



## Success Brief

HPC

Intel® Xeon® processor  
5400 series

Automotive

Computer Aided Design



“Computing times  
have decreased  
fourfold: from 12  
hours to  
2-3 hours.”

Pierpaolo Croveti,  
ICT Manager, Brembo

# Brembo Brakes Accelerates Time-to-Market with Intel® Technology

## Brembo turns to Intel® Xeon® processor 5400 series to galvanise market position and significantly reduce product development time

Brembo started in 1961 as a machine shop and grew quickly. Today it works on three continents (America, Asia and Europe) with eleven production sites. It markets its products in 70 countries and employs about 5,800 workers, about nine per cent of which are engineers. Innovation is the true heart of the company business, and it decided to transfer its headquarters to the Kilometro Rosso, Stezzano (Bergamo), Italy, one of the most important science parks in Europe in with nearly 1,500 research and development (R&D) workers. The company set up a R&D centre in 2007. To meet constantly changing market needs, the R&D departments have to adopt processes that improve performance and comfort and arrive at an almost final prototype more quickly, so testing can be carried out. Essentially, time-to-market has to be reduced. High performance computing (HPC) plays a key role in this. Sector standards entail applying Computer-Aided Engineering (CAE) modeling solutions and Finite Element Analysis (FEA) simulation as an integral and essential part of the design process itself. Both involve high levels of computational engineering. As a result, it implemented a computing cluster dedicated to three-dimensional modelling and simulation. It consisted of a Dell\* workstation and a server powered by Intel® Xeon® processor 5400 series with four cores.

- **Market pressures demand faster design.** Brembo Brakes needed to accelerate its computer-aided product development to maintain market leadership.
- **High-performance computing.** The company implemented a computing cluster dedicated to three-dimensional modelling and simulation, consisting of a Dell\* workstation and a server powered by Intel® Xeon® processor 5400 series with four cores.
- **Dramatic fall in computing times.** Design data flow plunges leading to computing simulations that take two to three hours rather than up to 12 hours, and ultimately faster product design.

Pierpaolo Croveti, ICT Manager at Brembo, explains: “Brembo works with all the major automobile and motorbike manufacturers in the world. They put us in charge of the entire design procedure. The prototype has to comply with the specifications provided by the manufacturer and also be innovative in terms of materials, safety and construction, as well as style. The market and end users acknowledge our ability to combine design with technology and rate it as a plus. And we do all this in the ever shorter times global competition demands.”

To reduce time-to-market and costs significantly, Brembo implemented a new computing cluster devoted to three-dimensional modeling and simulation, consisting of a Dell workstation and a server based on Intel Xeon processor 5400 series with four cores. These processors are the first in which Intel's Hafnium-based high-k (Hi-k) metal gate formula is used. They are also the first made with the 45 nm manufacturing process, which doubles transistor density, that is, they have up to 820 million transistors. With a clock speed of 3.40 GHz, a 1,600 MHz FSB and 12 MB cache, the X5482 is one of the top four-core processors in the 5400 platform, optimised for broadband applications like HPC. Intel® Xeon® processors also contribute to improving the environmental sustainability of systems by optimising the performance/watt ratio, reducing waste due to electricity leakage and doing away with the use of lead and halogens.

# Brembo gains faster design data flow and energy-efficiencies

## A leap in performance

Crovetti, said: "With the cluster based on the new Intel® Xeon® processor 5400 series with four cores, computing times have decreased fourfold. A simulation that took 12 hours before takes just two or three hours now. In this way, the number of characteristics we are able to check in a simulation session increases enormously, along with the accuracy of the tests. We now achieve the design specifications right from the first or at most the second physical prototype, with the highest production standards."

Since the simulation and modelling software is the same as was used on the previous cluster, the improvement in performance is attributable to the hardware, and to the optimisation of its architecture. Brembo turned to Intel's partner Exemplar for this optimisation. Exemplar provides innovative engineering services to firms and indicated the final architectural choices thanks to their experience in FEA and HPC.

The optimisation increased overall system performance by considering absolutely every aspect of the complex architecture. The aim was to optimise the processor's high performance not just as regards input/output speed, but also in terms of throughput to disks. Thanks to a special RAID0 configuration with SAS disks, the disk-writing bottlenecks were done away with and a throughput nearly four times greater than possible with the classic configuration was achieved.

Luca Romani, Large Accounts Director, Intel Italy and Switzerland, said: "With the introduction of 45 nm technology, many new functions have been implemented that improve HPC performance: 47 new instructions speed up the workload, virtual machine transition times have been improved by 25-75 per cent and a fast divider doubles the speed of almost all types of calculation. Thanks to these and other characteristics, further enhanced by optimisation of all the applications in the architecture, Brembo was able to increase the whole system performance significantly, from CPU management to interaction with disks and other network components. The result is faster design data flow that transforms into a significant decrease

## Spotlight: Brembo

- Brembo was founded as a small machine shop by Emilio Bombassei, father of the present chairman, who used the experience he had gained in the mechanical and metal working sectors to perform machining on behalf of important customers, such as Alfa Romeo.
- Today the company operates on three continents and has production sites in eleven countries. It has sales offices in Sweden, France and the United States, and markets its products in seventy countries throughout the world.
- 1964 was a milestone in the company's history: Brembo started manufacturing the first Italian brake disks for the spare-parts market. Up to that time, disks were imported from Great Britain. Later, brake disk production was flanked by the manufacture of other braking system parts. Its expertise, specialisation and quality led to Brembo becoming the leader in the disk-brake spare-part sector in Europe.



in time-to-market – a vital factor on the global market – in keeping with the highest production, security and consumption reduction standards."

Despite its relatively small size, the greater density of the simulation and modeling cluster contributes to improving corporate environmental sustainability thanks to the decrease in direct consumption and reduced need for local conditioning. This is an important result for Brembo. With its environment policy, it has been committed for years to a balanced industrial development project that respects the community in which it works by reducing environmental impact and using environmental friendly technologies in compliance with the ISO 14001 and OHSAS 18001 standards.

## System key points

- **Cluster consisting of Dell hardware with Intel® Xeon® X5482 processor with four cores (3.2 GHz, 12 MB cache, 1,600 MHz FSB)**
- **Decrease in simulation computing time of the order of going from 12 hours down to about 2-3 hours**
- **Less need to create expensive physical prototypes: from 4-5 to 1-2**
- **Elimination of bottlenecks in writing to disks and other network components**
- **Significant increase in throughput to disks**
- **Significant increase in performance for the same wattage**
- **Greater system density with lower direct power consumption and reduced need for conditioning**

**Find a business solution that is right for your company.**

**Contact your Intel representative or visit the Reference Room at:**

**<http://www.intel.com/references>**

Copyright © 2009 Intel Corporation. All rights reserved. Intel, the Intel logo, Xeon and Xeon logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

This document is for informational purposes only. INTEL MAKES NO WARRANTIES, EXPRESS OR IMPLIED, IN THIS DOCUMENT

Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel® products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing

\*Other brands may be claimed as the property of others

0509/JNW/RLC/XX/PDF

322014-001EN

