


# WHAT THEY ARE AND HOW THEY BOOST HMLV PRODUCTION

# QUICK-CHANGE EXCHANGEABLE MILLING HEAD SYSTEMS

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Mass production traditionally involves machining long runs of similar parts - also known as high volume, low mix (HVLM) scenarios.

More recently, global competition and trends toward product customization are prompting manufacturers to create different versions of their products, manufactured in smaller batches, to match the needs of smaller subsets of users.

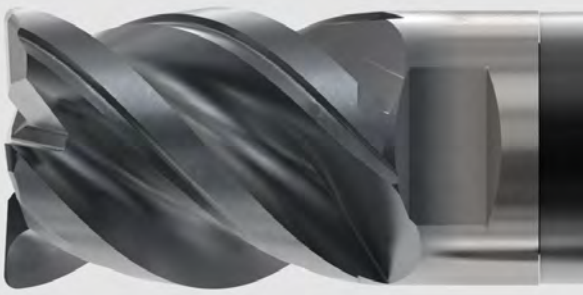
Data-driven manufacturing management enables rapid changes in part designs and machining programs. This management also expedites the tracking of product variations and inventory. The result is a shift to higher mix, lower volume (HMLV) production tactics aimed at smaller production runs.

# HOW HAS THIS SHIFT AFFECTED MACHINISTS?

An order for ten parts may be followed by ten, five or even single-item lots of different parts; workpiece materials may change from steel to aluminum to titanium; part geometries can vary from simple to complex.

The resulting increase in setup and tool change time between different parts, however, can have a significant effect on productivity and profitability. Additionally, purchasing a variety of different cutting tools to produce the different parts adds to production costs.

# HOW HAVE MANUFACTURERS RESPONDED TO THESE CHALLENGES?

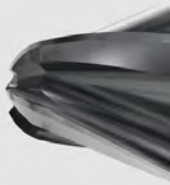


### QUICK-CHANGE TOOLING SYSTEMS

In response, Cutting Tool Manufacturers developed quick-change tooling systems. While maintaining full capability for high-volume production, these systems help manufacturers deal more efficiently with the complex and reactive nature of the HMLV planning and production process.

However, different quick-change tooling systems offer differing levels of success in regard to handling HMLV machining situations.

Manufacturers' definitions of quick change vary. Some consider replacing an indexable insert and resetting tool dimensions outside the machine to be a quick tool change. Other systems have interchangeable cutters or cutting heads that can require special tools and complex reconnecting procedures that, in the long run, consume excessive time.



Many quick-change tooling systems offer limited choice and versatility when it comes to cutting tool technology and the material to be machined.

