

Case Study

UPM Taurus Project





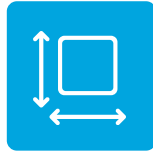
**Industry**  
Pulp and paper



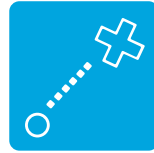
**Total Volume**  
263,300 FRT in total on 22 chartered breakbulk vessels



**Maximum Weight**  
Steam drum of 279 MT



**Maximum Dimensions**  
Longest item of 3,980 cm



**Origins**  
From Germany, Estonia, Finland and China to Uruguay



**Extensive infrastructure work for the 230 km road transport in central Uruguay, incl. the building of 28 bypasses**

# Case Study: UPM Taurus Project

The UPM Taurus Project was a logistical mega project that marked a completely new scale in the history of heavy haulage in Uruguay. Extensive planning and execution spanning 3.5 years was successfully handled by deugro and dteq Transport Engineering Solutions as a global team. It included one of the most complex overland transportation concepts ever planned at deugro group—developed over a full year—in close cooperation with the Uruguay Ministry of Transport and the client UPM. The main challenge was to bypass a dam, which was faced by developing a customized heavy lift ferry concept operated by a modular barge.

Furthermore, a new deugro office was opened and established in Montevideo, Uruguay, with a

dedicated project team to locally manage cargo from the many origins globally. The oversized



**Dedicated storage area at UPM Fray Bentos to consolidate and prepare the convoys to leave for UPM Paso de los Toros**

cargo was impressive, as well as the sheer number of 8,000 containers and 174 OSHLs packages that were moved 230 kilometers on axle lines into central Uruguay, requiring meticulous planning.

### **Project background/ history**

deugro's client UPM has an existing pulp mill in Fray Bentos, Uruguay and decided to invest in a second, larger pulp mill, UPM Paso de los Toros. This greenfield project, in Paso de los Toros, is located in the central region of Uruguay at a distance of 230 kilometers from UPM Fray Bentos.

This new world-class, single-line pulp mill has an annual production capacity of approximately 2.1 million metric tons of eucalyptus market pulp, which has increased UPM's pulp production capacity by over 50 percent. With the new pulp mill, UPM Uruguay is creating

7,000 jobs through the value chain and 10,000 induced jobs, and increasing Uruguay's GDP by 3.4 percent in total with the operation of both mills. Additionally, the mills are able to generate green energy from biomass. Both mills together have a maximum capacity of 400 megawatts.

The whole project investment is USD 3.470 million, also involving the local infrastructure, including building a new deep-sea terminal in Montevideo and a railway connection between the new mill and terminal.

Thanks to a great track record of successfully completed pulp and paper projects, deugro Finland was in the position to reach out to UPM directly and could convince the client with their concept proposal—ultimately winning the award for the project logistics. It is the biggest contract to date for the Scandinavian region, and for the pulp and paper industry in general for the deugro group of companies.



**Loading operations at Hamina Port, Finland**

### The logistics concept

Based on a proposal from deugro and dteq, a company of the deugro group for comprehensive route survey and consultation services, UPM awarded deugro two different scopes: First, the drafting of a preliminary overall logistics concept for moving equipment from various worldwide origins to the final job site in Paso de Los Toros, Uruguay.

And second, for the key and most challenging section—transport from the port of entry to the final job site—an in-depth route study and analysis for moving heavy and oversized cargo. This analysis became part of UPM's final investment decision process, and later became a full feasibility study with analysis of the local infrastructure.

The main points that deugro and dteq were entrusted to investigate was the maximum transport envelope that could be moved from any port to the site and the route modification work that would be required, plus the estimated costs. Having this kind of concept and presenting it to the Uruguayan road authorities was key to gaining pre-approval and allowing the project to move forward.

As part of the infrastructure analysis, various road challenges were identified. Even though the final job site, UPM Paso de los Toros, is located close to a river, barging from the port to the site was not feasible due to several dams en route, without water locks. Therefore, investigations for identifying a suitable route by road started.

