

# Timing and teamwork

**A UK-designed diesel engine for a British company machined by a UK-based firm using UK-manufactured machine tools? Andrew Allcock heard more**

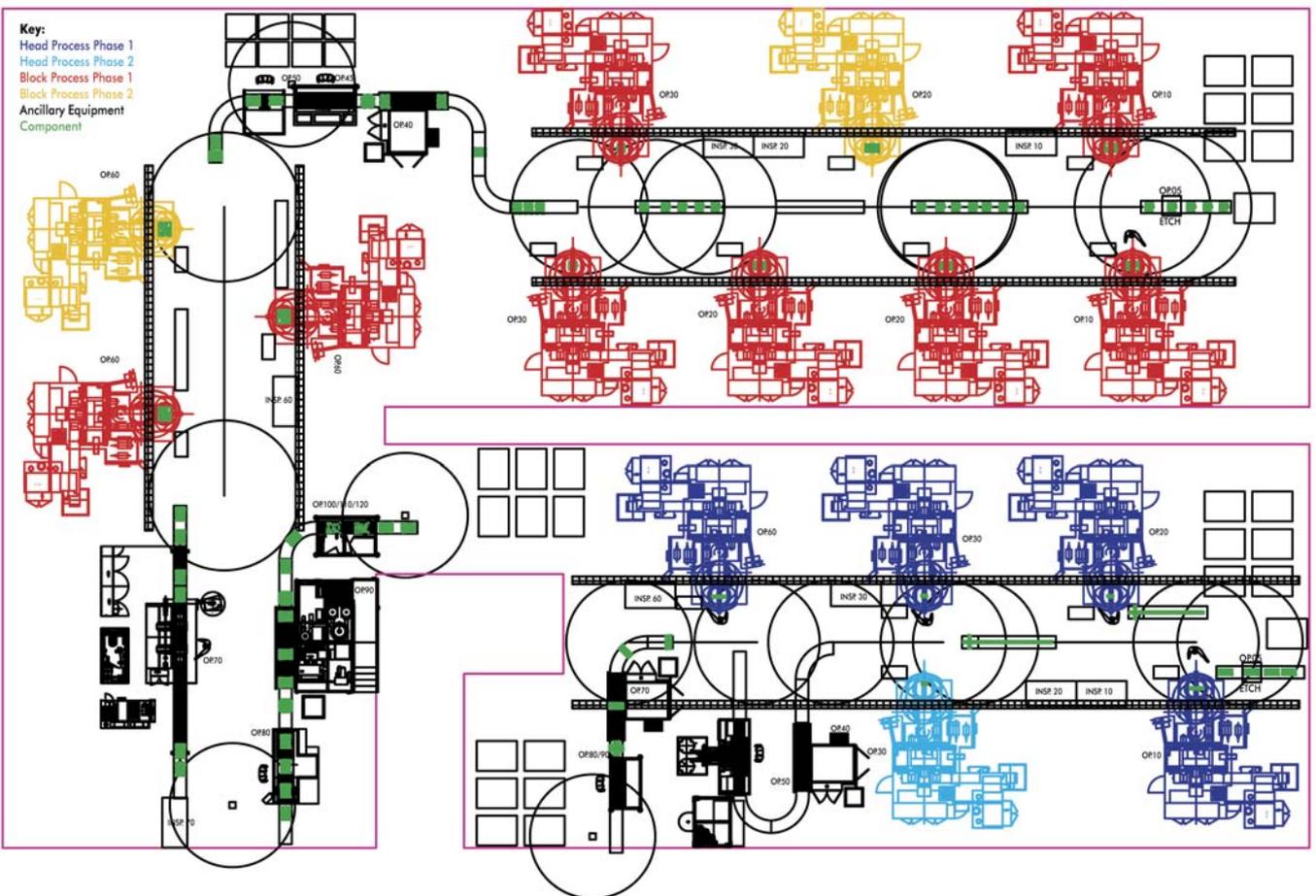
**T**iming and deadlines are a constant theme of the Mahle Powertrain/JCB engine contract, which sees Mahle Powertrain, Wellingborough, Northants machining cylinder heads, blocks and bedplates for the construction machinery maker's Ricardo-designed 4.4 litre diesel engine.

Once JCB made its decision about who was to manufacture these parts, it wanted action. The deal between Mahle

(previously Cosworth Technology Group) and JCB was signed at midnight on a Thursday in June 2003 at JCB's Rocester headquarters. At 2 am the next day finance for the project was signed off at Wellingborough and at 9 am builders got the go-ahead to start an eight-month contract to build the factory where JCB's parts would be made.