# COMPREHENSIVE CUTTING HEAD SELECTION

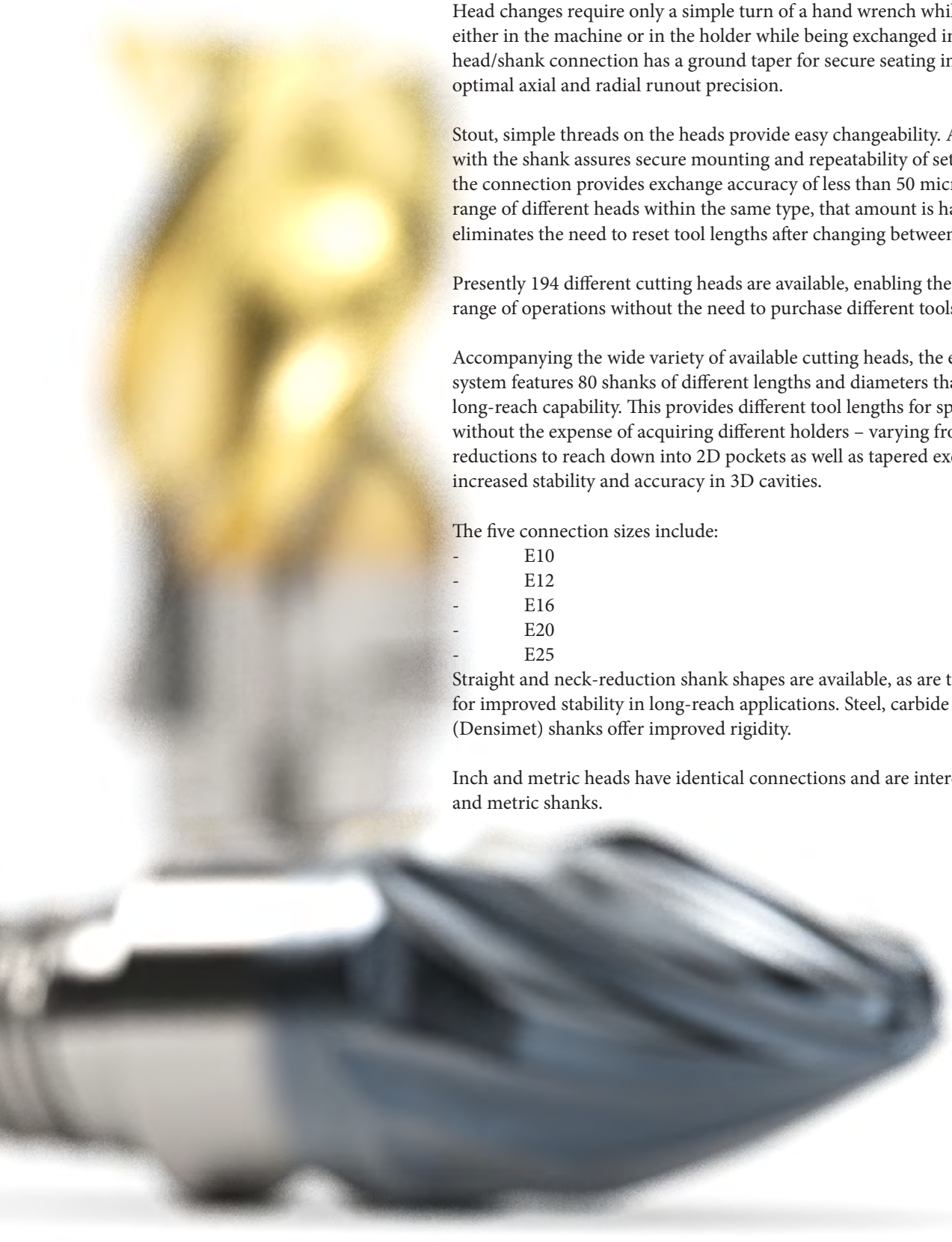
The advantages of the exchangeable head system include the ability to quickly and easily change a wide variety of solid-carbide geometries and types to optimize milling operations. This reduces tooling inventories, lead times and manufacturing costs.

Seco categorizes their exchangeable cutting heads into three basic performance groups:

- High-performance, material-focused heads that come in multiflute, ballnose multiflute, high feed, dedicated aluminum and barrel styles.
- Versatile performance heads that encompass square shoulder and ball end mill designs.
- Universal general purpose heads that offer chamfer geometries, concave designs, square shoulder, spade and ballnose styles.

All head types are available in inch and metric versions.

# EXTENSIVE SHANK SELECTION MULTIPLIES VERSATILITY AND ECONOMY



Head changes require only a simple turn of a hand wrench while the shank remains either in the machine or in the holder while being exchanged in a toolroom. The head/shank connection has a ground taper for secure seating in the shank and optimal axial and radial runout precision.

Stout, simple threads on the heads provide easy changeability. A direct contact face with the shank assures secure mounting and repeatability of setting height, while the connection provides exchange accuracy of less than 50 microns. Over the broad range of different heads within the same type, that amount is half or less. This eliminates the need to reset tool lengths after changing between various heads.

Presently 194 different cutting heads are available, enabling the completion of a wide range of operations without the need to purchase different tools for each application.

