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Maritime drumbeat – Caterpillar invests US\$ 300 million in MaK marine engine production

Hamburg, Germany – With global demand, order backlogs and delivery times for marine engines at an all-time high, Caterpillar Motoren is working on a huge investment program costing more than US\$ 300 million (€200 million) to optimise production processes and increase capacity up to 2012. A range of projects have already been launched at the German manufacturing sites in Kiel and Rostock and in Guangdong in the P.R. China. They will result in a doubling of the annual production of MaK marine engines from about 500 units now to more than 1,000 – up from only 200 few years ago.

Sustainability made by Caterpillar

By implementing the Caterpillar Production System, the company will transform its manufacturing systems to new standards of quality, speed and safety in the industry. Operations and supply chain management will utilise consistent processes throughout the entire value chain, and customers will benefit from expanded production capacity and reduced delivery times.

Another step is the move to focussed facilities, each of which with dedicated areas of competence. Apart from being the headquarters of Caterpillar Motoren, the Kiel site will specialise in research and engine development, block and component machining, spare parts management and production of the smaller MaK engine series M 20 C, M 25 C and inline M 32 C. The Rostock facility will more than double its capacity for assembly, painting, testing and shipment of inline M 43 C and vee-type M 43 C and M 32 C engines. Finally, the Guangdong facility will increase its production of M 25 C engines for Asia Pacific markets.

6-Sigma methodology paves the way

The US\$ 300 million investment is wide-ranging and involves many parties both inside and outside the company. It also entails stringent project management if it is to be finalised on schedule. 6-Sigma is Caterpillar's approach to complex missions of this kind, and numerous teams with subject matter experts from virtually all areas of Caterpillar Motoren have already started work on their parts of the overall project. The total amount of work required is estimated at 120 man years, comparable to more than 30 people working full-time on the project for the next four years. Carrying out the various projects will also affect the number of employees at Caterpillar Motoren sites by 2012, which will be considerably higher than the current 1,600.

The biggest project in Kiel is the creation of an additional 15,000 square metre machining centre for engine blocks and cylinder heads. The foundations were laid in February 2008 and completion is due in 2009. Ultra-modern machining equipment will be ramped-up gradually to full capacity up to 2011. Combining the new machining centre with the existing manufacturing facilities also requires advanced transport and logistics concepts.

Parallel to this, new horizontal machining centres, mill-turn and grinding machines will be installed in existing halls and, together with additional staff, will significantly raise manufacturing capacity for components like connecting rods and valves. The new machines will also help to increase spare parts production for the existing engine population in the field. Last but not least, assembly lines and test beds for M 20 C, M 25 C and M 32 C engines will be renewed and expanded to cope with higher throughput.

The vast capacity increase scheduled for Rostock requires a complete redesign of assembly lines and material flows. Based on step assembly, line flow and the intense use of pre-assembled modules, three flexible assembly lines will be implemented, each of which capable to produce VM 32 C, M 43 C, VM 43 C marine or GCM 34 gas engines. Engine paint and test bed capacity will also be increased with four additional test beds for both engine development and production. As in Kiel, logistics will be improved to cope with enhanced requirements.

In Guangdong, the capacity increase will be realised based on strategies already proven in Kiel and Rostock. A new manufacturing hall with an additional assembly line and one new test bed will double capacities for M 25 C production in the P. R. China, while manufacturing quality remains on premium level and identical to M 25 C assembly in Kiel.

The Caterpillar Production System currently being introduced stretches across more than 110 manufacturing locations world-wide. It helps keep process and material flows lean, increases capacity and significantly decreases delivery times. At Caterpillar Motoren, all three facilities in Kiel, Rostock and Guangdong leverage the Caterpillar Production System to embark from the former push-driven manufacturing philosophy to a pull-driven market philosophy. As a result, daily business at Caterpillar Motoren is more than ever determined by customer's needs.

Liaison with employees and suppliers

Investing big money into new buildings, machines and processes is necessary but not the whole story. Caterpillar Motoren also makes huge efforts to hire qualified employees, train the existing workforce and develop long-term relationships with suppliers and trusted business partners.

By 2012, 200-300 new employees will have joined the current 1,600 strong workforce in Kiel, Rostock and Guangdong. Even more important is training and developing the careers of the existing workforce. Caterpillar Motoren is proud of its loyal, flexible and dedicated personnel, some of whom have been working for the company for more than 40 years. Providing them with a safe and efficient working environment is already an essential part of the Caterpillar Production System. However, to make maximum use of their skills and experience, a new training centre will be built which is also meant to become the core of a new maritime cluster for the whole Kiel metropolitan area. The training centre will combine apprenticeship for young people, training in Simulated Working Environment (SWE) for experienced employees and service training for dealers and customers in a unique learning experience.

The most important business partner when it comes to capacity increases is Gießerei Kiel, part of the German foundry group Casting Technology (CT). For decades, the Kiel foundry has been the major source for MaK engine blocks, cylinder heads and flywheels. With the installation of new pit boxes and moulding areas, it will be capable of coping with increased future demand.

