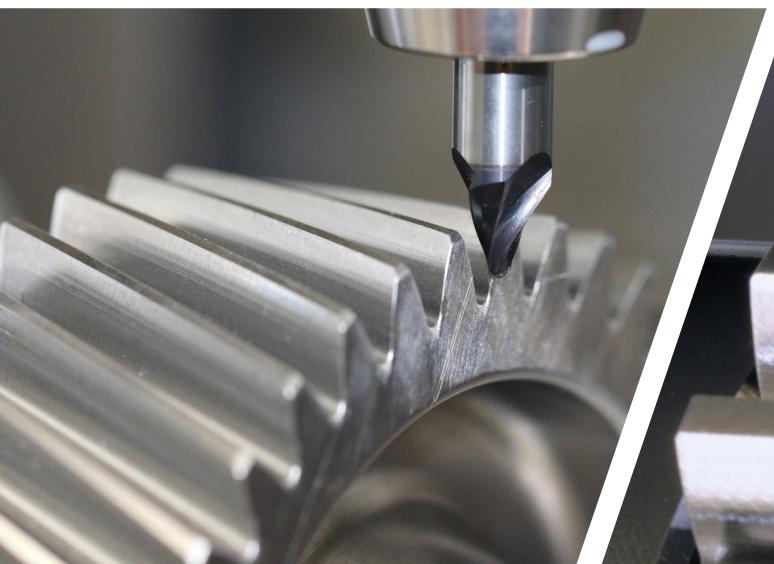


**AMRC**  
ADVANCED MANUFACTURING  
RESEARCH CENTRE



The  
University  
Of  
Sheffield.



**AMRC Gear Centre**

[amrc.co.uk](http://amrc.co.uk)



The  
University  
Of  
Sheffield.

**The University of Sheffield Advanced Manufacturing Research Centre (AMRC) is a network of world-leading research and innovation centres, based at the Advanced Manufacturing Park in South Yorkshire.**

The AMRC Gear Centre is a new group within AMRC Machining, established in 2015 when our partners called for a move into utilising our state-of-the-art machining research, particularly our specialism in done-in-one process, for gear manufacturing research.



A close-up photograph of a precision-machined gear assembly. The gears are made of a polished metal, showing intricate tooth profiles and a fine-grained texture. The lighting highlights the metallic surfaces and the complex geometry of the gears.

**Based a short distance from the AMRC's main campus, we have brought the AMRC's fundamental research to new industries in our new dedicated facility for gear research.**

Our focus is on flexible and novel machining methods for rolled-up operations on multifunctional tools, developing pioneering techniques and enhanced processes, with particular focus on efficient manufacture for prototype, low and medium-volume manufacture.

The AMRC can count among its members many of the world's most innovative machine tool developers and cutting tooling manufacturers, allowing it access to the very latest models and technologies, as well as to pool the collective knowledge of industry leaders. The AMRC can also act as an independent test facility to compare performance of competing technologies and suppliers.

# gear research



# Capabilities

Working with the AMRC Gear Centre means companies have access to the following equipment at our Sheffield site:



WFL M30G



Okuma Multus U3000



Doosan Puma TT1800SY



Okuma MU8000



DMG Mori NT5400



DMG Mori Lasertec 65 3D



Haas Multigrind CB



Höfler 1250 XLK



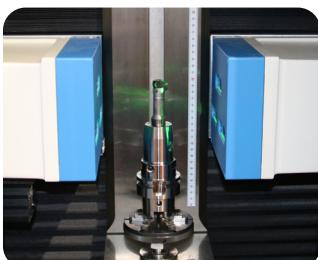
Studer S41



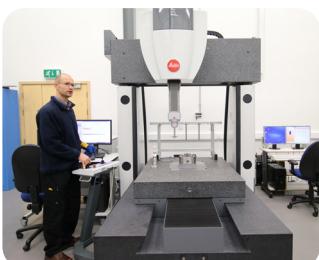
Makino G7



Starrag Heckert X40



Jenoptic Opticline



Leitz PMM-C



Mitutoyo CRYSTA-Apex S 9106

AMRC /

# Who we work with

The AMRC Gear Centre works with companies of all sizes on collaborative research and development projects, including with some of the world's largest manufacturers.

## Boeing Sheffield

Boeing initiated a major research and development programme with the AMRC Gear Centre to develop original manufacturing techniques at their new multi-million pound production facility in Sheffield.

Boeing Sheffield is the company's first manufacturing facility in Europe and specifically

built less than a mile away from the AMRC Gear Centre to utilise the capabilities we offer.

The facility now manufactures trailing edge flight control surface actuation systems for Boeing aircraft.