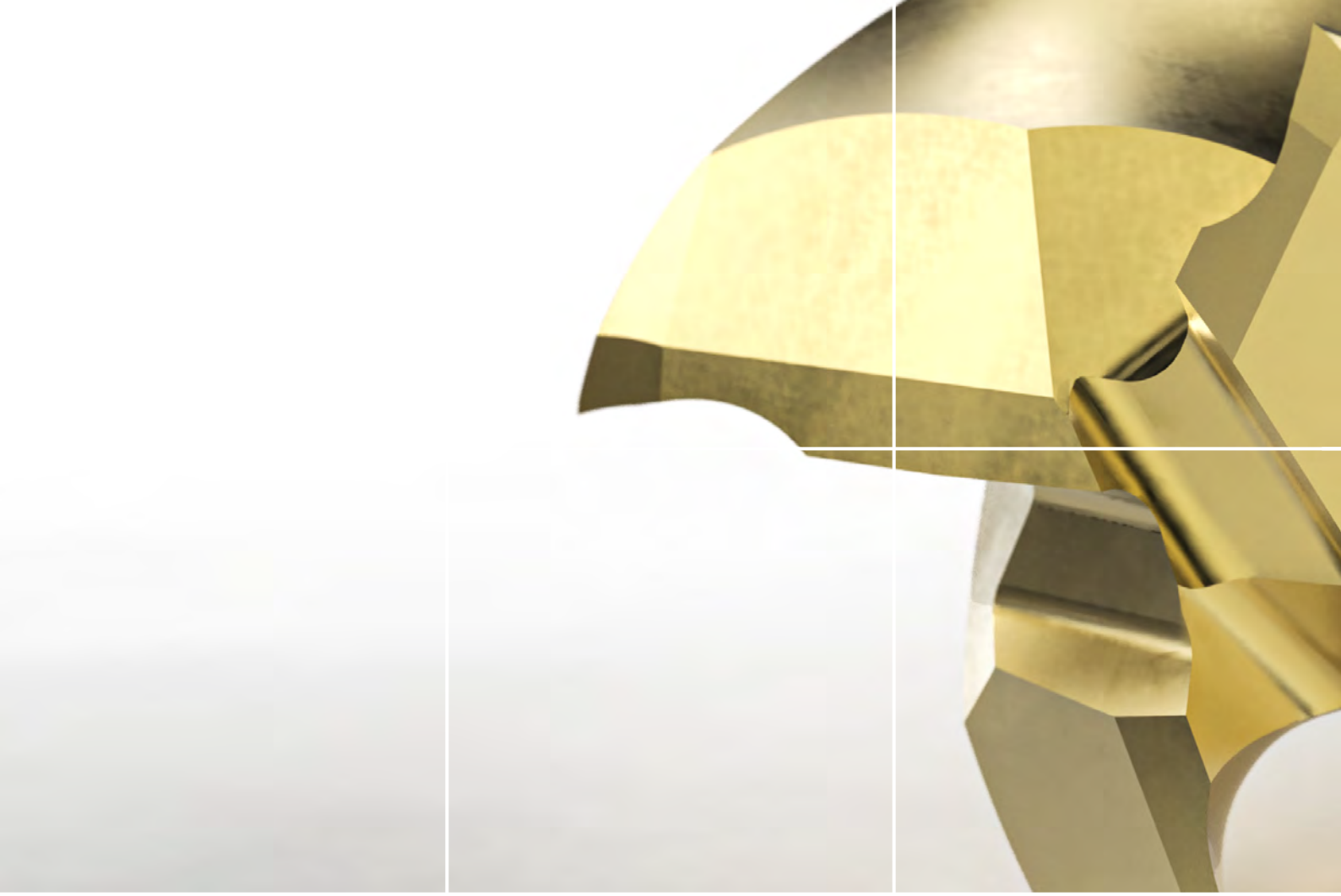
Accompanying the wide variety of available cutting heads, the exchangeable head system features 80 shanks of different lengths and diameters that provide short and long-reach capability. This provides different tool lengths for specific applications without the expense of acquiring different holders – varying from straight OD reductions to reach down into 2D pockets as well as tapered executions to provide increased stability and accuracy in 3D cavities.

