

WORLD EXCLUSIVE

Cutting edge

The European demolition industry continues to push the boundaries of extreme engineering. The latest extreme demo rig weighs in at over 320 tonnes and is designed to work with a 25-tonne attachment at 34 metres. Steven Vale gets a sneak preview of a monster in the making.

Last year we reported from Norway on a company that specialises in ripping apart end-of-life oil rigs. Called AF Decom, the business relies on a fleet of Hitachi excavators fitted with large scrap shears to cut up the massive constructions in the Norwegian Ekovisk field.

Many of the early rigs in this oilfield were built directly on to a concrete base on the seabed. When the oil well dries up the only option is to rip these large structures apart because they are not only too heavy to move, but also specifically designed to operate at a certain depth. It can take a year of preparation work and a further 18 months just to demolish a single one. With 400 still to go it's a task that will keep demolition contractors busy for the next 30 years.

Sections of the huge structures are brought by boat to the town of Vats on the rugged Norwegian coast. Reckoned to be Europe's most modern decommissioning yard for scrapped marine structures, the facility is tucked away at the end of a

fjord on the outskirts of Haugesund. Located midway between Bergen and Kristiansen, the Norwegian company continues to seek new and faster ways to cut up of the massive steel structures.

The purchase of a new demolition machine is part of a different approach to the way it tackles the rigs, as more of the work is done on dry land. The plan is to cut the rigs up into huge modular sections at sea, each containing as much as 10,000 tonnes of steel. They will then be shifted by boat to the mainland and then cut up with a 'big' machine.

In looking for something with more cutting power and reach than the current excavator fleet, the company approached Rusch Special Products. The Dutch firm is no stranger to larger-than-average demolition machines because it recently put the finishing touches to the world's



Main Picture: Dutch firm Rusch Special Products is currently modifying a Cat 5130 mining shovel into a 320-tonne demolition monster.

Above: Featuring a new specially-made three-piece boom design, the front-end equipment is so heavy that three main lift cylinders are needed.





tallest demolition rig. Based on a Cat 5110B and reaching to a record-breaking height of 90m, it features a telescopic boom design.

Although the Norwegian request was for a 'smaller' 52m telescopic boom, they wanted to fit it with a 25-tonne Genesis GXP2500R scrap shear – something that has never been done before.

"The result is a design that will help to spread the weight of the 320-tonne giant over a larger surface area"

Once again Rusch did not shy away from another seemingly impossible task.

The plan was to use a heavily-modified 180-tonne Cat 5130B as the base machine. However, the estimated price tag of around €4.5 to €5 million (including the shear) was deemed too expensive.

A cheaper solution was needed. The contractor reviewed his criteria and decided that cutting the rigs in half meant that the big machine would only need to reach to 34m. This allowed the telescopic boom option to be ditched in favour of a triple boom. Rusch recently developed just such a machine for Euro Demolition, based on a Cat 5110B. It reaches to a height of 34m and has just been shipped to the Congo, where it will spend the next two years fitted with a 12-tonne scrap shear.

Even though the 5110B is a sizeable machine, it is not man enough to support the weight of a 25-tonne attachment at 34m. A much heavier excavator was needed. Although they looked at a Hitachi EX2500, once again this option proved too expensive. In the end, Rusch bought a five-year-old Cat 5130B from Euro Machinery. As far as we are aware this is the very first one that is being

converted into an extreme demolition machine.

"We like the modular design of the Cat excavator," says Rusch managing director Ruud Schreijer. "Although it is a solidly built mining machine, it's easy to pull to pieces and modify."

Sourced from North America, it came without a boom, which is just as well because it would have

ended up on the scrap heap. One of the best-kept secrets in the European demolition business, the machine was delivered to Rusch last October. During the winter the 180-tonne excavator was stripped to the bare bones. Engineers then set to work to double the weight to prepare the base unit to take the new 70-tonne three-piece boom.

Additional weight

Part of this process involved cutting the track side frames in half, lengthening them by 2.5m to 9m, and packing them with additional weight. As a rule, the undercarriage of a high-reach demolition machine tends to be rotated through 90 degrees to provide the base with extra width.

In this case it was decided to stick to the standard format, but then add 1.5m-wide extensions to each corner. Not only does this provide extra width but also valuable additional weight. When lumped together with the four bolt-on extensions the main frame now weighs 65 tonnes.

The standard 650mm-wide track pads have been ousted. Instead, brand new 1m-wide versions

Above Left and Above: The new sub-frame design ensures that more of the weight of the boom is transferred back towards the centre of the machine.

Bottom Left and Right: The track frames were lengthening by 2.5m to 9m and fitted with new 1m-wide track pads, which were fitted with extra steel plates.

were sourced from Euro Machinery. Again, this is another reason why Rusch favours modifying Cat machines. "OEM spare parts are readily available and easy to obtain," he comments.

Even the new track pads needed to be modified. The result is a design that will help to spread the weight of the 320-tonne giant over a larger surface area and reduce scuffing when turning at the concreted Norwegian site.

The modified track pads alone add 10 tonnes of extra weight to each track – the equivalent of €30,000 of steel. When complete each track unit now weighs 37 tonnes.

