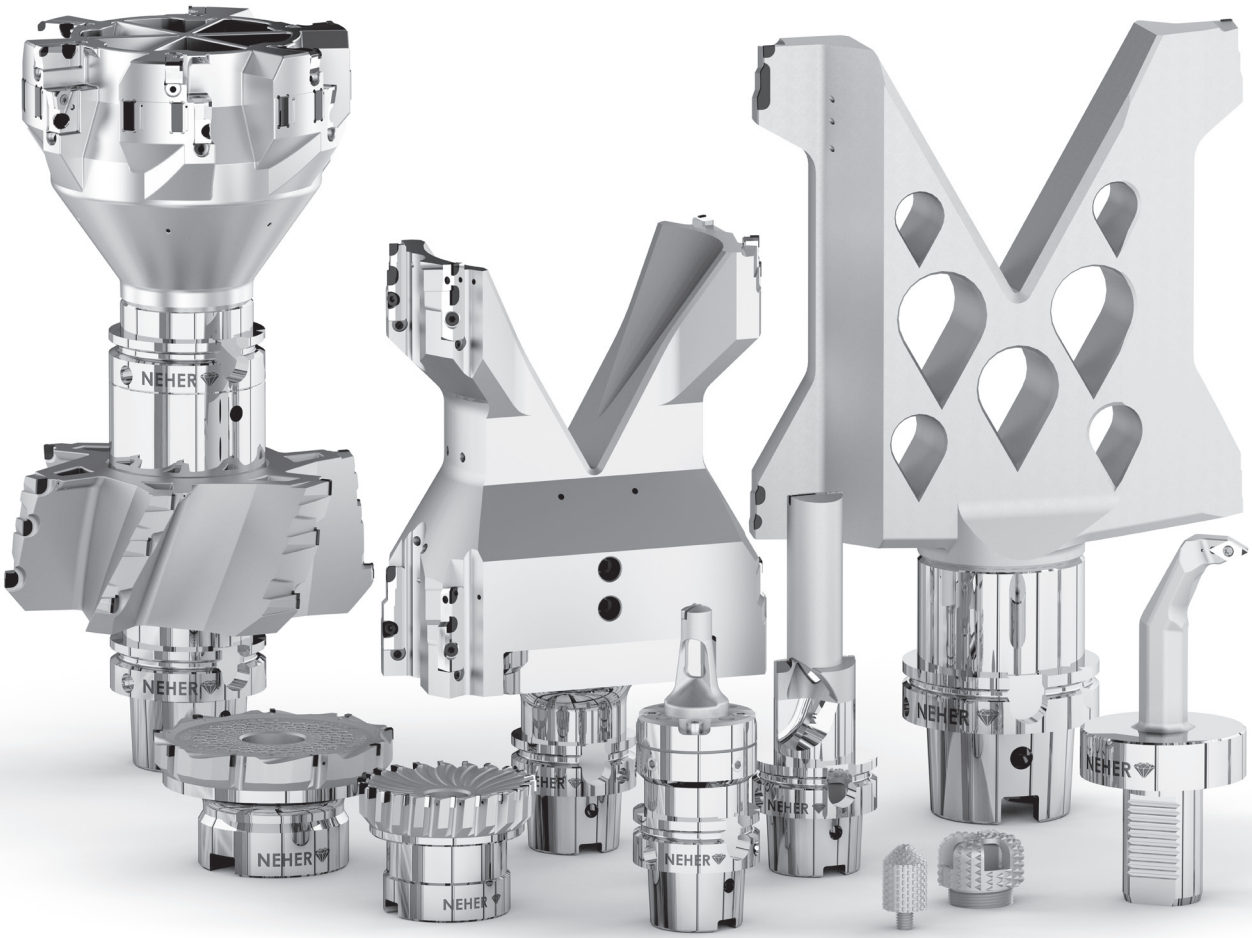



# ADDITIVE MANUFACTURING
# 3D Printed Tools

Star SU

NEHER

# Improving Machining with 3D Printed Tools

*Large tools are often required for the machining of powertrain components and aluminum prismatic parts, including stator housings for the growing electric motors market. The weight of these tools can prove problematic with traditional machining equipment, which can cause excessive spindle vibration and noise, poor tool life and potentially scrapped components.*

**» Star Cutter's technology partner Neher has invested in a solution to combat these issues with its in-house additive manufacturing capabilities, developing its own range of lightweight, but stable, 3D printed tools.**

Weight reduction in the tool can help reduce the wear and tear of the machine tool spindle. Additionally, 3D printing technology allows for strategic placement of the coolant channels, optimizing its exit location by aiming directly at the cutting edges, whereas in traditional tooling these holes are drilled into the monoblock body. This controlled coolant channel location technology is ideal for minimum quantity lubrication (MQL) tools, a growing trend across the global marketplace.

Neher has reported a 30-50% tool life increase using this 3D printing technology over its conventional manufacturing techniques, yet the torsional stiffness is equivalent to that of a steel ground body tool. Lightweighting can also play a big role in large, heavy tools that take a toll on the machine spindle, helping to reduce preventative maintenance.


The company offers printing in a variety of materials including plastic, aluminum, titanium, steel and stainless. The Star Cutter engineering team works with all customers to provide the optimal tool design for each application, which are produced on Neher's own additive manufacturing equipment.