In fact, Mahle Powertrain was able to move in after seven months, but a late

change of machine tool partner, meant the pressure was still on the production side, and on the new machine tool supplier, Heller. Mahle, via Heller, had to deliver 80 to-tolerance machined sets for test engines in six weeks, with demonstration of a proven, process-capable solution covering 50 of each part required in 16 weeks. This required Heller to co-opt people into a project team that could, as needed during run-



offs, deliver three-shift working!

Delivery of the initial order for 15 machines – 10 for block and five for head machining – was to start with four machines supporting early component operations. Follow-on machines would progressively deliver full machining capability and complete machined components. The capacity of the system was to be 40,000 sets/annum, with TAKT time set at 14 minutes per set.

This output is a step up from the previous volumes Mahle Powertrain has produced and it is the first time the company has installed a volume capability like this. Prior to this, the company had produced cylinder heads for Audi (its previous owner) at the rate of 2,000/month, ramping up from 500-600/week over a 19-week period, but this did provide Mahle Powertrain with valuable experience and was a factor in it winning the JCB order.

With JCB impressed with Mahle's performance in delivering the test sets, it then also placed the bedplate, which was to have been machined elsewhere, with the company, and that demanded a further three machines.

The first four of the now 18 machines were delivered in May 2004 following the demonstration of process capability at Heller's Redditch facility, with all of the UK-manufactured machines in place by December 2004 (see diagram for system layout). Current output is somewhere over 20,000 sets/year over 1.5 shifts, five days a week, but as Mahle Powertrain's managing director, manufacturing, Warren Roberts explains, the company opted for full capacity at the outset to avoid any disruption in the future.

And just as JCB's confidence in Mahle Powertrain grew, so too did Mahle's confidence in Heller, headed by managing director Geoff Lloyd. Mahle originally intended to engineer the process and fixturing itself, as was its practice, but decided to entrust Heller with the supply of a full turnkey solution,

### Mahle Powertrain's Heller system

The installed system comprises 15 MCH 280 machining centres to tackle the blocks and heads and three MCi 16 machines for the bedplates. The MCH 280s are grouped in two cells, one for heads; the other for blocks (see diagram, opposite page). The MCi 16s form a separate cell. On the MCH 280s, tools of up to 280 mm can be auto-changed and the system at Mahle Powertrain is changing boring tools up to a length of 606 mm. This tool, held by a HSK100 connection is achieving accuracies of 0.005 mm on diameter and 0.15 mm on concentricity.

including value-stream mapping to define system layout and manning.

Sitting in the Mahle Powertrain's Wellingborough offices in November last year then, the assembled team of Mahle and Heller representatives were able to say that there had never been a missed deadline and never a need for any top level meetings between JCB, Mahle Powertrain and Heller to thrash out problems, nor any tense meetings between Mr Lloyd and Mr Roberts. It was, both agreed, a measure of how closely the teams at both companies had worked together, sorting out any issues at the appropriate level without need for escalation. "Both companies have the same mentality and technical capabilities – it just worked," says Mr Lloyd.

#### CLOSE PROXIMITY BENEFIT

Essential to the development of close-knit teams has been close proximity and local manufacture of machine tools, say the companies. It has meant that Mahle personnel have been able to be closely involved such that there was a "seamless" ramp-up of production at the Mahle site.

But this happy outcome was not a given at the outset, as far as Mahle was concerned. The switch to Heller was made at a late stage, so what tipped the balance initially?

At this level it is not about the machine tools themselves, says Mr Roberts, it is more about other considerations. "The machines were identical, we couldn't differentiate." And

it was during a more thorough benchmarking of these other areas that caused the switch. Of particular importance were financial stability and commitment to after-sales service. Financial stability because the company had already felt the impact of a failed machine tool firm previously; while on after-sales service, as Mr Warren notes, Mahle Powertrain is not a large firm and so doesn't have "clout" to force the issue if the commitment isn't already there. And with the system required to operate over three shifts, five days/week at full capacity, high uptime is a must.

But this appraisal process cut both ways. As Heller's Mr Lloyd says, "We had to be sure that in accepting the 16-week challenge, Mahle would be able to absorb and run the production facility in such a brief period." But the "synergies were good" he says, adding that Mahle has, for example, TPM/PM well entrenched in its operations, so there wasn't a need to educate them.

Summing up the project succinctly, Heller's sales manager, Eric Pollard, says: "This sort of aggressive lead time is fast becoming the norm; with this project we have proved ourselves."

So, in JCB's eyes, no doubt, has Mahle Powertrain – and its new factory has room for more cast iron manufacturing capacity, which Mr Roberts is keen to exploit.□

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