

# Internship goes beyond polar circle

*A young engineer explains her motivation and commitment to play her part in solving climate change...*

I'm a French engineering student at École Centrale Lille. Currently in my end-of-studies internship, my next business trip will take place in Bodø, Norway.

I spent my entire childhood growing up by the ocean in the west of France. I started sailing at the age of three, and never stopped since then. By spending most of my free time on boats, I've cultivated a passion for the ocean and everything that goes with it. This is one of the reasons, amongst others, why I'm passionate about the marine industry.

Like most young people nowadays, I am more and more conscious of the urgent need to solve climate change. I don't want to have a job which participates in maintaining systems that destroys our planet. The young generation of engineers will need to invent technical solutions to solve the challenge of climate change.

Therefore, I want a job in which I can tell that, "I'm doing something to help reduce climate change".

During my studies at École Centrale Lille, I took a gap year during which I had two 6 months internships. After many years studying, I wanted to discover the labour market. I spent those two internships in companies of the CAC 40 (Top 40 French companies). I didn't feel really useful there and didn't make a real impact in my job.

Moreover, the environmental commitments taken by those companies were not visible in my everyday work. So, when the time arrived for me to search for the last internship of my studies, I decided to go for something different. I wanted to work either for a company with strong environmental values or a company in the shipping industry, ideally both. It would allow me to combine my willingness to work in the marine industry and my personal values. My dream job would also be one where I don't spend all my days in front of a computer. This is when I found my internship at NG3.

Before I explain what I do during my internship, I will tell you a little bit more about this company. NG3 (New Generation, Natural Gas, Natural Growth) was created in 2012 by Damien Féger who graduated in 1984 from École Centrale Paris Engineering School. He has spent two decades working in the space industry, on various projects such as Ariane Launcher or the International Space Station -80°C freezer. He then joined Snecma and worked on equipment for LNGCs terminal and carriers. He developed there a game changing Gas Combustion Unit solution.

After those different jobs, he decided to create his first business, NG2 (New Generation, Natural Gas) with an investor fund. He developed the PLUG solution alongside a concept of argon filled insulation for LNG tanks. The argon filled insulation was unsuccessful. But the PLUG solution got its first order from Color Line in 2010.

In 2012, Damien Féger and other NG2 shareholders decided to split up and he created NG3 to go on with PLUG and other innovative equipment's developments for the shipping industry. Since then, the PLUG solution has been implemented on multiple vessels in Norway and will be implemented for the first time in France this year. It will be on a small RoPax which connects Yeu island to the mainland. NG3 is inherently, a company which develops innovative technologies. And as an engineer, it is always pleasant to work in such a thriving environment.

By developing product that helps reduce the environmental footprint of the shipping industry, NG3 is playing its part in the fight against global warming. NG3 is mostly exporting its products to Norway, so we really work with an international mindset. Discovering different ways of working in countries other than France is a huge asset for me. Furthermore, it is a really small company. So, I have been entrusted with a lot of different missions.

I started my internship in September 2021. At the beginning it was part-time work, part-time engineering school, but since March this year I'm now working on a full-time basis. At the beginning of my internship, I worked on the PLUG quay side interface for the port of Trondheim.

The PLUG solution aims to connect ships to shore power. PLUG is an acronym for Power Generation during Loading and Unloading. Connecting ships to shore power is reducing their emissions during stops at harbours. Engines can be fully stopped and therefore, pollution around cities is reduced. PLUG is the world's first solution to permit "hands off" operations during the connection. It allows a safe and fast connection, usually in less than two minutes after the mooring. A tide following system is also included in the solution.

PLUG has been implemented on multiple vessels of the Color Line company in the last ten years. More recently, NG3 equipped both Hurtigruten and Havila vessels with ship side PLUG interface. Therefore, the next step is to implement quay side interface along the Kystruten route (west coast of Norway from Bergen in the south to Kirkenes in the north east).

For Trondheim, I helped finish the assembly of the tower before the shipment to Norway. After less than two months in the company, they trusted me enough to send me to Norway with a colleague to deliver the product in Trondheim. On site, we had to finish the installation of the tower; make sure of the right cable connections and information sharing with the port interface; realise connection and tide following tests on every vessel of the Hurtigruten fleet. I was also in charge of drafting the technical documentation provided with the tower (user manual including technical specifications, description, user sequence, alarms, security, maintenance schedule, etc.).

Then we started working on the tower for Bodø port. After several month of assembly, it has finally been shipped to Norway in the beginning of May. Along with the assembly of the tower, I also had to prepare documents for factory acceptance tests and site acceptance tests.

When the Norwegian team (Port of Bodø) came to our workshop, I was in charge of showing them every element for the factory acceptance test. We also perform a full connection and disconnection sequence with a mock-up of the vessel side interface. We made some improvements on the second tower so I update the user manual accordingly.

The next step will be in June. For the first time in my life, I will be given the opportunity to travel above the polar circle. In Bodø, we will install the quay side interface and run tests on Hurtigruten and Havila fleets. Multiple challenges are faced when implementing quay side interfaces of the PLUG solution along the Kystruten. The biggest one is probably the weather conditions during winter, indeed, there is a numerous amount of harbour located north of polar circle. Wind and snow load from the Norwegian national annex of Eurocode must be taken into account.

In order to adapt to each vessel and reduce the footprint on board, the ship side interface can be installed from deck three to deck four. In Bodø and Trondheim, the tide range is around 4 meters. Those two conditions added, the quay side interface must be able to connect at various heights. It is also necessary to follow the tide given the fact that vessels stop for several hours (6 hours in Bergen, 3 hours in Trondheim, 2 hours in Bodø).

The PLUG quay side interface of Bodø is designed to resist extreme arctic conditions and to provide a power exchange up to 2000 amp under 1 kilo Volt. The interface is protected inside a 12-meter high mobile tower. The tower can move sideways, on rails along the quay, to align itself with the ship. For each connection, a door is opened on the front and a beam slides out with the connector. The sliding beam is on a platform which can move up and down.

Thereby, adjustment to the deck level is possible as well as automatic adjustment with tide level or drifting of the vessel.