The five connection sizes include:

- E10
- E12
- E16
- E20
- E25

Straight and neck-reduction shank shapes are available, as are taper-type shanks for improved stability in long-reach applications. Steel, carbide and heavy metal (Densimet) shanks offer improved rigidity.

Inch and metric heads have identical connections and are interchangeable on inch and metric shanks.



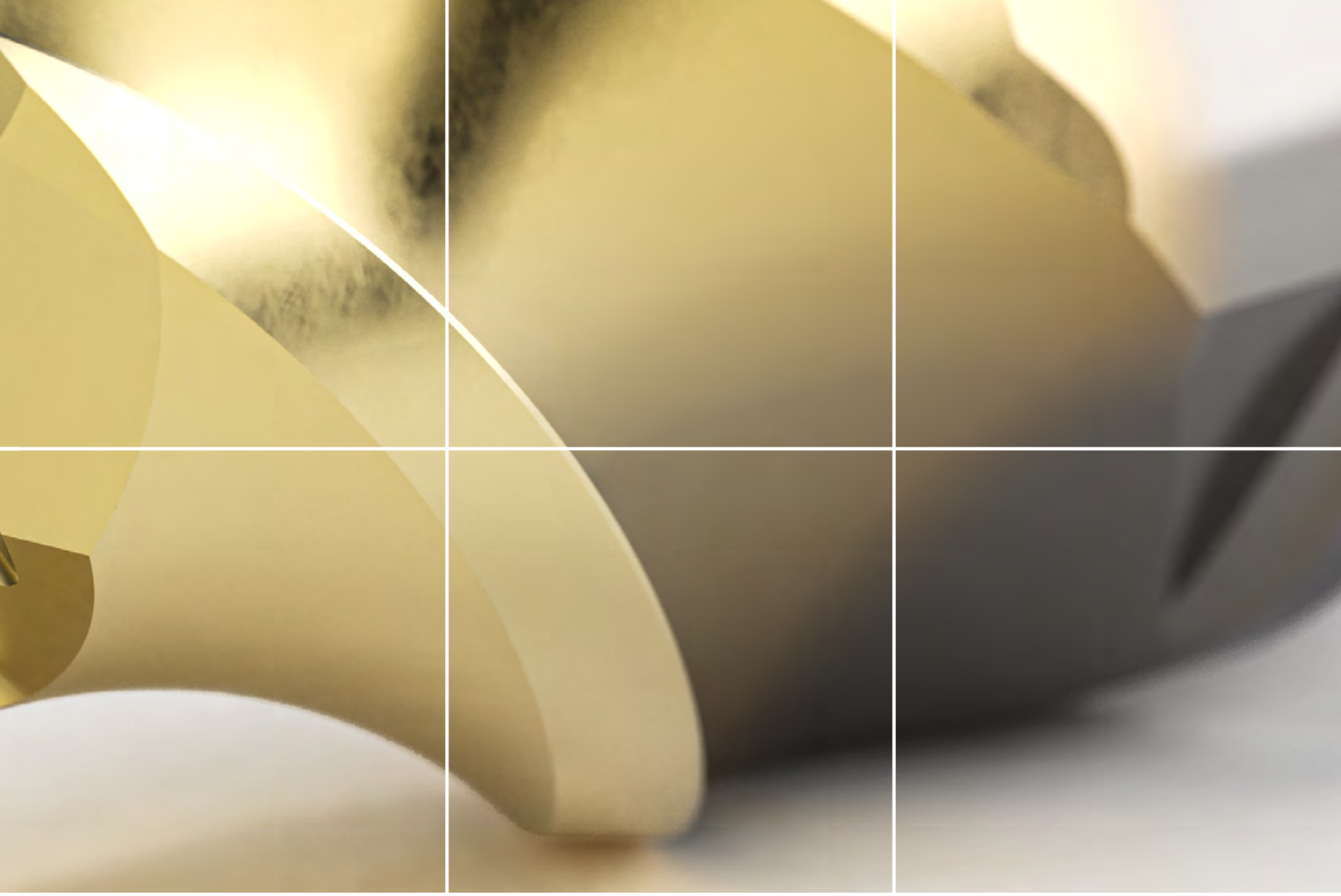
# INNOVATIVE PACKAGING

Innovative packaging is an added feature of the X-Head system. The heads' compact plastic shipping holders are designed to be removed after mounting the head on a shank. The removable holder improves handling security and protects both the cutting edges of the tool as well as the hands of machine operators before machining begins.