The majority of modifications took place in the undercarriage. While it has yet to be weighed, so much additional extra weight has been built into it that the standard 60-tonne version is expected to almost double to 115 tonnes.

Although it is not necessary to add any extra weight to the 21-tonne rear counterweight, a larger hydraulic tank is currently being added to the ballast block.

The upper-structure was much easier to prepare. For instance, the engine, hydraulic system and pumps have been retained. So too has the slew ring. "It is big and strong and great for this type of



Above and Above Right: Track frame extensions to the main frame help to increase the overall width of the undercarriage by 1.4m over standard.

Bottom Left and Right: Excavator booms don't get much bigger than this. The first section of the new three-piece boom design weighs 25 tonnes.

work," adds Mr Schreijer

Much of the work on the upper-structure centres on the cab, which is so large that there is even room for a trainer seat at the rear. Removed from the machine, it is still in the workshop being fitted with new 5cm-thick padding to reduce interior noise levels. The standard glazing has already been replaced by 3cm-thick armoured glass and it will be completed with a safety guard. Before it goes back on the machine the cab will be given 40 degrees of hydraulic tilt. The modifications are expected to increase the standard weight of the upper-structure from 52 to 75 tonnes.

On previous machines it was necessary to cut off the boom foot and reposition it between 1m to 1.5m further back to increase stability. While this helps to solve the weight distribution issue with a big, heavy boom, it means that the machine can no longer be used with a backhoe boom for digging.

Rusch felt that there must be a way to bring the centre of gravity further to the middle of the machine without reverting to such drastic action. After much discussion and many drawings the result was born



– a specially-made sub-frame. Weighing 15 tonnes it fits to the standard pin attachment holes. The design ensures that the weight of the boom is brought a full 1m to the centre of the machine, providing improved weight spread on the slew ring.

Demolition machine

Although AF Decom plans to use it as a full-time demolition machine, Rusch is confident that the concept provides future customers with the option to remove the sub-frame and fit the machine with the standard digging boom. Also, with different holes drilled into the sub-frame, the company reckons it can also be fitted to Hitachi excavators in the future.

The sub-frame design will also ensure a more efficient lifting position for the hoist rams. "The sub-frame is a major feature of the design. Without it we would have needed to make extensive modifications to the excavator."

"The forces generated while cutting are so strong that no boom in the world is capable of taking them"

The three-stage boom is phenomenal. The second and third sections have been sent off to be painted. All three are made from Weldox 960, which varies in thickness from eight to 30mm. The result is a first stage of 25 tonnes, a second length of 10 tonnes and a final section of 11 tonnes. When all the

cylinders have been added the boom has an operating weight of 70 tonnes.

Five specially-made cylinders had to be manufactured for the triple boom. Each one weighs three tonnes, extends by 4.5m and costs roughly the price of an average family car! Three of these are used to lift the main boom. Then there are two for the second while the original hoist cylinders are needed for the third section. The 5130B's original dipper stick cylinders are used for the attachment.

Fitting the attachment is another secret weapon of this one-of-a-kind machine. The Genesis GXP2500R is the world's largest rotating scrap shear. However, Rusch reckons that the forces generated while cutting are so strong that no boom in the world is capable of taking them. "The cutting force at the front of the jaw can create a moment of 11,000kNm," he says.

He reckons that even though it rotates, it is not always possible to ensure that the jaws are always

at the best possible angle for cutting. "The huge oil rig sections contain several thousand tonnes of steel. If the tool cuts at an angle then these sections will not move. Instead, the tool will try to twist the boom."

Rusch's background is with crane boom repair





Above: Although there is still a great deal of work to be done, one of the world's heaviest demolition rigs is starting to take shape.

Left: The cab is getting a complete rebuild, including a new electrical control system, 3cm-thick armoured glass and a hydraulic tilting mechanism.

work, and especially with telescopic booms. The company reckons that much of the damage caused to demolition booms is due to the stresses created by the scrap shears. The company appears to have the solution, and once again it sounds drastic because the rotating head of the shear, which costs the best part of US\$400,000, needs to be cut off.

The end of the tool will be fitted with an adaptor. Still in development, it features two mechanical springs to absorb the forces. Boosting the weight of the attachment to 30 tonnes, providing it is successful, then we may see the technique being offered on smaller machines in the future.

Huge components

Completely filling the workshop, the huge components of what will be known as the Cat Triple 34-25 (34 metres/25 tonnes) are currently being assembled at Rusch headquarters at Zwaag, north of Amsterdam. Expected to take several weeks to fully assemble, when finished the 9m-wide machine will stand over 7m to the top of the cab. The €3.5 million machine will then be ready for tests. When the engineering company is satisfied it will be pulled apart again into manageable lumps ready for the long trip overland on the back of 13 trucks to Norway.

We hope to be able to see the machine in action later this year. In the meantime, Rusch reveals that it has received a request from an as yet unnamed contractor for an even larger machine that will handle a newly-developed 40-tonne Genesis scrap shear.

Fitted with a four-stage boom that will operate at a height of 54m, and a depth of 33m, a Hitachi EX3600 will be used as the base. Although nothing has been decided, if this machine ever sees the light of day the 600-tonne operating weight will easily make it the world's heaviest demolition machine. 

