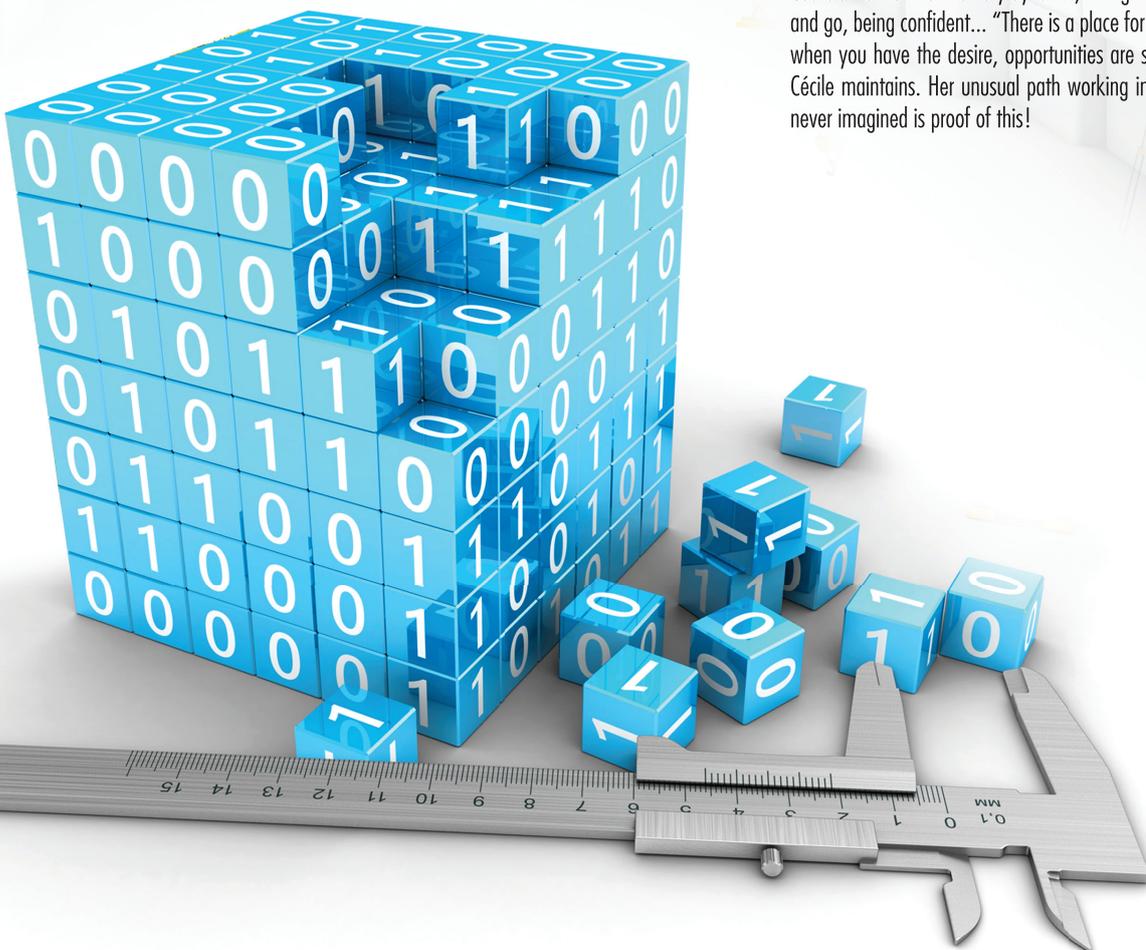
There was no question of her staying in her comfort zone! Her drive was recognised by her managers at ALTEN and they suggested she should try working in a whole other environment: the nuclear sector. "This was a surprising idea at first but in the end a very logical one considering the already highly regulated sector that I was coming from. Paperwork, strict organisation of projects, variety of disciplines, safety... All in all, the nuclear and pharmaceutical industries are not so different!" Cécile observes. For the last two years she has been working as an ALTEN Project Manager for Tractebel, an engineering company belonging to the Engie group, whose main client is the operator of Belgian nuclear power stations. Cécile needs to be versatile as she works on a multitude of projects involving cross-disciplinary teams of engineers: "Civil engineering, monitoring and maintenance of installations, adaptation to new requirements of the nuclear authorities... there is no shortage of challenges which suits me perfectly! In my role as Project Manager, I act as an interface between the client's needs and those of the engineers," she adds.

