

PBS Professional at Chrysler: Managing 250,000 Simulations a Year



Key Highlights

Industry

Automotive

Challenge

A reliable job scheduler to handle Chrysler's growing CAE server farm.

Altair Solution

By running all jobs through one scheduler, better utilization is obtained on all of Chrysler's servers.

Benefits

- Shared resources between CFD jobs and our other simulations
- Better utilization

Customer Profile

The people who design cars and trucks at Chrysler have been using computer simulation tools since the 1980s. Since those early beginnings, the use of computer-aided engineering and finite element analysis has expanded to become the powerhouse enabler for Chrysler designers that it is today.

“It used to be that you did simulation because it was cheaper or faster than physical testing,” says John Picklo, Chrysler’s Manager, Web Infrastructure and high-performance Computing. “You used to have to convince people that CAE was important. We never have those discussions now. We only discuss how much of it we can afford to do.”

“Frankly, there’s no car company in the world now that can design a car without a significant use of simulation. Just the quality demands and the time-to-market demands make it impossible to design a car and bring it to market without CAE being tightly integrated into the design process. It’s a major part of the overall design.”

“That’s why we’re running 250,000 simulation jobs a year.”

And that’s why the processor count at Chrysler’s HPC center has grown to 1,544-cores, all managed by PBS Professional®.

Chrysler Success Story

“The industry is moving into an era in which we expect rapid growth in the number of cores. To some extent, it will be more difficult to schedule jobs. Our core footprint will be much larger. PBS Professional will play a central role in enabling us to do that well.”

John Picklo,
Manager, Web Infrastructure and high-performance Computing, Chrysler

Growing Chrysler’s CAE Server Farm

In the late 1990s, Chrysler was building up its HPC capacity for the growing demand for CAE simulations by installing a number of servers. They made the decision to manage these resources with commercial job scheduling software.

“We wanted to allow work to be allocated to any of our servers,” says Picklo, whose résumé covers 25 years in information technology, including systems design and management at General Motors, Nissan, and Toyota. “Rather than targeting jobs to specific servers, we wanted the ability to move them around.”

Chrysler initially used a competitor’s product for workload management. In 2003, they acquired 384 PBS Professional licenses to manage

clusters used exclusively for computational fluid dynamics (CFD) jobs with a variety of commercial software packages. “We brought in PBS Professional simply to introduce competition,” says Picklo.

Fast forward to 2008. The HPC center is now operating 10 servers from a mix of vendors – SGI, HP, and IBM – using a mixture of Intel and AMD chips running Red Hat or SUSE Linux. The core count on the server farm is up to 1,544.

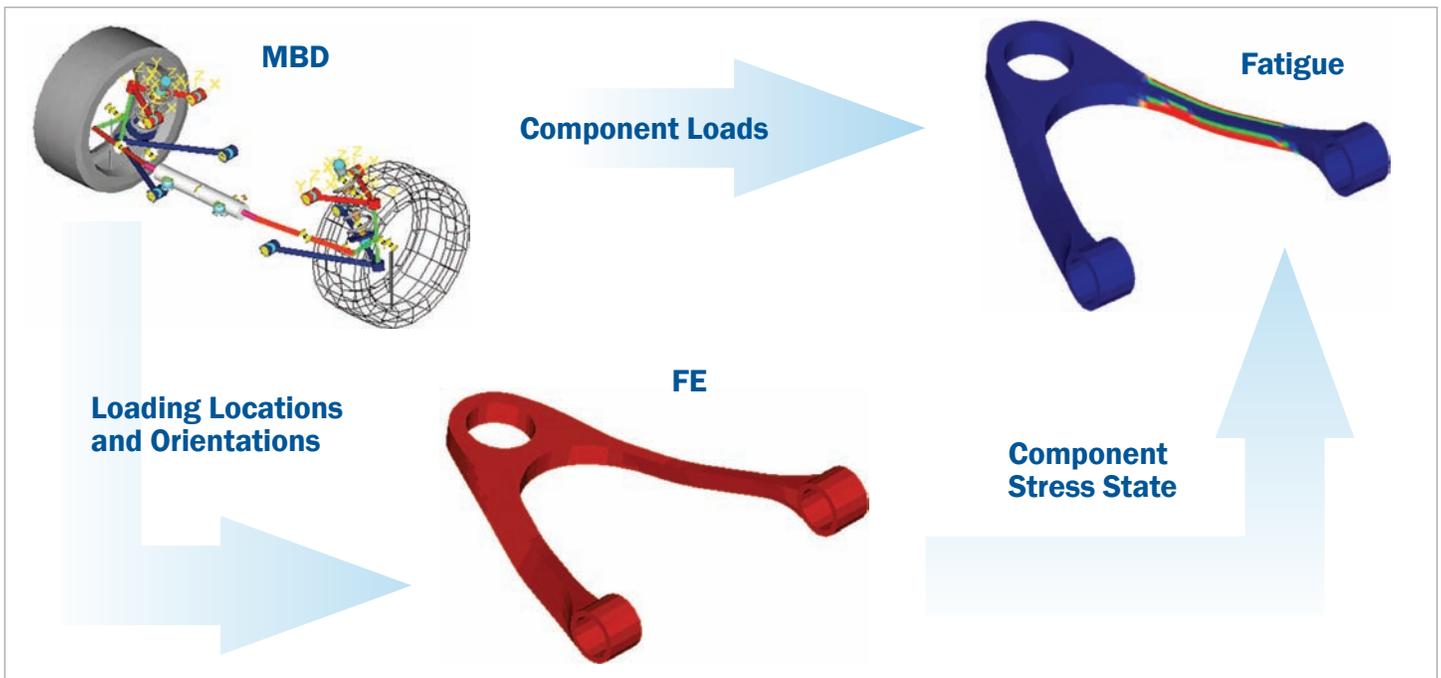
“We were pretty happy with the way things were running,” says Picklo. “But Altair’s unique licensing model created a compelling business case that helped us make the decision to use one scheduler for all our jobs. We’re now scheduling all our jobs with PBS Professional. We installed it ourselves and have the installation fully completed.”

