



When touring the *Agile* at the Scheldepoort repair yard in Flushing, the Netherlands, it is hard to imagine why an owner would carry out such an extensive conversion on a 33-year old Ro-Flo ship (roll-on, roll-off, float-on, float-off). It is only during the meeting afterwards, with both the shipyard's managing director Durk-Jan Nederlof and the owner's representative that things become clear. More than clear: the conversion makes solid business sense. The investment will be recouped with *Agile*'s first five-year contract.

#### Sturdy vessel

First and foremost, while the *Agile* has her age and the wrinkles to show it, she was built as a very sturdy vessel in Rauma, Finland in 1977. She started out life as a barge carrier for the Soviet Union and was used by the Russian navy to transport submarines. *Agile* features a large dock, which can be submerged when the ballast tanks are filled to allow for the loading and unloading of barges. Nowadays, these tanks are not used anymore and the deck stays above the waterline at all times, but the very thick and strong tanktop proved the perfect platform for later conversions.

#### 2.000 metres below sea level

Shipowner Mc Dermott are a well-known engineering, procurement, construction and

installation company focused on executing complex offshore oil and gas projects world-wide. In December 2010, Mc Dermott announced that *Agile* was contracted by Brazilian oil and gas major Petrobras to install subsea flexible pipelines and umbilicals in up to 2,000 metres of water offshore Brazil. Eager to get a foothold in this growing market, Mc Dermott decided to convert *Agile* to a flexible pipe layer in the shortest amount of time possible.

#### One go

Since the end of 2009, a plan to rebuild *Agile* had been on the drawing board. First it was intended to do the structural work at Mc Dermott's own shipyard in Dubai and the outfitting in Northern Europe, but the sudden urgency of the Petrobras

# AGILE

## 33-YEAR OLD RO-FLO SHIP CONVERTED TO FLEXIBLE-PIPELAY VESSEL

### Principal contractor

Scheldepoot Repair & Conversion Yard,  
Flushing, the Netherlands

### Owner

McDermott Inc., Houston, Texas, U.S.A.

### Principal particulars

Length o.a.	139.5 m
Length b.p.p.	121.8 m
Beam mld.	20.2 m
Depth to maindeck	13.6 m
Max draught	8.7 m
Deadweight	8200 MT
Gross tonnage	10271 GT
Net tonnage	3082 NT

### Tank capacities

Fuel	2950 cu.m
Ballast water	4855 cu.m
Potable water	438 cu.m

### Propulsion

Main engines	2 x 2391 kW
Propellers	2 x CPP Hamewa
Bow thrusters	2 x CPP 1100 kW
Stern thrusters	2 x CPP 1100 kW
Mid retract. thruster	1 x CPP 1000 kW
Max speed	10 knots [1.25 t/h cons.]
Econ. Speed	9 knots [0.92 t/h cons.]



Scheldepoot's 215 metres long covered drydock made the conversion planning independent of weather

contract made the company decide to carry out the entire conversion in one go. Out of various bidding shipyards, Scheldepoot Repair & Conversion Yard in Flushing were contracted to do the work. A significant factor in the decision was the large covered drydock, which would guarantee that at least the weather could not provoke unpredictable delays.

### Nova Scotia

Although she is a relatively old ship, *Agile* proved an ideal candidate for the conversion to a flexible pipe layer. This is mainly due to her solid construction with scantlings corresponding to those of a heavy-lift vessel. To put matters in perspective: the cargo deck can sustain a load of 17 tons/sqm. The plans for the conversion were

made by Lengkeek Vessel Engineering, based in Dartmouth in Nova Scotia, Canada, where also McDermott has an office. One of the main modifications was the installation of an offshore construction crane with a safe working load of 100 tons. This required the construction of a pedestal which is solidly anchored in the aft ship structure.