This has been another successful move for Cécile, who has been able to make use of operating modes from the nuclear sector thanks to her limitless curiosity and ability to apply generic knowledge to a particular environment, "the gift of the Engineer" she says.

### **"Being Project Manager is about choosing what approach to take on a daily basis"**

Communication and human values are at the core of all of Cécile's projects: "Primarily because I want to participate on projects that have a positive and qualitative impact on society. Vaccines protect, nuclear provides electricity... two very definite results in everyday life". The Project Manager is then the link between the concepts, the ideas, the tools and means that are available, the needs of the different stakeholders... and they cannot do this without proactiveness and communication. Cécile accompanies her team on the ground as often as possible, especially as the sites where she works are very dynamic environments with daily challenges. "It is impossible to find solutions if we don't communicate! I am very proud to have met highly competent professionals and to work alongside them. Working side by side and discussing with them is also a way of learning, developing, becoming an expert in the work that you do and then passing it on to others one day. We should not forget that we all have things that we can learn from one another, diversity is essential at all levels," Cécile concludes. She then adds, "I have not got where I am only by learning but also by having always tried to be honest: daring to say when I am sure of myself, and daring to admit my shortcomings... It is also by stating clearly that I work well in a profession and in a team!".

Cécile's view of work is very dynamic, fitting in with her personality: get up and go, being confident... "There is a place for everyone in all domains and when you have the desire, opportunities are sure to present themselves," Cécile maintains. Her unusual path working in environments that she had never imagined is proof of this!



# Aiming for the sky

*Sarah*, ALTEN Manufacturing Process Engineer for Airbus



With an engineering degree in the bag, Sarah began her career in consultancy. "What I liked about the idea of being a Consultant Engineer is having flexibility in my profession, both in terms of activity sector and projects". This wish was quickly granted as Sarah's first work experience saw her specialising in material and functional validation of gas meters, while today she works with aeroplanes.

## Taking to the skies

When joining the ALTEN teams, she worked on her first Airbus project as a Technical Coordinator: "I helped with production of the aircraft fuselage. This central structure consists of supports that enable installation of equipment (electric cables, pipes, protective padding, etc.) which are attached to parts such as the floor".

Due to her engineering training, ALTEN suggested she work as a Manufacturing Process Engineer for Airbus on the production line producing centre wingboxes for the A320. These contain kerosene and allow the wings to be attached to the rest of the aircraft's fuselage. "My role is to manage the configuration when changes to plans need to be applied to the production: I need to be able to indicate to the operators where a particular support needs to be mounted and how it should be fastened... while also aiming to reduce production time due to the high rates which are characteristic of the Aeronautics sector". This new project enabled Sarah to quickly increase her skill set in an area where she did not have prior experience. "They trust me, I have responsibilities, I bring support and I learn. For me this is an extremely positive project," she says.

## Learning through coordination

As well as working on a central part of the aircraft, Sarah has a strategic post: "I am the liaison between the design office and the production. This pivotal role between these two entities is key because they don't speak the same language. My technical expertise allows me to re-draft the language used by the design office, which is full of numbers of standards and plans, and make it intelligible for the operators. So my job is to be an interpreter too!". She could also be likened to an orchestra conductor as Sarah and her colleagues coordinate all the parts essential for a good performance.

Coordination which could not be done without interaction on the ground with the operators. "To ensure the effectiveness of the production lines, they need to be included in all the decision-making loops. I really enjoy supporting their work, this is also what makes my job interesting. The requests for support are different every day and enable me to broaden my skill set," Sarah explains.