After discussing various alternatives, the final solution involved extensive infrastructure work such as:

- Building at total of 28 bypasses, three of them to bypass bridges on the route and one to completely bypass the town of Young
- Removing or adjusting 1,106 traffic signs and poles
- Adjusting 59 overhead obstacles to allow the cargo to pass
- Building new high-tension cable line masts, etc.
- Reinforcing 23 culverts

On the last route section, close to the sleepy town of Baygorria, a dam posed the largest challenge for the project. Uruguayan road authorities made clear that no items over 45 metric tons in gross weight would be allowed to cross this dam—making a road crossing of the project cargo impossible. A unique concept created by dteq was the solution: A custom-designed barge, which required very detailed investigations, starting from a bathymetric study to ensure suitable draft for barge operation, to the design of jetties and the access roads to both sides of the river.

As a result of the various surveys and analyses, deugro found a way to transport the massive cargo

» A prerequisite was to provide a track-and-trace program, with carriers directly integrated into the system via API. This was satisfied by deugro visiotrack, a Web-based supply chain management system. «

by road. This was an important factor for the client, who wanted to move the cargo to the site with a degree of pre-fabrication as high as possible, since any fabrication and assembly work at the site was considered a potential quality risk. With the overall logistics concept, deugro helped the client to avoid assembly and welding work at the job site.

The final transportation solution was presented, together with



**Precise maneuvering of cargo through the UPM Fray Bentos working pulp mill**



**An evaporator effect on its way to the storage area at UPM Fray Bentos**

the client UPM, to the Uruguay Ministry of Transport (MTO). After some further clarifications, MTO approved the plan, allowing the project to move forward. This was the end of the project pre-feed consultation scope, and UPM then began all the route modification work required to make the route feasible.

### The execution

The multimodal transport of the heavy and oversized cargo consisted of ocean transportation, followed by road transportation to the job site.

#### Ocean transportation

Containers were loaded from over 25 different ports in Europe, Asia, India and North America, with the main volumes being shipped via Hamburg, Germany; Helsinki and Kotka, Finland; and Shanghai, China. Mainly the shipper's own containers (SOCs) were used, which highly benefited the project on account of equipment shortage issues during the COVID-19 pandemic.

The original plan was to ship containers to Montevideo, Uruguay

only. However, due to a shortage of vessel capacity, a creative solution was found to use both containers and breakbulk on the same vessel. This resulted in a higher draft, so not all the vessels could pass the river to Fray Bentos, the location of the current UPM mill. Therefore, some of the cargo was discharged in Montevideo and the remaining equipment in Fray Bentos. This resulted in a more complex planning.

The project shipping period faced some of the most challenging conditions ever experienced in the global shipping industry. These included:

- Scheduling issues due to substantial cancellations of scheduled sailings
- Severe shortages of containers and lack of space
- Port congestion globally, with vessel delays and longer waiting times for documentation processing
- Skyrocketing prices and unreliability of liner vessel schedules
- Surveyors not allowed to board vessels due to COVID-19 mandates

Despite these and many other challenges, the deugro and dteq teams managed to transport the cargo as scheduled and to the client's full satisfaction. The offshore team found a solution to consolidate the cargo from various shippers and use alternative shipping options. The negotiation of long-term Contracts of Affreightment (COAs) with strategic key carriers ensured commitment to project requirements.

Furthermore, a deugro Control Tower was set up to continuously monitor and coordinate the situation in close collaboration with shippers, carriers and the project owner. In addition to contingency planning, the Control Tower team proactively looked for ad hoc solutions to mitigate the impacts of the market disruption, utilizing alternative means of transport, etc.

### Road transportation

To coordinate the move within Uruguay, a new office was opened in Montevideo, with the project team consisting of 16 full-time employees at the peak of the project, of which 12 were Uruguayan nationals working from different locations: Montevideo, Fray Bentos and

Baygorria. Besides this, finding and managing the right subcontractors was a key factor and required local knowledge and contacts. This included the onboarding and training of the partners as well as close communication and coordination throughout the whole project, with daily meetings.

## » Finding and managing the right subcontractors was a key factor and required local knowledge and contacts. «

The team ensured that the highest HSE standards and the deugro Life Saving Rules were adhered to at all times. This involved continual engagement with the subcontractor companies and personnel assigned to the project sites during the project execution. An overseas specialist from the deugro group QHSES team was deployed during the key parts of the project to observe, advise and report. This included safe systems of work, crane lifting operations, heavy transportation and barge operations, among others.



Once the cargo arrived at UPM's private jetty in Fray Bentos, it had to be moved through the working mill, considering the operations. A new internal route needed to be designed and a dedicated laydown area had to be defined to make the oversized transports possible.