An Unforeseen Benefit

Moving entirely to PBS Works was a strategic decision based partly on cost. Chrysler uses Altair HyperWorks tools for CAE, and they run on our HPC systems. Altair’s licensing structure enabled Chrysler to leverage HyperWorks licenses and substantially reduce license costs for workload management software. Running all 1,544 cores on PBS Professional also produced an unforeseen benefit.

The 384 cores originally managed by PBS Professional and dedicated to CFD applications did not share any workload with the rest of the server population.

“It turns out,” says Picklo, “that because we made the strategic decision to run everything through one scheduler, we are now able to share resources between CFD jobs and our other simulations.



As a result we're getting better utilization on all our servers."

Chrysler runs impact simulations using the LS-DYNA solver; noise, vibration, and harshness (NVH) studies in NASTRAN and Abaqus; and CFD in a variety of commercial packages. The HPC operation is the heartbeat of engineering design because CAE is involved at every stage. Three hundred Chrysler CAE engineers, scattered around the world, feed jobs to the HPC resources through PBS Professional using a homegrown script interface.

"It starts at the very beginning of the process," says Picklo. "When they first sketch a vehicle, one of the first things they want is a drag coefficient. So we're doing simulations from the original basic sketches, right through to when the first vehicles are coming off the assembly line.

Altair HyperWorks® suite improves this process with its tools for concept design, modeling and visualization, multi-body dynamics, test data analysis, electrical schematic generation, and optimization."

The Future: More Work for PBS Professional

The bottom line for Picklo and Chrysler in this case is that his team was able to maintain service levels while switching to PBS Professional, accomplishing it in about 12 weeks. They met their customers' expectations while achieving a sizeable cost advantage and increasing server utilization.

Now that Chrysler has standardized on PBS Professional, Picklo intends to keep it as a strategic scheduling tool going forward as HPC technology continues to evolve.

"The industry is moving into an era in which we expect rapid growth in the number of cores," says Picklo. "With Intel and AMD going to multi-core chips rather than faster chips, we'll be running orders of magnitude more cores than we have in the past. To some extent, it will be more difficult to schedule jobs. Our core footprint will be much larger. PBS Professional will play a central role in enabling us to do that well."

"And as we do that, there will be issues around license management for the CAE applications. The scheduler will also become pivotal in managing those licenses and using them efficiently."

"We have no doubt that PBS Professional will have any trouble helping us into that new paradigm of simulation computing."

Visit the PBS Works library of
Success Stories
at www.pbsworks.com

About Altair

Altair empowers client innovation and decision-making through technology that optimizes the analysis, management and visualization of business and engineering information. Privately held with more than 1,800 employees, Altair has offices throughout North America, South America, Europe and Asia/Pacific. With a 27-year-plus track record for high-end software and consulting services for engineering, computing and enterprise analytics, Altair consistently delivers a competitive advantage to customers in a broad range of industries. Altair has more than 3,000 corporate clients representing the automotive, aerospace, government and defense, and consumer products verticals. Altair also has a growing client presence in the electronics, architecture engineering and construction, and energy markets.

About PBS Works

PBS Works™, Altair's suite of on-demand cloud computing technologies, allows enterprises to maximize ROI on existing infrastructure assets. PBS Works is the most widely implemented software environment for managing grid, cloud, and cluster computing resources worldwide. The suite's flagship product, PBS Professional®, allows enterprises to easily share distributed computing resources across geographic boundaries. With additional tools for portal-based submission, analytics, and data management, the PBS Works suite is a comprehensive solution for optimizing HPC environments. Leveraging a revolutionary "pay-for-use" unit-based business model, PBS Works delivers increased value and flexibility over conventional software-licensing models.

www.pbsworks.com



Altair Engineering, Inc., World Headquarters: 1820 E. Big Beaver Rd., Troy, MI 48083-2031 USA
Phone: +1.248.614.2400 • Fax: +1.248.614.2411 • www.altair.com • info@altair.com