## Being an Engineer: the sky is the limit

Curiosity is a real strength for an engineer. In Sarah's case this characteristic comes alongside some areas of interest: mechanics, materials, mass production, a sense of detail on parts that need to be handled with great precision... Sarah can find these aspects in a number of activity sectors. "One day I would really like to work in the field of clock-making! It's still mechanics, very specialised and delicate, mass produced... So why not?" she suggests.

Working in engineering means you have other possibilities open to you and it is about finding the perfect harmony!



# Transport(ed) to the future

*Svetlana*, Automotive and Aeronautics Innovation Manager in ALTEN's Innovation Department



"My passion for space programmes came from observing my brother, a professor in transport science," recalls Svetlana. Originally from Bulgaria where she completed her secondary education at a French school, she then studied electrical engineering at the Technical University in Sofia, taught in French, and graduated with a dual French-Bulgarian degree in Automation Engineering.

## Teaching and expertise combined

She gained experience in robotics for medical use for the IRCAD laboratory in Strasbourg, then in monitoring of drone trajectories on a second internship. She then had to decide whether she wanted to work in the medical or space sector. In the end she wrote her thesis, published by Université Paris-Saclay and supervised by the French National Centre for Space Studies (CNES), about systems for launching reusable satellites.

Svetlana wanted to work in research and teaching so became a Director of Studies. Between 2012 and 2018 she worked at three schools simultaneously, particularly on subjects related to smart energy distribution or planning missions for autonomous aircraft.

All of her scientific research is an unending source of solutions to respond to industrial challenges. She therefore joined the ALTEN Group's Innovation Department.

## Miles of autonomy

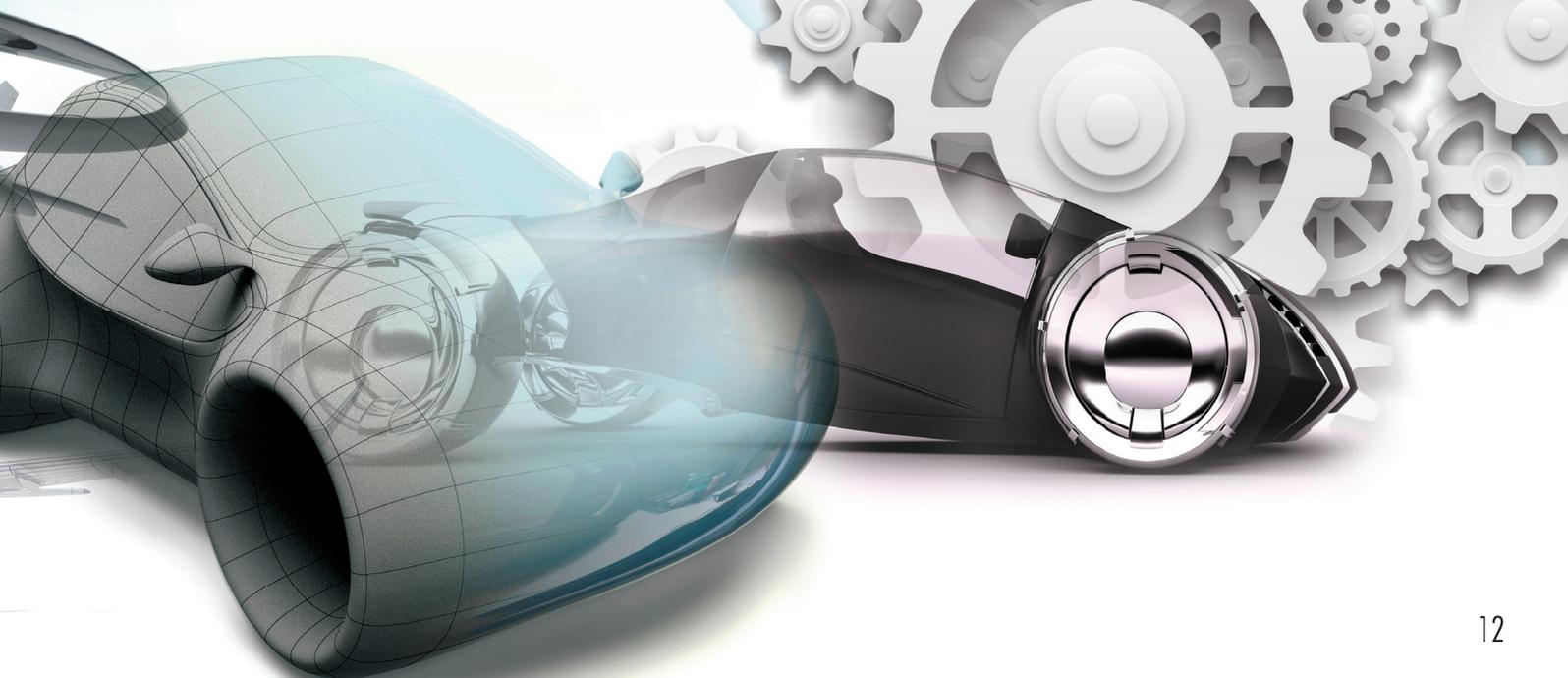
"My school was 200km from my family. I have always thought that people waste time on transport so, whether land, air or space transport, I think we should work to optimise them through automation". As Innovation Manager / Automotive and Aeronautics Project Manager, Svetlana contributes to innovation for autonomous vehicles and aircraft, or for the cockpit of the future.

