



Putting the pedal to the
virtual metal.

Triple Eight Race Engineering was able to design and build a winning race car in record time, with workstations running AMD Opteron™ processors and ATI professional graphics.

Challenge:

- Triple Eight Race Engineering began developing its car for the 2007 race season but hit a major snag when the British Touring Car Championship (BTCC) adopted a new set of regulations.
- As a result, the car it had been racing could no longer compete and they were forced to switch to an entirely different model, with a mere six month design-to-racetrack development cycle.

Solution:

- Triple Eight put their AMD Opteron™ processor-based workstations with ATI FireGL™ graphics accelerators to the test, modeling all car components in Autodesk Inventor, a complex 3-D CAD design package.
- After a great deal of success with the AMD-based workstations, Triple Eight decided to implement AMD Opteron™ processor-based HP ProLiant servers in its data center.

Impact:

- Designers had been frustrated that at least an hour of their day was spent performing the simple task of doing rotations of 3-D drawings – a problem that the AMD graphics processors addressed beautifully.
- With the HP ProLiant servers in its data center, designers were able to access the models and data they needed without delay.
- Triple Eight completed the design of the Vectra in time, went on to win the 2007 BTCC Driver and Manufacturer Championships, and continued their success with the 2008 Drivers, Manufacturers and Teams championships.



“We are working with very complex models here. Taking an engine and figuring out how it will fit within the engine bay — that used to be a challenge. We couldn’t do it as well before we used AMD Opteron™ processors and ATI FireGL™ technology. It just wasn’t possible.”

— Richard Walker, IT director, Triple Eight Race Engineering.

Formula for Success

As any race car driver can attest, there’s more to winning a championship than a well-oiled machine. To win a race you need endurance, skill and a high performing vehicle. For race car engineers, you must also have the right technology to turn your vision of the ultimate race car into reality.

The team at Triple Eight Race Engineering is well versed in what it takes to win championship titles. The Banbury, England-based firm began in 1996, when they were founded with the primary goal of designing, building and racing Vauxhalls – the U.K. division of General Motors. A decade of success on the racetrack, including the Manufacturer, Driver and Team titles in 2001, 2002, 2003 and 2004, and the prestigious British Touring Car Championship (BTCC) Manufacturer title in 2005, has intensified the partnership, and now Triple Eight is Vauxhall’s technical partner for motorsport.

Caution: Detour Ahead

With the skills, strategy and expertise in place to keep the success and championships coming, 2007 brought an unexpected bump in the otherwise perfect racing road. The BTCC adopted a new set of regulations that limited the amount of “on track” testing time while giving more technical freedom on some areas of the race car design.

These new regulations hit Triple Eight hard – the Astra Sport Hatch car it had been racing could no longer compete and they were forced to switch to an entirely different model, the Vectra. “We were given a very short design cycle,” said Triple Eight’s IT director Richard Walker. “Speed was of the essence both on the track and off.”

With a small design team – including just six design engineers – the team would have had challenges under normal design circumstances, but with the addition of new regulations, a new car design, and an accelerated deadline, the team was on a tight schedule to deliver a championship-worthy race car.

The team immediately got to work on building a new virtual model of the Vectra that would be the framework for the final design. “One of the big things about a racing car is you’ve got the packaging constraints – meaning you’ve got to get all the components in a restricted and defined amount of space and you can’t do that type of work on a piece of paper anymore,” said Franck Marie, commercial and marketing director, Triple Eight Race Engineering.

With only six months to complete their design and manufacture the race car, they couldn’t afford any setbacks, no matter how small. “You have to get it right pretty much the first time,” commented Marie, “because if you don’t, you won’t have enough time before the first race of the season. And if you’re not in the race, you can’t win.”

Racing Against the Clock

With the accelerated design schedule, the AMD Opteron™ processor-based workstations used by Triple Eight were put to the test. The software used by Triple Eight to design the car is a complex 3-D CAD design package by Autodesk called Inventor. Inventor is used in tandem with a variety of other programs that provide functionality for special areas such as vehicle stress analysis. To begin the design process, the engineers first model all of the car components in 3-D and then filter them through the various computer programs.





Given the team can't waste valuable time waiting for the 3-D images to render on their computer, it is extremely important that the CPU and GPU running the software respond quickly, reliably and efficiently. "For us, technology is absolutely key. We need successful technology to make a race-winning car," said Walker. "We are quite lucky with AMD. The high-performing processors really allowed us to work efficiently."

In addition to AMD's processor technology, Triple Eight was also utilizing the ATI FireGL™ line of graphics card accelerators for workstations. Triple Eight began working with ATI prior to AMD acquiring the company, so Triple Eight was going to both vendors to source their technology. "We actually started our respective relationships with ATI and AMD before the merge, then the companies merged and we thought 'ah, that makes perfect sense!'"

With the trusted AMD Opteron™ processors and ATI FireGL™ workstation graphics accelerators in place as Triple Eight's powerful design "engines," the team began working practically 24/7 to meet their deadlines. "It's a very stressful situation to be in," said Walker. "But we're very lucky because we have such a good partner in AMD and ATI. We could cope with the stress because we were all in it to win."

