UPDATE ON LIVE TOOLING

heimatec offers a review of this machining method, the basic concepts and some exciting developments in the technology.

Live tooling, as a component on a lathe, is specifically manipulated by the CNC to perform various milling, drilling and other operations while the workpiece is being held in position by the main or sub spindle. These components, whether BMT or VDI, are also called driven tools, as opposed to static tools, that are used during turning operations.

All live and static tools are built per the machine tool builder's specification for each of the various models they produce. A key to running a successful job shop or production department is to partner with a supplier who can meet the tooling needs for all or most of the machines on your floor.

One such supplier is heimatec GmbH, located in Renchen, Germany and one of the international technology and quality leaders for precision tools, with a wide range of live and static tools for numerous leading machine manufacturers.

This article provides a set of parameters to consider when evaluating the live and static tooling to use in your shop or production department. Simply put, you need to do as much evaluation of your process, when determining the proper tooling to be used, as you did when you evaluated the various machines available for purchase. This fact is often overlooked and that can be a critical error, in the long run.

Live Vs Static Tooling

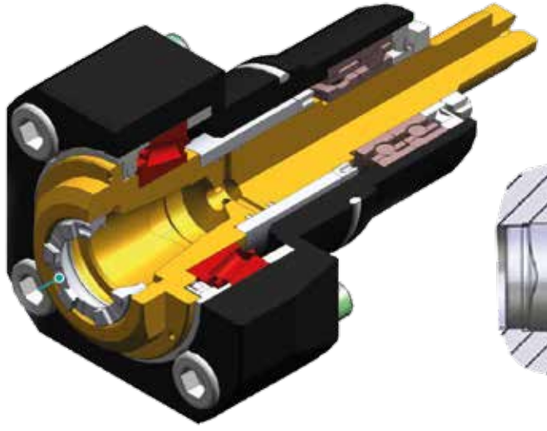
Most often, live tooling is offered in standard straight and 90º angle head configurations with a wide range of tool output clamping

Shown here is a standard BMT cross working tool.

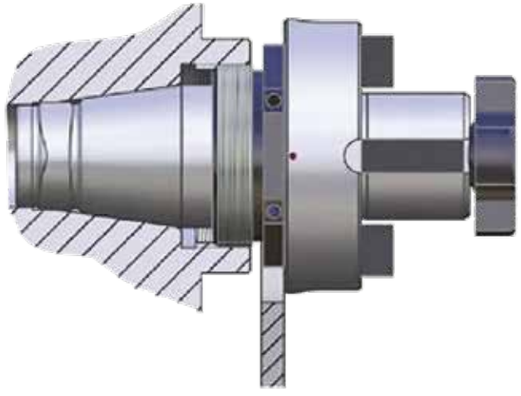
Universal style adjustable tool might be the ideal solution for families of parts.

Internal clamping nut seats the cutting tool closer to the bearings.

Multi-spindle tool brings improved cutting capacity to your lathe.



The combination of taper roller bearings and spindle bearings are best for live tool rigidity.



A typical ER collet adapter changing system allows for greater flexibility and cost savings.

systems, including ER collet chuck, arbor, Weldon, Capto, whistle notch, hydraulic, HSK, CAT, ABS and a variety of custom or proprietary systems developed by the many suppliers to the industry.

When the need arises for a new machine tool, careful consideration should be made to determine which live tools are appropriate for your application. While a standard machine tool package will help you get started, it is important to anticipate job and volume changes, as well any unforeseen machining challenges from the beginning, in order to avoid machine downtime.

Your examination can range from the simple (external vs. internal coolant, for example) to the sublime (adjustable or multi-spindle configurations) to the custom tool, that may be required and built to suit your special application. Finding a supplier with an in-house machine shop for the preparation of special tools is a great value-add.

Good advice is also important, which at heimatec is not only provided by the sales department, but also together with the design department, so that the customer-specific requirements are checked for feasibility and ultimately the best possible tool is selected for the customer.

Making The Best Decision

Tool life is the product of cutting intensity, materials processed, machine stability and, of course, piece parts produced. Two seemingly identical job shops can have vastly different tooling needs because one is automotive and one is medical, or one specialises in the one-off and low-volume work, while the other has a greater occurrence of longer running jobs. The totality of your operation determines the best tooling for the machines being purchased.

Bearing construction and the resulting spindle concentricity drive the life of any tool. You might find that just a 10-15 percent greater investment in a better design can yield both longer lasting cutters and consistently superior finish on your products. Of course, the stability and rigidity of the machine tool are always critical factors. Bevel and spur gears that are hardened, ground and lapped in sets are best for smooth transition and maximum torque output. Taper roller bearings are consistently superior to spindle bearings in live tool milling applications, so look for a combination system to get the highest rigidity possible. Also, look for an internal vs. external collet nut, so the cutting tool seats more deeply in the tool, as superior performance will result. Likewise, high pressure internal coolant might be desirable. Look for 2000 psi capabilities in 90º tools and 1000 psi in straight tools.

Taking It Further

You need to ask another question: is the turret RPM sufficient to handle the work? It is possible that a live tool with a built-in speed increaser, often called a speed multiplier, would be helpful. heimatec created solutions with a gear ratio of 1:2, 1:3 or 1:4 with a rpm range up to 24.000 rpm. Would it be beneficial to move secondary operations to your lathe? Gear hobbing can be accomplished in this manner, as can producing squares or flats, through the use of polygon machining.

Standard live tooling most often is best suited to production work, where the finish, tolerances and cutter life are critical, while quick-change systems like heimatec. Capto may be better suited to the shop producing families of products and other applications where the tool presetting offline is a key factor in keeping the shop at maximum productivity. It is a given in our industry that when the machine is not running, the money is not coming.

This opens the discussion of long-term flexibility and is also the most often overlooked consideration in buying live tools. You might ask, what work do you currently have in the shop and what work will be coming in the future? The overall economies of a changeable adapter system on your tooling may be a consideration not often made when your focus is centered on the machine being purchased. Dedicated tools for large families of products may often be desirable for some applications, but do consider whether a flexible changing system like heimatec.u-tec would be more appropriate.Talk to your tooling supplier for the various options, before making that decision.

If standard ER tooling is suitable for the work, there are many good suppliers. It is important though, to pay close attention to the construction aspects noted above. For a quick-change or changeable adapter system, there are fewer suppliers in the market, so seek them out and be sure they can supply the product styles you need for all your lathe brands.

Case Study

Now, an application example showing clear evidence of the value of testing live tool performance:

One company was performing a cross-milling application using an ER 32 output tool on a lathe, running 10 ipm at 4000 rpm. They were making three passes with a cycle time of 262 seconds and were having difficulties with chatter on the finish, while producing 20,000 pieces per year. The annual cost of the machining was over $130,000. By using an alternative live tool with an ER 32AX output, internal collet nut design, with the same parameters, they were able to produce the part in a single pass with a smooth finish and cycle time of just 172 seconds. Over the course of the year, this yielded a cost savings of $45,000, approximately 20x the cost of the tool. The bottom line is the bottom line, as the accountants tell us.

In the end, you may not need a universal adjustable tool or a multi-spindle live holder or even a quick-change adapter system, but do consider all these options. Speak to your machine builder and several tool suppliers, plus the most important people in this equation, your shop personnel, as their input is invaluable to keeping you up and running in a profitable, customer-satisfying scenario.