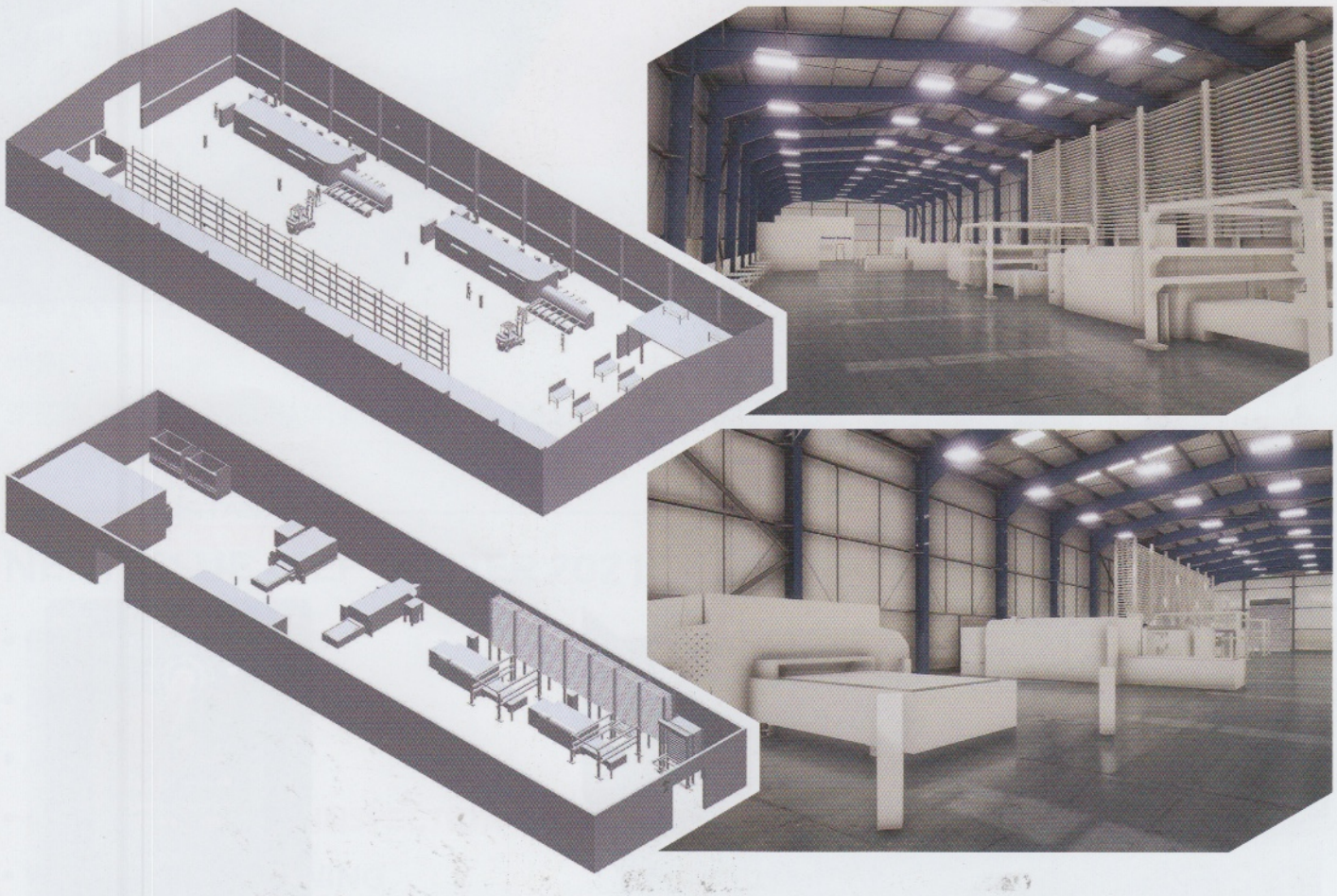
ENGINEERING subcontractor JULY 2021

'FC Laser see a bright future for British manufacturing'



FC Laser discuss growth in a pandemic, the investment made to double their Derbyshire production facility and how they see the future of British Manufacturing

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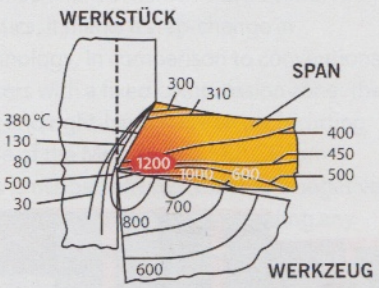
Efficient cutting tool solutions

One of the main tasks in metal cutting is to extract the enormous heat in the cutting zone efficiently. This is quite a challenge, especially in turning work where there is continuous contact between the cutting edge and the workpiece. If process parameters cannot be sacrificed for the sake of productivity, there is only one solution: cool, cool, cool. The catchphrase with many external coolant supply systems is: "A lot goes a long way." But there are also smarter and more refined solutions. One of them uses state-of-the-art production processes and is so innovative that it also convinced the patent office.