Get Your Motor Runnin'

Without the use of ATI and AMD's sophisticated and progressive architectures, Triple Eight would have had a much tougher time meeting their accelerated schedules. "It is really quite simple, we noticed a massive improvement with the ATI and AMD technology," commented Walker. "We are working with very complex models here. Taking an engine and figuring out how it will fit within the engine bay – that used to be a challenge. We couldn't do it with the levels of detail and accuracy required before we used AMD Opteron™ processors and ATI FireGL™ technology. It just wasn't possible. The ATI FireGL™ cards have been great and we are equally excited to begin utilizing AMD's new ATI FirePro™ graphics cards as well."

The ability to do a great deal of processing via the graphics accelerator rather than just relying on the CPU proved to be particularly valuable for the team. Before the AMD/ATI systems were in place, engineers would grumble that at least an hour of their day was spent performing the simple task of doing rotations of their 3-D drawings – a problem that the AMD graphics processors, with superior graphics power, addressed beautifully.

Leveraging AMD/ATI and partner technology, Triple Eight was able to get the quick start it needed for the project. "With the new rules, we weren't allowed to just start from the ground up. For example, we had to double the power of the car and make it twice as quick around the circuit as a road car would be, but still stick to the engine-base size that we were given. We also needed to design new ancillary components that could cope with the added power and speed," explained Walker. "Being able to model all of that in 3-D rather than the way we used to do it which was essentially taking educated guesses, building a mock up, finding out it won't work and then heading right back to the drawing board not only took a lot of time but wasn't very eco-friendly either. With the technology supplied through AMD and its partners, we can work much more efficiently."

Keeping Pace

While the AMD/ATI based workstations were helping the team reach the finish line, Triple Eight was not as satisfied with the performance of its data center. "One of the very helpful features of the Autodesk software is we can catalog the whole car on the server and then all of the designers can log on to the server and check in and out their parts. Unfortunately though, because these are large models, the server is under a heavy load when the team pulls the data onto their machines," commented Walker.

The pressure this placed on Triple Eight's previous server was significant and often created delays and glitches for the team. With the success of AMD processor-based systems in the workstations, Triple Eight decided to re-evaluate its IT infrastructure.

"We decided to implement AMD Opteron™ processor-based HP ProLiant servers in our data center. To say we immediately noticed a huge improvement in the systems' ability to access these parts would be an understatement," commented Walker. "Further, we often need to access data we've stored from previous car models, sometimes from as far back as 2003. Every time the designer pulls up a model – which can be comprised of hundreds of parts – it causes a significant strain on the server. With the HP ProLiant system though, the designers were able to access the models and data they needed without delay, which was extremely valuable."

Leaving the Competition in the Dust

After months of sleepless nights, lots of coffee (and tea) and over 1,400 different part's drawings being designed, the team submitted the Vectra specs to the racing commission.

Not only did Triple Eight complete the design of the Vectra in time to qualify, but that design also went on to win both the Driver's Championship and the Manufacturer's Championship at the 2007 BTCC – to the obvious delight of the entire team.

"The right car is a constant evolution. The design cycle doesn't stop with the building of the first car. Unlike a road car, we have to create and ship our designs quickly and then immediately begin working on the next car," Walker pointed out.

Even though a race car may be designed perfectly in theory, the ability to tweak the car in to maximize performance happens until moments before the drivers "put the pedal to the metal" on race day. This is because the car is outfitted with sensors and an internal computer system that transmits vital performance data back to the

engineering team. In fact, some of the most useful insight the Triple Eight team gathers is when they send the race car out for a few test laps.

"The neat thing is we can download all the data from the race car every time the driver turns the wheel, so we can make any updates very quickly," Walker explained. Having servers in place that can handle the heavy influx of data is extremely important as the tweaks made to the car can be the difference between first or second place. "There are a lot of environmental factors we need to take into consideration on race day and there can be up to three races in a single day, so the information we receive can be used in a later race that day, if needed."

The aggressive design lifecycle, the ongoing performance tweaks and the heavy demands placed on the race car mean that Triple Eight can't take the chance of not working with the best people, technology or partners. "Everything we do, support and use needs to be reliable; it has to ease our workload and help us speed up our work. Therefore, we not only need the best hardware we can get, but we also need the best support, because if or when something goes wrong we need someone to fix it straight away," said Marie. "That's why we continue to work with AMD – in addition to providing superior technology they truly are a fantastic partner."

Building on the success experienced during the 2007 racing season, the Triple Eight team finished the 2008 season winning all three BTCC titles again: driver, team and manufacturer. But of course, the work of a race car engineer is never done.

"We're still thrilled about those wins but we don't have time to sit on our laurels too much – we are already beginning to actively work on the 2009 season."

About AMD

Advanced Micro Devices (NYSE: AMD) is an innovative technology company dedicated to collaborating with customers and partners to ignite the next generation of computing and graphics solutions at work, home and play.

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