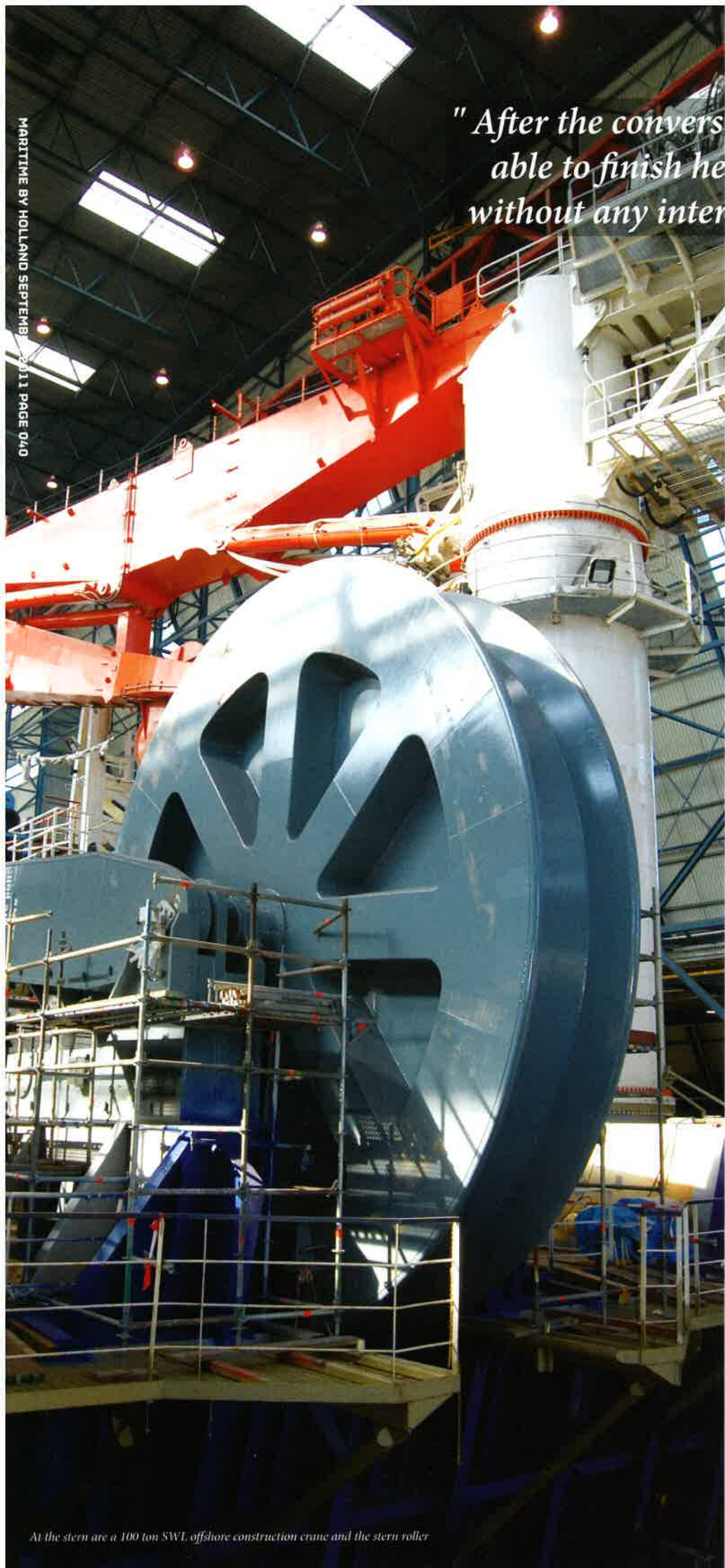
### Worklist

The whole conversion and refit was planned with the idea that *Agile* should be able to finish her five-year contract without any intermediate dockings. For the electrical installation, Scheldepoot contracted Alewijnse, who were involved with the power supply of the new project equipment: cranes, the tensioner, the abandonment & retrieval winch, the reel deployment system and the thrusters.

They also installed a CCTV system and carried out modifications to the power distribution systems, fire detections system, dynamic-positioning system and the ship's lighting. The interior of the accommodation and the bridge were entirely renewed by interior contractors Hertel. The ship has facilities for a crew of 102.

