



2010 WINNING CASE STUDY
Platinum Award and
Operational Performance in the Private Sector
IBM with Brawn GP



Improving performance with the wheels still spinning

Executive summary

Formula One racing is all about speed, and not just on the track. Teams spend millions of pounds on two cars which race 18 times a year. Pace and precision in the design and build phase are just as important as track performance, especially as there are constant modifications throughout the racing season.

Following a difficult period of change, Brawn GP – the Northamptonshire based motor racing team and constructor - was determined to create a competitive car in time for the start of the 2009 season. The company turned to IBM to help rapidly re-engineer its design and manufacturing processes around new software and the latest Formula One technical regulations.

This fundamental shift to the processes, methods and tools used by the designers, engineering and production staff had to be achieved with minimum disruption to the 'non-stop' Formula One development cycle. The pressure was on to make sure that design could continue between each race and throughout the close season.

Faster manufacturing, relational design and an improved ability to handle late changes have helped build a highly competitive car. The team has had an extremely successful season with driver Jenson Button winning the 2009 Drivers' Championship and Brawn GP winning the Constructors' Championship.

An understanding of the unique, competitive environment plus a passion for Formula One was crucial in this engagement. IBM provided a team of specialised Product Lifecycle Management (PLM) consultants who helped Brawn GP's in-house PLM team of just four people with this end-to-end design and manufacturing transformation.

The problem/opportunity faced by the client

In the high-pressure environment of a Formula One team, each year's car must be built to meet rigorous design regulations, and modified throughout the racing season to deliver the best possible performance.

Efficient Product Lifecycle Management (PLM) is crucial – managing each component from conception through design, modelling, manufacture and testing to installation and maintenance throughout the race season.

In a period of great change within the organisation, Brawn GP was committed to migrating to a new PLM and computer-aided design and manufacturing (CAD/CAM) solution as part of a corporate standardisation exercise. The new solution had to be introduced and designers helped to transition to the new tools with as little disruption as possible – especially difficult when design has to continue in the tight window of time between each race and throughout the close season.

Brawn GP was determined to get the new solution into full production in time to develop its 2009 car and take advantage of significant changes to the Formula One technical regulations. When there are major changes like this, it levels the playing field and represents an opportunity for smaller teams like Brawn GP to gain ground on more established rivals. Everyone has to totally redesign the car rather than continuing to develop the previous year's model.

Brief project background

Brawn GP is a motor racing team and constructor based in Northamptonshire, which competes in the FIA Formula One World Championship. The team is led by Ross Brawn and employs 450 people, the majority of whom are engineers designing, manufacturing and building the team's Formula One car to help drivers Jenson Button and Rubens Barrichello win Grand Prix races.

Consulting activity

Asked to take the lead in the PLM implementation project, IBM quickly recognised that this was more than the implementation of new software and tools. It was an ideal opportunity for Brawn GP to radically improve its performance by transforming its PLM processes and introducing new ways of working.

Managing a team of almost 40 people, including key representatives from Brawn GP and consultants from several technology specialists, IBM helped deliver a complex phased programme of change that involved a significant shift in the culture and structure of the organisation.

Careful timing

IBM worked to re-engineer processes within Brawn GP, while implementing the PLM solution and integrating it with the company's legacy software. Both systems were run in parallel initially and shared data. This made it possible for different design and manufacturing teams to transition at different times, minimising the disruption to operations.

The 2008 car was designed during the transition period, using a mixture of the legacy systems and the new PLM solution. By the time work started on the 2009 model, the transition to the new way of working was complete. The BGP 001 is the first Brawn GP car to be designed and manufactured entirely using the new solution.

Leaner, more agile performance

Design engineers can make last minute changes to any one of the thousands of precision engineered parts on a car before a race. Before the transition, design and manufacturing were not well integrated. Engineers designed without much regard for complexity or the time needed to machine the required parts. The change team worked to break down boundaries between design and manufacturing and introduce integrated, leaner processes right across the business.

By bringing about a major shift in skills to support the introduction of relational design techniques – which use computer modelling to show how minor changes to a single component could affect other components – it is now possible to handle late changes much more effectively, with less risk of unforeseen impact.

With the support of the Brawn GP management team, IBM divided manufacturing into two groups, a machining group and a group that learnt new computer modelling skills. Promoting from within the original manufacturing group and training a talented individual to work with IBM to implement and manage the process changes worked well. People trusted their colleague to ensure workable solutions.

Managing cultural change

IBM used a variety of means to help overcome resistance and keep Brawn GP's challenging, fast-paced change programme on track. There were weekly user forums, monthly management meetings and quarterly executive meetings to keep everybody informed. Surveys were used to test people's reaction to the changes as they were introduced and three open forums gave people an opportunity to discuss their concerns and challenges.