For the autonomous driving project, she carries out automated scenarios and specific uses, such as for the ADAS function (advanced driver-assistance systems). Svetlana has more than 20 people who she is in constant collaboration with every day. "This diversity of contributors and multitude of experiences is what helps to build reliable solutions," she emphasises.

The project related to the cockpit of the future requires juggling between coordination of tasks, identification of materials and analysis of research into the functional electronics that make this modular cockpit possible.

The technical aspect involves logic and innovative ideas and requires a creative mind. This stimulating combination is helped by "working in a team with people of different backgrounds, especially when you know that you are contributing to the technological advances of tomorrow," Svetlana concludes.

She believes that her multicultural background gives her an international view which is a real asset for sharing her research and experience with her partners. Svetlana is convinced that the future of engineering is one of diversity.



# Driving smarter, greener and safer!

*Cécile*, Project Manager in ALTEN's Projects Department



Within four years of graduating, Cécile was making her way in the automotive sector with no plans to leave such a good road! After studying thermal energy at Polytech Nantes and specialising in energy management, she joined ALTEN to begin her career as a Vehicle Performance/Consumption Testing Manager for Renault. This involved carrying out testing campaigns on workbenches and tracks. The experience propelled her into increasingly technical and challenging environments.

## **Automotive, fertile ground for ecological and innovative projects**

Since university Cécile was already very involved in the Automotive sector, which was always a calling for her. "It's an exciting domain because it involves a lot of future challenges. Vehicle of the future, green mobility... the field of possibilities is vast in the Automotive sector! When I was a student, I had the chance to familiarise myself with these subjects by joining an association that made prototypes that worked with alternative energies: electricity and hydrogen. Our goal was to compete in races with these prototypes to show that they were viable and promising!".

Three months after starting her first project, Cécile had the opportunity to become a Project Manager, still working on performance/consumption. Instead of carrying out the testing campaigns, she was now directly managing the projects that were being tested. "The objective was to run an entire vehicle project from its creation, through its development phase up to its manufacturing. Specifically, I was in charge of approving the vehicle in terms of performance/consumption before it was put on the market: consumption by the vehicle, by the engine, pollutant emissions, etc. All of these technical characteristics had to be optimised so the vehicle would consume as little as possible and reach the highest level of performance. It was a great experience which allowed me to take more responsibility," recalls Cécile. "I can see the fruit of my labour every day in the street, it is useful for millions of people and is developing quickly. What better way to give meaning to what I do?" she reflects.