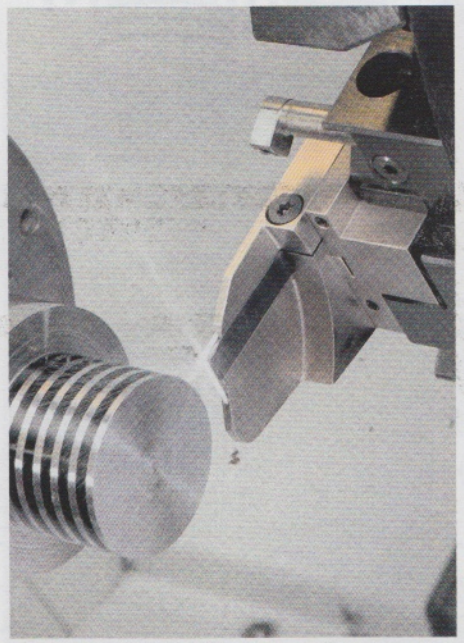
Although a large part of the heat generated by turning is dissipated in the chip, the temperatures prevailing in the cutting zone are enormous and this causes problems for the cutting tool. The heat can reach temperatures in excess of 1,000°C, depending on the material, feed and rpm. This activates thermal processes that cause the cutting tool to wear more quickly. In extreme cases, the tool can even burn out after a short time. A more positive geometry and cutting speed adapted to the process may provide a superficial remedy, but this either causes long-term costs or lowers productivity.



Feeding coolant directly to the cut point

Of course, cooling is necessary. However, the commonly used external cooling method is not precise in application and its true effect is limited. In fact, the relatively imprecise and uncontrolled flooding of coolant or oil into the cutting process cools the chips instead of the cutting edge. In many cases, the high temperature differences at the cut point cause a thermal shock that fatally damages the cutting edge.

On the other hand, through tool cooling acts in a controlled and precise application. There are tool manufacturers who have



succeeded in feeding coolant directly to the cut point, the actual problem zone, via bespoke and dedicated tooling systems. Tool manufacturer ARNO Werkzeuge was awarded the highest honours by the patent office for the ARNO Cooling System® (ACS). It succeeds in feeding coolant directly to the cut point via two channels from the top and from the bottom.

ARNO Werkzeuge has developed the field-proven ACS system in two variants. With the ACS1 variant, the coolant jet is guided along the insert seat in a coolant channel and emerges directly at the cutting zone. The coolant then effectively goes under the chip and optimally flushes it out of the cutting zone. This drastically lowers wear and significantly prolongs the service life of grooving and parting tools. With the ACS2 variant, the coolant channel at the insert seat is coupled with a second flow-optimised coolant jet from the bottom onto the tool flank. The latest developments offer this coolant channel with a triangular outlet which supplies coolant across the full width of the insert right through to the edge.

Tool setup and application is also optimised. Whereas the optimum coolant supply of an external cooling system is manually positioned and often inaccurate in application, the internally guided coolant jet always goes precisely where it has the greatest effect; to the cutting zone and the tool flank It also minimises the risk of material build-up on the cutting edge and the associated crumbling of the cutting edge.

Longer tool life due to less stress on the tool

With the ACS2 from ARNO, users feed coolant to places which were previously impossible. As this supplies coolant under the chip, the chip breaks optimally and is flushed more easily out of the cutting zone. Chips are shorter and the tendency for built up edge insert conditions are greatly reduced. Measurements confirm that this coolant method reduces temperature by about half. As a result, the tool is exposed to much less stress and flank wear is

considerably reduced. Instead of having to lower cutting and feed rates to protect the tool, rates can even be increased. Productivity rises since tool life is significantly longer. Users report that their tools last up to three times longer or at least twice as long. Fewer tool changes ultimately relieves the work burden on operating personnel while significantly reducing machine down time

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