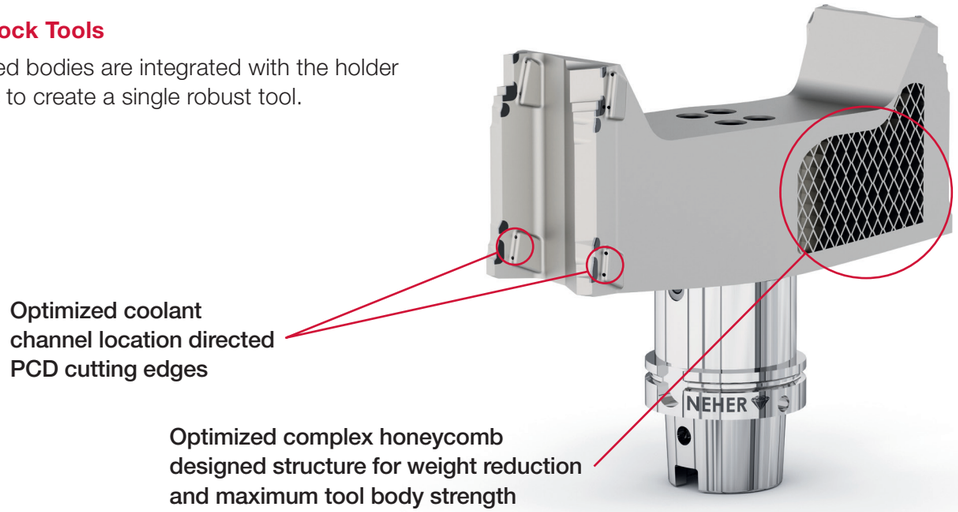
### » Advantages of 3D Printed Tools

- Lightweight materials improve tool life and lower maintenance
- Rapid prototyping
- Variety of material choice
- Near-net shape capability lowers costs
- Enables geometries that cannot be manufactured conventionally
- Acceleration of development processes
- Shorter delivery times

# Real World Results

### Monoblock Tools

3D printed bodies are integrated with the holder interface to create a single robust tool.




Multiple cutting geometries are available


Coolant channels are directed at the PCD cutting edge to optimize chip control.

## Case Example

### Weight Reduction Results:

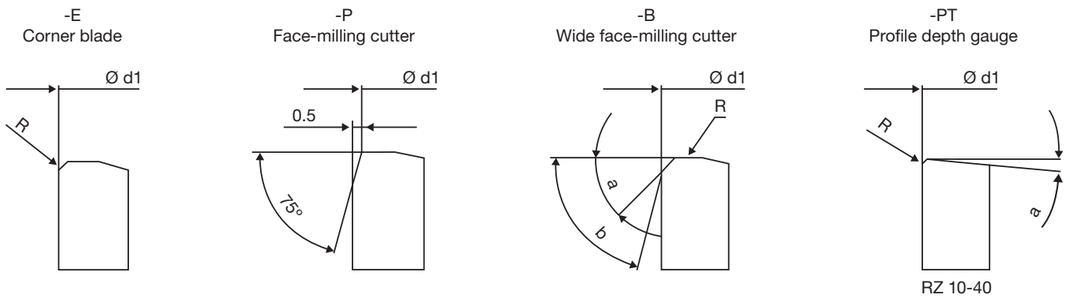
- Traditional monoblock design weight = 51.2 LBS
- Neher 3D printer technology weight = 39.5 LBS
- Resulting in a 30% weight reduction

### NEHMO LongLife & NEHMO DUAL

Available in standard diameters sizes of:

- ø40, ø50, ø63, ø80, ø100, ø125 & ø160mm
- One-piece monoblock style mills that include the holder interface are also available

### Cutting Edge Geometry




The internal coolant channels are directed at the PCD cutting edge shown for optimization of chip control and overall tool life. The maximum coolant of MQL flow is created in the design of the unique internal 3D printed coolant channels that feed the orifice exit.

Additional benefits include:

- Maintain axial run-out consistency below 0.005µm
- Cutting lip height variation held within 0.005µm
- Increased amount of blades versus standard PCD cartridge style
- 30-50% tool life improvements achieved

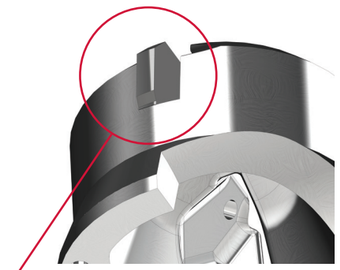
### Chip Breakers and Deflector Tools

Also available are 3D printed chip deflectors for applications that require total elimination of chips from the workpiece. These deflectors are mounted on the body of the tool so that when the tool is in the cut, the chip has no way to exit except through the flute channel.

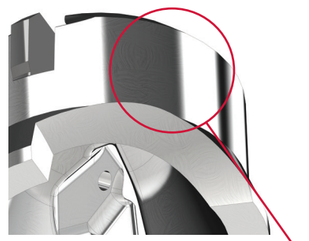
# Real World Results

## Water Jacket Reamer


**Solution:** Special PCD designed tool with a 3D printed cage chip deflector steers the cutting chip back into the tool body so that this chip doesn't get left inside the part.



"Laser Chip Breaker Technology" assists with reducing the size of the chip for better chip control



3D printed coolant channel locations are directed at the PCD cutting edges to assist with reducing the size of the chip

### » Compatibility and versatility

Manufacturing all types of shapes and forms for today's larger size cutting tools

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