# Who we work with

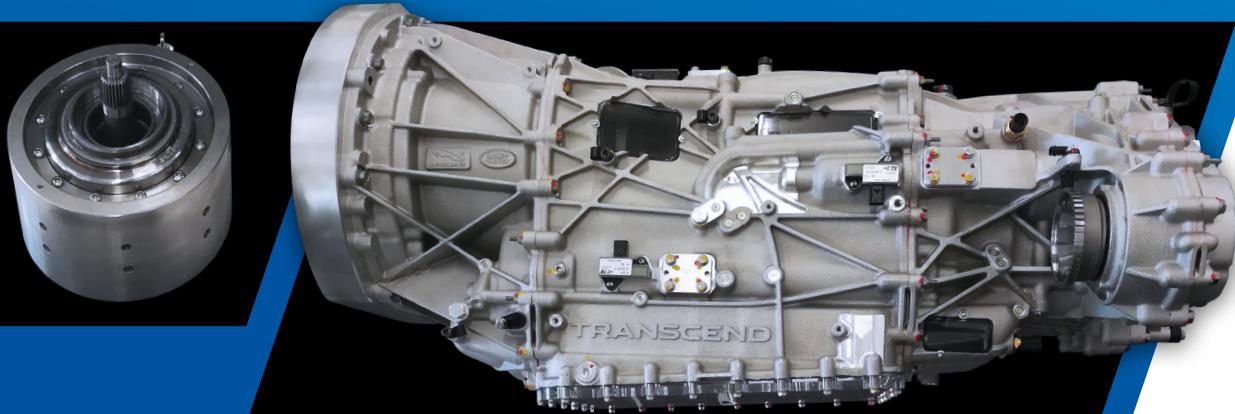
## Jaguar Land Rover Transcend

We investigated how flexible machining technologies could be efficiently applied to the automotive gearbox manufacture sector and assessed the commercial feasibility of those techniques for a range of volume scenarios.

It was shown that a move to flexible machining technology could reduce tooling lead time, offer

design flexibility and enable a broader supply chain for gear component manufacture.

The project was able to validate the innovative processes through manufacture of demonstrator components and creation of a discrete event simulation of the proposed facility.



# Who we work with

## Rolls-Royce Power Gearbox

We researched the development of key novel manufacturing processes for high performance gear manufacturing which could be utilised in the fan power gearbox of Rolls-Royce's new Ultrafan engine.

We were able to establish the scope for design enhancement through the use of novel manufacturing techniques. Step-changing productivity and opportunities for reduced operating footprint were also demonstrated.



Image: Rolls-Royce.