A lunchtime session on Fridays which involved inviting key stakeholders to a frank discussion over a fish and chip lunch proved one of the most productive hours of the week. Dubbed “chip chat” it encouraged doubters to see the benefits of the changes being implemented.

Finally, there was no substitute for walking around the Brawn GP site and talking to people in an informal setting. Every Friday morning, IBM’s Lead Consultant did this, accompanied by a senior executive or key stakeholder from Brawn GP. Gaining one-to-one feedback and answering questions from people in different departments and roles proved an extremely useful way of identifying and managing issues before they escalated.

Keeping the focus on racing

Formula One racing has unique pressures and it was important that the IBM team was led by someone with a passion for and a deep understanding of Formula One racing. IBM also provided a team of specialised Product Lifecycle Management (PLM) consultants backed by a large pool of experts who could join the team and focus on a particular area as and when required.

The entire IBM team was fixed on getting a winning car onto the racetrack as quickly as possible and worked on a change programme focussed on best practice within Formula One manufacturing and design.

Success factors and challenges

Meeting project objectives

Brawn GP’s engineers are already reaping the benefits of efficient processes linked to relational design techniques. When installing the Mercedes-Benz engine just seven weeks before the start of the season, they were able to make the required changes to all related systems without major problems.

Relational design also helps the manufacturing department. At one point, the team needed to build fourteen new gearboxes as quickly as possible. Seven were allocated to the in-house manufacturing department, and seven to a more expensive external manufacturer. With more resources at its disposal, the external manufacturer was expected to fulfil orders more quickly – but in this case, there were a number of late changes to the design and Brawn GP’s manufacturing team was able to take these on board quickly and build its seven gearboxes significantly ahead of the external team.

With new concurrent design capabilities, Brawn GP’s engineers can work together to make changes and improvements, knowing they are always working with the most up to date version of a part and that their latest changes are reflected in real-time in the design. This speeds the process and improves accuracy, ensuring the team gets the best car onto the track each week at a faster pace than the competition.

Improvements in design and manufacturing cycle times have been a major advantage for the aerodynamics team, which has been able to design and test more components in less time than ever before – helping to optimise the aerodynamic profile of the car and maximise performance. Aerodynamics is a science of millimetres and tiny modifications, so the more iterations you can complete in terms of design and the more testing you can do in the computational fluid dynamics system and the wind tunnel, the better. Improvements in aerodynamics have been a major factor in Brawn GP’s success this season, and the ability to develop new components faster is an important part of that.

Overcoming challenges

At the start of the change programme, parts of the design office at Brawn GP were resistant to the new solution. The turning point in winning hearts and minds came when Ross Brawn agreed to endorse the proposed transformation. All the design engineers were invited to an event where IBM explained the benefits and Ross Brawn spoke to show his support.

Client benefits

The BGP 001 – the first Brawn GP car designed entirely with the new processes and solution in place – has enjoyed considerable success in the 2009 Formula One season with driver Jenson Button winning the 2009 Drivers' Championship and Brawn GP winning the Constructors' Championship.

Streamlined design and manufacturing processes have helped the aerodynamics team reduce cycle times and test more components more rapidly, making a vital difference to the car's performance.

The team can manage redesigns quickly thanks to relational design capabilities which enable them to enhance and optimise the car throughout the season.

Design re-use and automation, improved surfacing, concurrent design and 5-axis machining have improved quality, safety and reliability of the car on the track, ensuring the team stays ahead of the competition.

Lessons learnt

Identify your most influential allies early and use them to win hearts and minds in order to complete your transformation as smoothly and quickly as possible.

Don't be afraid to challenge traditional divisions of labour. Training a selection of the manufacturing team in relational design was extremely successful.

The client/consultant relationship

“We had to win the hearts and minds of our 200 design engineers and persuade them to work in a new way. IBM won our respect and confidence quickly, and integrated so closely with our own staff that it was sometimes difficult to tell which members of the team were Brawn GP and which were IBM. This close relationship helped to reinforce the idea that the move to the new solution was a team initiative – not something imposed on the design engineers from outside by IBM. This fostered a positive collaborative approach: a problem for the team was a problem for IBM, and both companies worked together to find a solution.” - Matt Harris, Head of IT, Brawn GP

“The Brawn GP team's unprecedented success against larger and more established rivals is testament not only to the skill of Ross Brawn, our drivers Jensen Button and Rubens Barrichello and the whole race team, but also to the ingenuity and innovation of our engineering teams, who have created a very fast and highly competitive car. Even though our team is 40 per cent smaller now than it was before the Brawn GP era, we're still managing to stay at the front of the field. IBM deserves great credit for supporting us through this period of major cultural, organisational and technical transition.” - David France, IT Director, Brawn GP