

Machining

Why Should Machine Shops Use Shrink Fit Technology?

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For over 100 years, machinists have accepted the fact that they can only run their machines at a certain RPM due to high runout and vibration caused by unbalance. In order to assure cutting tool security in a tool holder in an effort to reduce the tool pull out rate, many operators turned to Weldon Flat (Side Lock) holders. While this type of tool holder allowed the cutting tool to stay in the holder unless it broke off, it greatly affected the runout of the cutting tool and the balance of the tool assembly, which required machinists to continue to run at lower RPMs. Another option was collet chucks, which had better runout but did not have as sufficient gripping torque so again, machinists had to run at low RPMs or they had to lighten their depths of cut.

As a response to this entire struggle, the shrink fit system was born. Shrink fit, in essence, has no moving parts. With using shrink fit technology in machine shops, this requires an additional, external machine to heat up shrink fit holders so machinists can insert and remove cutting tools from the holder. The initial investment in the new machine and shrink fit tool holders comes with an additional price tag, which may scare off some machinists. However, when making any large purchase, it is important to understand how the new technology can improve machining operations. "The answer lies in the performance benefits of the tool holder assembly," Brendt Holden, President of Haimer USA, explains. "The consistency of the set-up is the best improvement – as since the set-up is the same from operator to operator, a shop can really rely on their predicted tool life. Also, in most cases, they can increase their metal removal rates based on the better balance, lower run-outs, and solid gripping torque that shrink fit holders give them in their operations." Additionally, shrink fit technology offers unsurpassed accuracy and extended reach options.

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If a machine shop was looking for another tool holder that offers similar benefits, typically the costs of those tool holder solutions are double the price of a high quality shrink fit holder. Based on their experience, Haimer USA has found tooling up two new machining centers with a shrink fit machine and shrink fit tool holders would generally equal the cost of tooling up the same two machines with a different style of high accuracy tool holders (high precision collet chucks, milling chucks, hydraulic chucks, etc.). Then, once the machine is in the shop, all of the existing machines in the shop can use the technology in an effort to improve those operations as well. "We have found that an ROI for purchasing a high-end shrink fit machine is easily paid off within six months for shops of all sizes," states Holden. In addition, all shops have seen a benefit of using shrink fit technologies, regardless if they are doing high precision work or not. While this technology offers tight tolerances, it also allows for increased metal removal rates, less runout and faster tool changes. "So, whether or not you are doing 'high precision' work in your shop, just these three benefits would greatly assist any shop's production," Holden describes.

Some machinists are hesitant to jump on the shrink fit bandwagon because they believe that adding this process will increase tool set-up complications. Holden explains, "This is actually opposite of the

reality of adding shrink fit tooling in the shop environment.” Using shrink fit holders is the fastest and most consistent method of cutting tool clamping. In five to 10 seconds, a tool holder’s cutting tool is changed and it is repeatable the exact same way from operator to operator. “There are no variables in the set-up of the tool holder’s assembly whether you have been setting up tools for 20 years or two weeks – the cutting tools go in and out the same every time,” Holden explains. This leads to the most consistent set-up which then translates to a consistent part production and reliable tool life.

There are many options of shrink fit tool holder manufacturers, as almost every tool holder manufacturer offers shrink fit holders. However, just like anything, there are good and bad manufacturers as related to making quality shrink fit tool holders. It is important that the holder has a rigid interface in the machine tool, based on a properly ground taper. In addition, it is important that the manufacturer holds a tight tolerance between the taper and bore in order to get the good runout accuracy available with a properly produced shrink fit holder.

Not only do machinists have to find high-quality shrink fit chucks, but they must recognize the standard shrink fit holder design might not be appropriate for the application. HAIMER realized this and expanded their shrink fit tool holder offering to consider the geometry of the holder. The company made a wide variety of shrink fit holders (Power Shrink, Heavy-Duty Shrink, Safe-Lock Shrink and Power Mini-Shrink holders) which made the HAIMER shrink fit offerings a great option for all applications from heavy roughing to fine finishing and from slower speed applications to high-speed applications.

It is also true that there are many options of shrink fit machines on the market. HAIMER alone offers over 20 configurations of shrink fit machines available; from entry-level desktop models to automated shrink fit systems. “The most important feature of any shrink fit machine is to confirm that the machine is sophisticated enough to prevent the overheating of the tool holder,” states Holden. “All HAIMER models have this feature and they are all fast in the process of heating up the tool holder.”

In general, all HAIMER shrink fit machines are modular and allow machinists to grow into the shrink fit technology utilization within their production. “In addition, [Haimer] has a very high-end ‘Tool Shrink’ machine, which is a full-blown tool presetter combined with an inductive shrink fit machine,” says Holden. “This machine is used for customers with multi-spindle machines that must set up families of tools with exact gage lengths for each spindle.”

While it is important to consider all of your options, using shrink fit technology offers many benefits to machine shops. From better runout accuracy to increased gripping torque, the shrink fit technology can help machinists run at higher RPMs, decrease setup times and improve surface quality. Consider implementing this technology into your shop and you will be impressed with the results.

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