All items were unloaded and stored at this laydown area first, before being loaded for the road transportation. With the respective crane equipment, the cargo was lifted onto axle lines, for instance with a configuration of up to two 24-axle lines for a feed water tank. The loading of cargo was handled in line with a complex schedule and in an order that was constantly updated upon consultation with the client to match the requirements of the construction site at UPM Paso de los Toros.

The leaving of the convoy also had to be well coordinated with local police and the Ministry of Transport, since they faced limited staff availability to escort the cargo. In addition, the water level at two

bypasses that went directly over rivers had to be carefully considered on account of heavy rainfall, which caused several floodings. This made it impossible to pass with the cargo, and, in such cases, the convoy needed to wait for better conditions.

From the port of arrival at the first mill to the final job site, the oversized cargo had to traverse a journey of 230 kilometers over two to three days. Several stops were made at bypasses along the road to let everyday traffic pass. Different route and infrastructure works were executed to make the journey feasible, including: building bypasses, installing new high-voltage cable towers, and constructing jetties for barge operations, to name just a few.

After the convoy finally left the mill at Fray Bentos, it had to face everyday road traffic. Due to safety reasons, transportations at night were not allowed, so the cargo had to be transported during the busier daylight hours. To minimize the impact on the road user, a website



**Crossing of a dam at Baygorria on a modular self-propelled barge exclusively designed for the project**





**Final stage of the transportation to the construction site of the new UPM pulp mill**

and information via radio was implemented to inform the public about the current location of the transports and their various stops at the bypasses.

Once at Baygorria, the bottleneck of the overland transportation, all trailers that exceeding a total load of 45 metric tons had to be rolled onto a barge to avoid crossing the fragile dam. Dedicated dteq personnel operated and supervised the barge, which crossed the Rio Negro River around 700 times in total to move all of the project cargo safely to the other side of the Baygorria reservoir. dteq designed a modular self-propelled barge that fitted the specific needs of the project. It is capable of performing roll-on and roll-off operations and constructed of interlocking pontoons. Once rolled off at the custom-built jetty, the cargo continued as a convoy to the final job site in Paso de los Toros, in central Uruguay.

Following this route, deugro hauled around 2,000 items to the site, with a total of 174 packages delivered on axle lines. A total of 8,000 containers arrived at the job site, whereby the main portion was delivered from Montevideo.

## Successful results

The whole project planning and execution was only possible due to the great teamwork between all parties: the client, the EPC, the subcontractors, deugro and dteq. The combination of industry knowledge from deugro Finland, the local experience of deugro in South America and the technical excellence from dteq led to success, as well as the involvement from deugro offices in China and Germany who locally coordinated the cargo shipped via Hamburg and various Chinese ports.

In general, it was a major success to ship such a huge volume of cargo in such a short period of time in such a challenging market, in the middle of the global pandemic and unforeseen market disruptions, with capacity issues and rising freight rates. These extremely difficult conditions put huge pressure on our own project team as well as the teams of the stakeholders, shippers, project owner and carriers, making the transportation for the UPM Taurus Project a major achievement.



## Main challenges and solutions

For every challenge, deugro had a solution.

### No. 1

Delays due to COVID-19 mandates; no personnel at ports; container shippers did not provide space that was agreed

**Solution:** Flexible shipping of containers on a breakbulk vessel, with a back-up crew for barge operations

### No. 2

Shifting cargo inside an ongoing, producing pulp mill

**Solution:** Conceptual design of internal route for the project to bypass the mill; constant communication during execution to make delivery of pulp production supplies possible at the same time

### No. 3

Side-by-side configurations with more axle lines required, with only new axles allowed by the government to be imported

**Solution:** Local partnership to rent axle lines, with technical management performed by dteq

### No. 4

The highest, widest and heaviest cargo ever transported in Uruguay; an unprecedented inland transportation project

**Solution:** Extensive infrastructure work and out-of-the-box solutions, as well as flexible transport execution

### No. 5

Approx. 230 km of overland transport from the port of arrival to the job site in Uruguay

**Solution:** Full transportation concept planned together with the Uruguay Ministry of Transport to avoid impact on public traffic, including the construction of bypasses, the set-up of a website with interactive map and information via local radio channel

### No. 6

Manpower and equipment shortage in Uruguay

**Solution:** Reduction of local welding work by transporting items to the highest-possible degree of pre-fabrication

### No. 7

Dam that could not be passed with cargo exceeding 45 metric tons

**Solution:** Tailor-made barge design by dteq