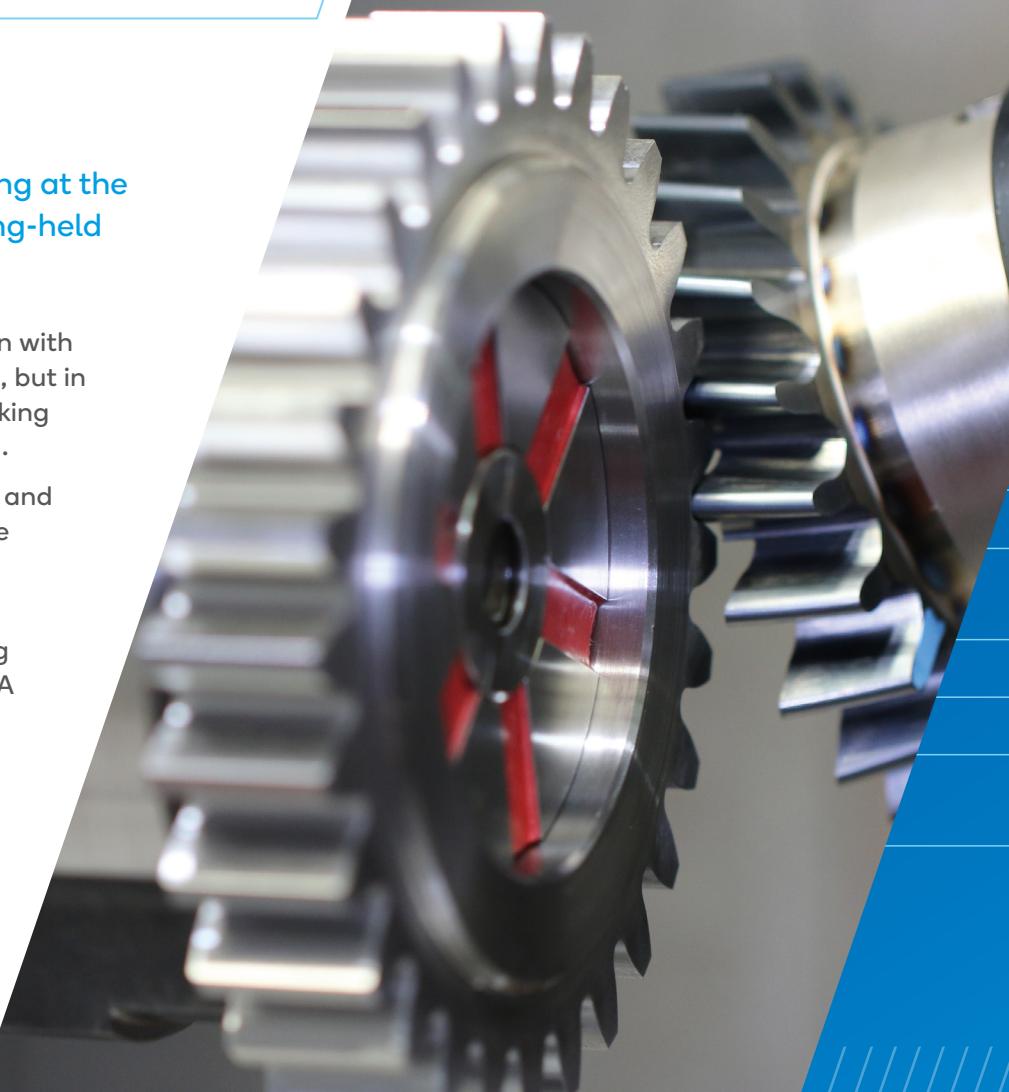
# Power skiving

The development of power skiving at the AMRC Gear Centre proved a long-held concept with tangible evidence.

The process has attributes in common with hobbing, shaping, milling and turning, but in essence is an entirely novel metalworking process with new techniques required.

Our aim is to devise these techniques and be in a position to deploy these for the benefit of industry.

We have quantified the process capability and demonstrated finishing accuracy up to ISO1328 class 5/AGMA 2015-1-A01 A5 (AGMA 2000-A88 Q12) in combination with revolutionary productivity. We are developing software models to predict performance and devise cutting strategies for a wide range of gear geometries.



# The future

As novel technologies emerge and key sectors undergo significant change, there is an opportunity for revolution in the gear manufacturing sector.

**At the AMRC Gear Centre we aspire to:**

- ◆ Establish an alternative to the multi-step production line approach which uses bespoke equipment designed for high volume production.
- ◆ Expand our unique capability focused on our novel processes.
- ◆ Utilise multifunctional machines in a single setup for efficient gear production.
- ◆ Have a flexible manufacturing process for a range of volumes.
- ◆ Have design freedom with configurable machining methods.
- ◆ Embrace opportunities offered by new manufacturing and material technologies.
- ◆ Enable our partners and customers to make step changing enhancements to productivity, agility, quality and performance, radically enhancing their competitiveness.

**AMRC**

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Advanced Manufacturing Park  
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Rotherham, S60 5TZ

**AMRC**



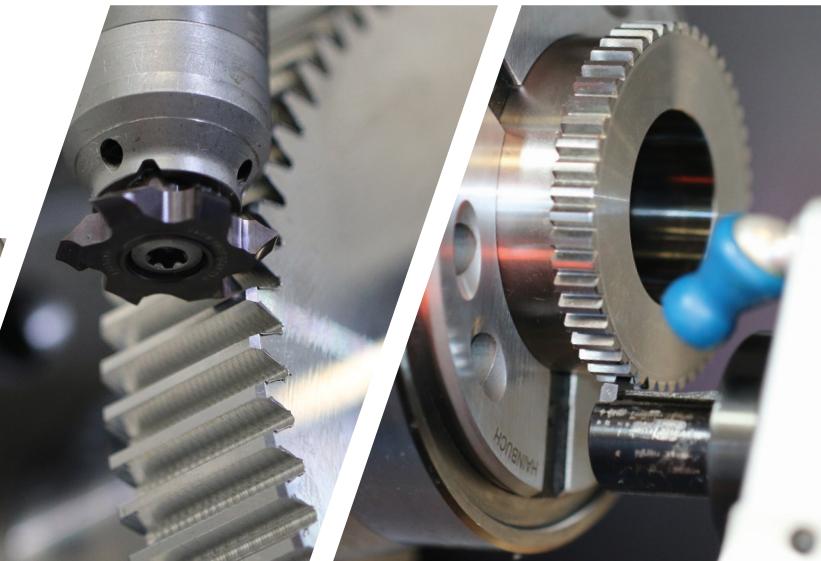
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High Value Manufacturing

Working with  
**Innovate UK**



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