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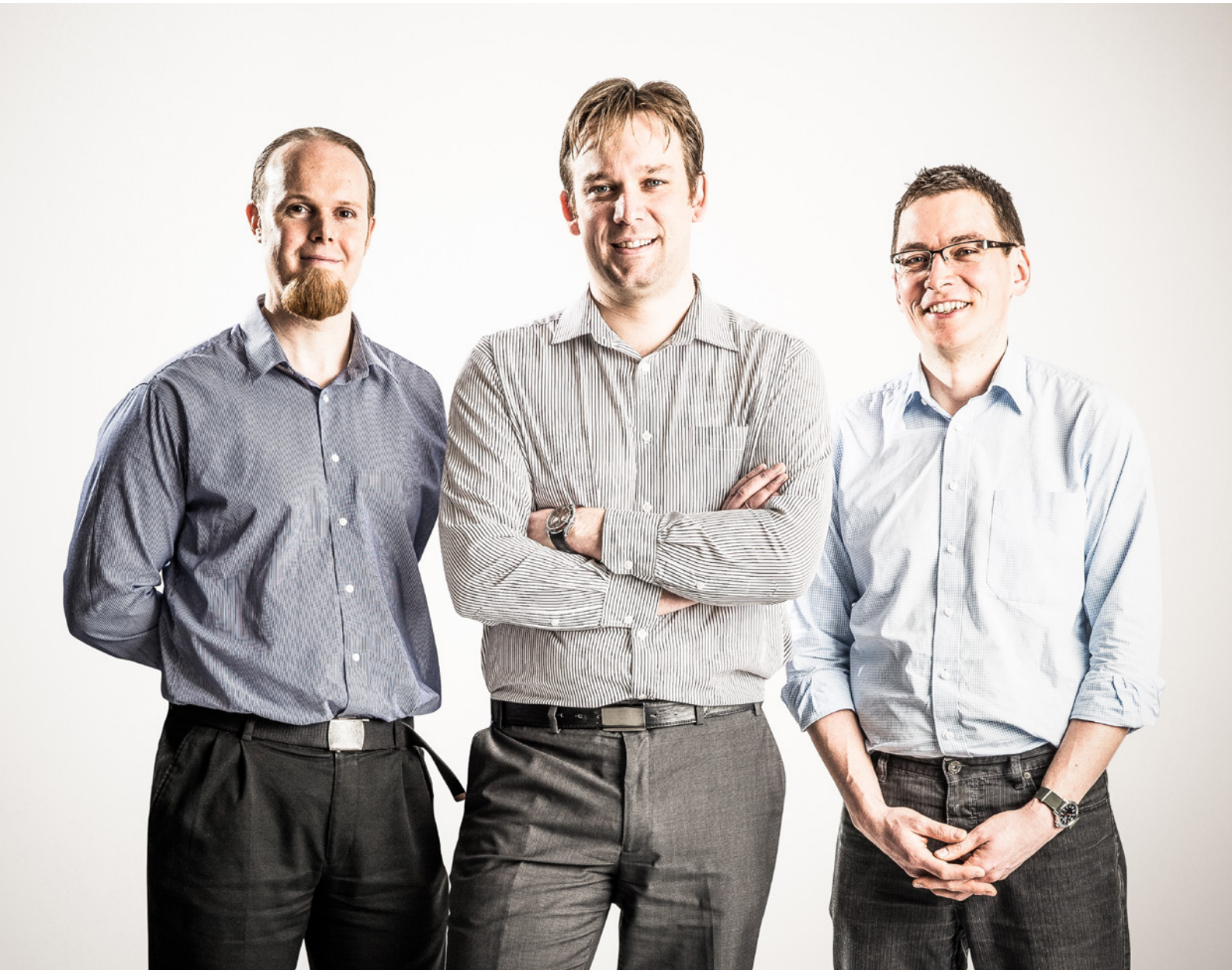

Fuelling genius

The team at Norgren.

Norgren developed the Diverter Valve, part of its Waste Heat Recovery System for truck engines.

The design team cut production time by six months and saved thousands of pounds.

The team uses Autodesk® Inventor® and Autodesk® Simulation CFD, part of the Autodesk® solution for Digital Prototyping.

Meet our easy rider

It's Patrick Williams, technical manager at Norgren.

"Today's truck diesel engines are only 40% efficient. The other 60% is lost through noise, heat and other factors. The Waste Heat Recovery system is designed to absorb the wasted heat that goes out of the exhaust pipe and pump it back into the truck engine.

So, we had to develop a solution that's small, compact and light. It had to optimise the fluid flow and minimise leakage and pressure drop.

We did upfront analysis with Digital Prototyping. We used Autodesk Inventor for the CAD work, 3D design and 2D drafting. Then we exported the design into Autodesk Simulation CFD to test the flow through the valve, examine the pressure drop and flow path. When we came up with our initial prototype, we used the Simulation CFD to run analyses and verify our design.

Digital Prototyping gave us the confidence to create the physical prototype. And it passed with flying colours. It's always good to see something work straight out of the box. That way, you don't have to go back to the drawing board and go through that iterative process, solving small problems and making improvements here and there.

If you do that, you affect your lead time for manufacturing parts. If you use an external supplier, it can take up to six weeks to manufacture parts. Then another six weeks for the second batch of prototypes if you realise the hole through the middle's not big enough or something like that."

Meet our perfect fit

It's Chris Narborough, design engineer at Norgren.

"Traditional exhaust valves are quite leaky – they let a lot of the exhaust through because you can't get a good seal due to the temperatures and conditions the valve operates in. But our valve is quite innovative. It allows a good seal and a reliable, low-leak rest position.

I use Autodesk Inventor 2013 for conceptual modelling for presentations and quick prototyping. For the Diverter Valve, we did CAD modelling at the start of the project and used Autodesk Simulation CFD tools to model and check the flow through components. That way, we knew what we were proposing was suitable for the application.

We don't want to waste time prototyping parts. We're under short deadlines, so the more we can use Digital Prototyping to simulate all this stuff, and gain confidence in the designs before we produce them, the better.

The prototypes we built went straight to a cast component, rather than a machined body. That's saved us thousands of pounds worth of machining and two months waiting for parts to be delivered and assembled."

Meet our cool head

It's James Robinson, UK technical director at Norgren.

"We needed to come up with a valve which would divert very hot gases of up to 800 degrees. We had to supply samples to customers in a very short time and it costs tens of thousands of pounds to produce samples. So, we didn't want to waste time or money on multiple iterations of prototypes.

That would have added up to six months of engineering time plus the cost of parts. So, we had to be confident that the valves we produced were going to deliver the right kind of performance first time.

With Autodesk Simulation CFD and Autodesk Inventor, part of the Autodesk solution for Digital Prototyping, we were able to simulate pressure and test size. Half-way through the process, we made a change to our original assumptions, so CFD gave us a better comparison.

With the Diverter Valve and the Waste Heat Recovery project, we expect to see efficiency gains of about 11% - that's the waste heat converted into useful energy."