# SUSTAINABILITY

As an alternative to solid-carbide end mills, the exchangeable head system reduces waste in multiple ways. The interchangeable heads use much less carbide than solid tools and weigh less for shipping, conserving energy. As with solid tools, exchangeable head tools are normally resharpenable and are included in the Seco reconditioning recycling program. Plus, the addition of a Data Matrix code provides product information over its entire lifespan.

Efforts to reduce energy consumption succeed when overall part production times are lower, tool exchange times are shorter and non-cut time is reduced. This is where exchangeable heads shine, because the tool design eliminates the need to remove, re-measure and reset tools when changing heads.



# MULTIPLE AREAS OF APPLICATION

Exchangeable heads boost productivity in many segments of the manufacturing industry:

- Key aerospace industry uses include machining structural parts, engine blisks, casings and discs in high-temperature alloys.
- Automotive uses range from processing tough transmission parts to steering knuckles.
- Medical applications include implants and other surgical components in medical-grade materials.
- The tooling's rigidity and accuracy also aids in challenging mold and die applications.
- The versatile mix of head geometries with shank executions allows manufacturers to anticipate and respond to the different situations and requirements present in many HMLV customer requests.

# X-HEADS IN ACTION - A LONG-REACH CASE STUDY

When a tool extension of 213 mm from the spindle threatened process security, the new exchangeable head system from Seco provided the solution.

Before exchangeable head tooling was applied, a conventional long-length 12mm ball end mill with a tapered shank, mounted in a tapered shrinkfit holder, provided a tool life of 11 minutes, or one part.

Here's what changed:

- An exchangeable head ball end mill with an extended-length shank was installed.
- Radial depth of cut increased from 1.75 mm with the conventional tooling to 6 mm.

The results?

Tool life doubled to 22 minutes and allowed for the machining of two completed parts.

# TECHNICAL ASSISTANCE

In most cases, the application of exchangeable head tooling is straightforward and provides immediate gains in productivity and manufacturing economy. Considering the extensive selection of cutting heads, carbide grades and cutting geometries provided by the exchangeable head system, many shops will also welcome technical guidance based on decades of Seco tool development and application experience. That guidance is always available from Seco field representatives, corporate technical advisory staff, and through Suggest, our 24/7 digital support software.

# GET AHEAD OF THE COMPETITION

Five ways to improve productivity and outperform the competition with Seco exchangeable heads:

1. Utilize interchangeable heads with advanced solid-carbide materials and geometries to boost metal removal rates. Seco develops carbide/coating/treatment combinations that produce maximum speeds, feeds and tool life. They design cutting head geometries aimed at specific operations and workpiece materials.

2. Match tool performance to machining applications with material-focused specific high performance, versatile high performance and universal tool groups. In addition to material-specific cutting tool compositions, tool geometries provide wide application versatility.

3. Take advantage of long-reach shanks to maximize efficiency and minimize scrap when machining deep part features. Long shanks maintain accuracy and permit the use of higher cutting parameters in long overhang situations.

4. Lower tooling costs by reducing carbide use and tool holder inventory. Exchangeable head tools use less carbide than solid-carbide end mills. One shank can accommodate many different heads, and heads can be mounted on a variety of shanks to produce different part contours.

5. Reduce tool change and overall setup times by eliminating the need to remove, re-measure and reset tools. The strong, simple and secure head connection system enables tool changes without removing the holder from the machine tool.

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