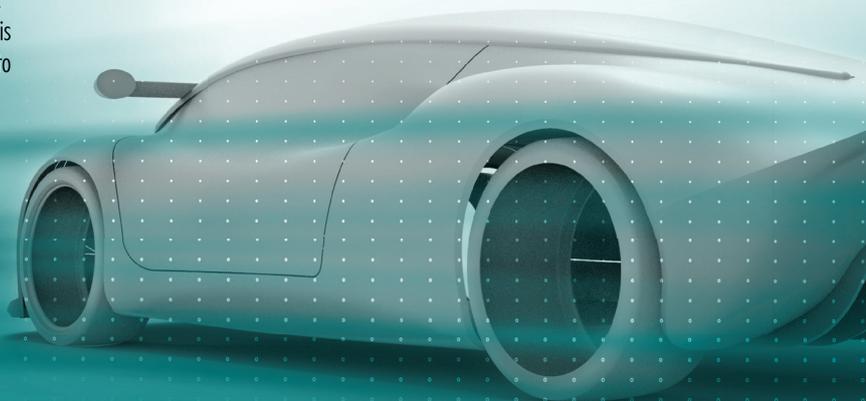
## **Fast evolution to satisfy constant curiosity**

Cécile then returned to her primary speciality by becoming Project Manager in Energy Management for another automotive manufacturer: "This project allowed me to participate in the development of three types of autonomous vehicles: combustion, hybrid and electric". This was once again a very formative experience, covering a broad spectrum of work on a very specific subject: optimisation of the vehicle architecture. This would both allow greener travel and guarantee maximum safety for passengers.

Cécile's growing experience led to ALTEN offering her a job as Operational Project Manager for Renault. "A project which was no longer limited to my core business but also included more than a dozen technical areas covering all activities of a Project Manager and Business Manager: reliability, ergonomics, suspension, etc. A real intellectual and interpersonal challenge!". Cécile currently works as an Operational and Financial Project Manager on new projects and also has a second role as Optimisation and Performance Project Manager in ALTEN's Projects Department, a job that gives her an even more versatile role. "I am the link between the teams and the client, helping to constantly make our activity more effective. Every day presents a different challenge where the issues and responses need to be adapted... A dynamic that fits well with my personality!" she says.

## **Speaking up for women in engineering professions**

Cécile promotes the role of women in her sector and in scientific and technical careers in general. "Collaboration between men and women is absolutely necessary on engineering projects because their complementary approaches are a source of efficiency and agility". Cécile believes that women should be encouraged to become engineers so that this dual approach can be applied more systematically. This is why she joined Elles Bougent (an association that aims to promote gender equality in companies working in industrial and technological sectors) as a sponsor to raise awareness among young girls. "Me talking to them about my profession makes it tangible, real and attainable," Cécile asserts. Her best engineering memory came in 2018 when she spoke at the Paris Motor Show as an ALTEN sponsor of Elles Bougent. "This was an important moment in my career where I was able to dismantle preconceptions among female pupils and students and show them that I was able to work in such a profession".



# A career in Space: to infinity and beyond!

*Nina*, ALTEN Optical AIT Engineer for the French National Centre for Space Studies (CNES)