A lot of steelwork was needed to bring the ballast tanks back into condition, even though most of them will never see seawater again, as the ship does not have to flood its cargo deck anymore. A large amount of work involved the stripping of the vessel and, in particular, the asbestos removal. The main engines were not renewed, but their turbo blowers were overhauled. The gearboxes were removed from the ship and completely overhauled

*" After the conversion, Agile should be able to finish her 5-year contract without any intermediate dockings"*



by Stork. New starting air receivers were placed in the engine room and all electrical motors were reconditioned. All tanks were derusted, chipped and recoated. The outside of the hull was wetblasted and recoated. One fuel tank was divided in two, with half of it used to accommodate a new swing up Azithruster.

**Swing-up thruster**

When new, *Agile* had only one bowthruster. During past conversions, one bow thruster and two stern thrusters were added. In Flushing, the dynamic positioning system was upgraded from DP-2 to DP-2+, by adding an extra thruster, resulting in improved DP-capabilities. This thruster, located around the midship section, is of the swing-up type from Rolls Royce, as this only takes up tank space and does not intrude into the cargo space as a vertically retractable thruster would have. Part of the cargo hold was however claimed for the addition of an extra generator room with two extra generators. A Kongsberg DP system integrates the new thruster and generators seamlessly into the existing propulsion plant. To enable the installation of the new thruster, the entire ship was placed on blocks of 2.60 metres in the drydock, while normally blocks of 1.50 metres are used.

**Pipelay spread**

The new pipelay spread was an owner's delivery item and was supplied by Wellstream. The whiskers on the aft ship, which were already there from the vessel's earliest days, now perform a useful function in the pipelay spread. They support the hang-off platform with the A-frame where the last bit of a previous pipe is connected to the first bit of a new pipe. The hold provides enough room for six pipe reels with 250 tons on each. The reels can be spooled onboard if they are not delivered pre-spooled. With the tensioner aft and containers forward above the cargo hold, only a small section of the hatch covers is openable to load or unload the reels. A system with a rotating roller bend shoe leads the pipe from the hold to the deck and towards the aft. There, a 200-ton tensioner keeps the correct tension in the pipeline, independent of small variations in the ship's speed. Finally, the pipe passes over a last wheel and is lowered down to the bottom. A new ROV (remote operated vehicle) station was added to the ship, to allow the monitoring of the cable-laying process at the seabed. A large abandonment & retrieval winch was placed all the way in the back of the cargo hold.

*At the stern are a 100 ton SWL offshore construction crane and the stern roller*



An ROV can be launched to monitor the pipelaying at the seabed



The 200 ton tensioner ensures the pipe is lowered from the ship in a controlled manner

### Sponsoons

Stability is of prime importance for a deep-water flexible pipelayer. A big factor impacting the stability is the weight of up to 2.000 metre pipe below the vessel, which is hung off a reel, well above the vessel's vertical centre of gravity. A free-hanging weight has a similar negative effect to a ship's stability as a half-full tank with free water surface. To add reserve stability, sponsoons were added to the hull. These are positioned above the waterline, thus not impacting on the ship's resistance, but become submerged at higher angles of heel.

### Potential

The potential of the Brazilian deep-sea oil fields can hardly be overstated. The currently planned exploitation requires the construction of 17 new ships in the coming five years. In addition to the covered drydock, Mc Dermott chose Scheldepoort based on cost and delivery time considerations and on their previous positive experiences during two drydockings of their vessels. The shipyard is gaining a strong reputation in the offshore market, with large projects for Acergy, Helix, Well-Ops and Fugro already on its curriculum. With *Agile*,

the yard has proven it can work well with the strict regulatory framework of the Brazilian offshore industry. The biggest challenge was to get the job done as soon as possible, with the main limiting factor being the amount of people which can be at work simultaneously on a 140 metre long ship without getting in each other's way.

*Bruno Bouckaert*