Block production for the M 43 C and VM 43 C engine series will be further enlarged by long-term commercial partnerships with external suppliers. Similar agreements have been concluded with manufacturers of crankcases, turbo chargers and other crucial core components. Both internal and external suppliers will be linked in by new logistics concepts, SAP business management processes and by the controlling principles of the Caterpillar Production System.

“Yet another challenge”

Florian Hennings, Project Manager for the capacity increase at Caterpillar Motoren, commented: “The US\$ 300 million investment has led to largest reconstruction phase ever on the three sites of Caterpillar Motoren. The foundations of the new machining centre in Kiel, for example, are based on more than 900 piles, each up to 20 metres long, because of the bog soil underground. And before we could start with the actual drilling, legacy buildings including an old world-war two bunker, made of strongest concrete, needed to be demolished.”

In contrast, Caterpillar Motoren will install some of the most-modern machines on its renewed sites. The 3D Coordinate Measuring Machine (CMM) to be used for quality control in engine block production is the largest-ever built by German industrial measuring specialist Zeiss. The portal machining centres ordered with market leader Waldrich Coburg mark the biggest-ever single order for the company.

To manage a vast project like this on time, on quality and on schedule, as natural, bears many challenges for the project manager. “However,” Hennings declared, “to implement cutting-edge manufacturing technology and build up the marine engine facility of the future probably is the most-fascinating jobs the company has to offer.”

Sales and Service reinforced

In parallel with improvements on the manufacturing side, Caterpillar Marine Power Systems (CMPS) has also increased its power. A comprehensive reorganisation earlier this year has consolidated CMPS, headquartered in Hamburg, Germany, Caterpillar Global Petroleum, headquartered in Houston, Texas, in the USA, and Caterpillar Motoren, headquartered in Kiel, Germany, under the new “Marine and Petroleum Power Division” headed by Caterpillar Vice President Richard J. Case. This strategic move not only combines the two fastest-growing segments of Caterpillar’s global engine business in one organisation, but also gives them direct access to Caterpillar’s most-powerful medium-speed diesel engines manufactured in Germany and in the P. R. China.

CMPS today comprises more than 300 dedicated marine professionals in 11 global offices and regional headquarters, plus thousands of related experts in research, development, manufacturing and at dealerships world-wide. The office space, as well as the number of people working, at the CMPS headquarters in Hamburg, for example, have more than doubled in five years. By the end of 2008, about 50 people from 11 different countries will be working there. The global personnel headcount is also expected to further increase significantly in 2009.

At the inauguration of the expanded Hamburg headquarters, Nigel Parkinson, Managing Director CMPS, said: “In only five years of existence, Caterpillar Marine Power Systems has gained an outstanding position on the international marine markets and also within Caterpillar Inc. Today, Cat and MaK engines are leaders in numerous maritime application fields and make a substantial contribution to Caterpillar’s global engine business that was worth US\$ 13.603 billion in 2007 and now accounts for some 30 % of entire corporate sales and revenues of US\$ 44.958 billion. We will continue to invest in products, processes and people so that CMPS can continue its dynamic growth and supply tailor-made power solutions for every need,” Parkinson declared.

Riding the wave of success

“We have established a long-standing tradition of manufacturing excellence backed by innovative engine designs, sophisticated engineering and superior engine emission reduction technologies”, said Hans E. Timm, Managing Director Caterpillar Motoren. “With the current

US\$ 300 million investment, we will not only cope with strong demand for the MaK product on virtually all global markets but also evolve our three manufacturing facilities to the latest standards in safety, flexibility and efficiency. The Caterpillar Production System combines tailored processes, lean management and full employee engagement in the best possible way. Having said that, I am pretty sure that Caterpillar Motoren is capable of withstanding any future challenge in either boom or trough.”

Characters: 11,078

Pictures available on request:

- 1.) Artist's Impression of new Machining Centre Building in Kiel**
- 2.) Legacy Buildings and Bunkers being demolished**
- 3.) Solid Foundation is the Key for Success**
- 4.) Erection of new Machining Centre Building**
- 5.) Good Progress in Construction Work**
- 6.) Engine Block manufacturing with new Waldrich Machining Centre**
- 7.) Quality testing with Zeiss 3D Coordinate Measuring Machine**

About Caterpillar Marine Power Systems

Caterpillar Marine Power Systems, with headquarters in Hamburg, Germany, brings together all the sales and service activities for Cat and MaK branded marine products within Caterpillar Inc. This organization provides premier marine power solutions (high and medium speed with outputs from 11 kW to 16,000 kW) and customer service from a single source for the global ocean-going, commercial and pleasure craft markets. The Caterpillar Marine Power Systems sales and service network includes more than 2,100 dealer locations world-wide and is well positioned to support customers wherever they are.

More information is available at www.cat-marine.com or www.mak-global.com.

About Caterpillar

For more than 80 years, Caterpillar Inc. has been making progress possible and driving positive and sustainable change on every continent. With 2007 sales and revenues of \$44.958 billion, Caterpillar is a technology leader and the world's leading manufacturer of construction and mining equipment, clean diesel and natural gas engines and industrial gas turbines.

More information is available at www.cat.com.

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