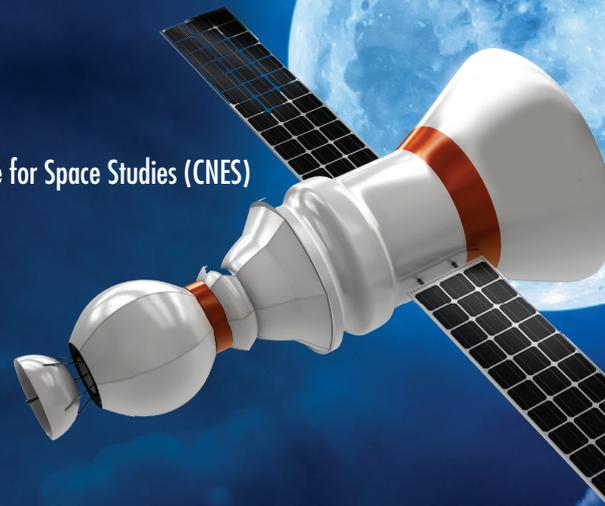
"I have always been interested in astronomy and understanding the universe. When I was a child I used to love watching documentaries about how the universe works. So when I had to choose my path, I thought "why not astrophysics?". It was therefore very natural that I went into this field!" Nina recalls.

Having obtained an undergraduate degree in Fundamental Physics and a Master's in Science of the Universe and Space Technology, specialising in Space Technology and Instrumentation, she joined ALTEN to support prestigious players in the Space sector as an Optical Instrumentation Engineer and then in Optical Assembly, Integration and Testing (AIT). "Optics is an incredible speciality. This is definitely a field that I want to continue working in".

## Answering the big scientific questions through optical instrumentation

Joining a space project is often something that children dream about. "Working with the teams in this sector, which has a magical aspect to it, is really an incredible experience. It indulges my deep curiosity and is a source of satisfaction. I always feel the same pleasure when I see an instrument that we have worked on being sent into space to be used by astronauts, sometimes even on board the International Space Station (ISS)! There is nothing that could give more meaning to my work," confirms Nina.

The space adventure is fascinating and perpetual: each project is specific. Just three years after graduating with an Engineering degree, Nina has worked on many highly technical space projects of great scientific importance. "First I joined the optical service of the CNES as an Optical Instrumentation Engineer. I have worked on a project characterising optical filters which are used in cameras that can be embedded in satellites for example. I also worked on an active optics project on a programme that was preparing next-generation satellites for observing the Earth and for defense. When a satellite observes the Earth, the wave that returns to the image is distorted by the atmosphere. My job was to rectify the wave, meaning to make it flat, so we could get a good quality and very detailed image using a wavefront sensor".



Nina has also trained students on a nano-satellite project with a mission of improving our knowledge of the solar system. "My role was around the payload of the nano-satellite and I was able to help them with the optical part of the equipment. The satellite is now in space, a source of great pride for the team!". This passionate Engineer also had the opportunity to work on validation of the thermal vacuum on the head of the Perseverance rover which is searching for signs of life on Mars...

## A mini laboratory on board the ISS

The latest significant project has been integrating the new laser on the DECLIC instrument. DECLIC is the Device for the Study of Critical Liquids and Crystallisation, a collaborative programme between the CNES and NASA. This mini-laboratory, installed on board the ISS since 2009, is for studying the behaviour of transparent media in micro-gravity conditions. As an Optical AIT Engineer in the CADMOS department (Support Centre for Development of Micro-gravity Activities and Space Operations) of the CNES, Nina helps to draft the procedure for integrating the new laser and supervises testing of its alignment. "DECLIC activity should start again soon on board the ISS. I hope it will have a long life on board the International Space Station and that it will lead to even more interesting experiences! This is why, in three years, I haven't really had time to be bored!" Nina explains.

## Creativity, patience and curiosity are key

All the projects that Nina has worked on require a reactivity which pushes her to always be more creative in how she responds to the challenges, which are different every day. For Nina, being an Optical Instrumentation Engineer also requires great precision, a daily challenge that means a combination of thoroughness and patience. "I have had to set an active optical bench before that needed to be so precise that it was down to the nearest hundred nanometres!".

This profession delights fans of the big scientific questions and experimentation... And unites them! "I am fortunate to meet people every day who are passionate about the same subjects that excite me so much. This gives even more meaning to the work that I have chosen to do," reflects Nina. She certainly seems to have found her path in life.

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