What Type of Automatic Bar Feeder Should You Choose?
Consider your applications

Not too many years ago CNC machining was all about speeds, feeds and other machine tool specs. While machine capabilities are still a key factor, savvy manufacturers have turned their attention to applying automation to maximize the performance of both their CNC machines and the entire production process.

Reflecting this trend are such terms as the Internet of Things (IOT), Industry 4.0 and Overall Equipment Effectiveness (OEE) that point to improving machine tool utilization, accelerating throughput and reducing material waste.

If you're turning parts from bar stock, automatic magazine bar feeders are an affordable way to achieve the manufacturing efficiency you crave.

The right bar feeder:

- Reduces the machine tool operator's time and effort handling raw material
- Supports bar stock to reduce vibrations that can transfer to the cutting zone and create dimensional and surface finish problems
- Enables the machine tool to operate at optimum spindle speeds
- Minimizes changeover times
- Reduces material waste
- Provides consistent, reliable operation that enables lights-out production

The big question is: What is the "right" bar feeder?

One size does not fit all

Your specific machining needs are as unique as your fingerprints and the bar feeder and other peripherals that enhance your productivity should fit your applications just as precisely. That's why it's important to consider current and future requirements when considering what kind of bar feeder to buy.

Among the factors to consider are the range of bar stock diameters you'll be machining, if your production runs are large or small, the length of parts to be produced, material costs, whether or not you want to run unattended production, and the amount of available floor space. The basic choices are (1) long form bar feeders that load 12-foot bar stock, (2) short loaders for spindle length bars, and (3) six-foot bar loaders.

Long bar feeders

If your application calls for large quantity production runs and the parts being made are five inches long or longer, a bar feeder that loads 12-foot bar stock is a good choice, especially if the material you are turning is expensive and/or you will be operating unattended for long periods.

Here's why:

- You can stage greater quantities of raw material in a 12-foot bar feeder than with other types, thus enabling longer periods of unattended operation.
- Because there is only one remnant at the end of the bar, versus other types of bar feeders that produce two or more remnants, you reduce waste and material costs. This is especially significant when machining titanium or other expensive materials.

However, long form bar feeders may not be the best choice when working with bars that are not straight or are profiled. Typically, these conditions require you to reduce RPM so you can minimize vibrations that can impact cutting accuracies and surface finish. This slowing of spindle speeds, in turn, reduces throughput.

It is possible to successfully machine profiled material run through long bar feeders, however you'll need to determine if the type and quality of the material is compatible with the bar feeder you use. The bar feeder manufacturer's application specialists can advise you accordingly.

Another concern with long bar feeders is the amount of space they require. The typical length of a loader designed to run 12-foot bars is 16 feet, or twice the length of a short loader.

Other 12-foot bar feeder considerations:

- How easy is it to changeover? There are a number of components that must be adjusted when moving from one bar stock diameter to another. This can be extremely time consuming, especially if the bar feeder requires tools to change guiding elements and pushers, or make other adjustments.
- How realistic is the stated diameter range? Be suspicious of bar feeders that claim you can run a wide range of bar diameters without changeovers. Even bar feeders that use the hydrodynamic principal by surrounding the bar with oil cannot change the laws of physics to arbitrarily expand the range of diameters. Bar stock that is not properly supported through appropriate guides will create vibrations that can harm machine tools and impact part quality.
- For the same reason, a 12-foot bar feeder must be built of substantial materials that provide the same kind of rigidity found in high quality CNC machine tools. Spinning a 12-foot bar at high RPM requires stability for smooth and reliable bar feeding, extending the life of the bar feeder and for the safety of the machine operator.
- What about managing remnants? This can affect both material waste and bar loading time. Are you better off retracting the remnant back to the bar feeder, pulling it with the sub-spindle, or pushing it through the lathe chuck? From a materials waste standpoint, remnants are longer when pulled back to the bar feeder than if the remnant is not held by the pusher collet.
- Is it possible to easily convert the bar feeder from one remnant application to another?

- Look for advanced technology such as smoothly operating servo motors, absolute encoders and sophisticated yet easy-to-use controls that guide operators through programming and operation.
- To enable longer production runs, determine if it's possible to expand the bar feeder's magazine capacity.

Short Loaders

Perhaps the least expensive form of automation for a CNC lathe is a short load bar feeder. These versatile machines load spindle length bars into the lathe for automatic operations, and they're perfect for applications calling for production lots as small as 20 – 30 parts. The key here is to choose a bar feeder has quick setup times, ideally in the range of 2 – 3 minutes or less.

Primary considerations for determining if a short loader is right for your applications are: part length, material shape, material cost and the length of unattended operation time you desire.

Most short loaders provide three modes of operation:

- Feeding to a programmed length without the help of the turret stop
- Feeding to a turret stop
- Using the sub-spindle to extract material when transferring the part from the main spindle to the sub spindle for back side machining

Short loaders are extremely cost-effective, take up minimal floor space, do not require bar end preparation and enable unattended operation. Because the entire length of bar stock is contained within the lathe headstock, there are virtually no RPM limits for a short load bar feeder.

They're also excellent choices for running profiled material or bars that are not perfectly straight. Used in conjunction with a shaped spindle liner and custom work holding, short loaders are capable of running a variety of extruded shapes as well as square and rectangular bars. This means you can use a short load bar feeder for unattended machining of a part that previously would only be a candidate for milling.

Some short loaders can be converted for high-speed shaft loading in which precut shafts may be loaded in less than 4 seconds.

Short loaders may not be the best choice for longer part runs because they do not hold as much material as a 12-foot bar feeder. Another concern is that the maximum bar stock length is limited to the headstock length of the machine tool. Typically, and because machine spindles are getting shorter, this length is no more than 4 feet and, in some cases, less than 3 feet which may create additional remnants that can be costly, especially when you are turning expensive bar stock. In this case a six-foot bar feeder may be your best choice.

Six-Foot Bar Feeders

Among the application criteria that point to a six-foot bar feeder are production of longer parts, use of expensive materials and higher volume part runs. Depending on your needs, a six-foot bar feeder may provide the best features of both 12-foot and short load loaders:

- Less material waste with only two remnants per 12-foot bar
- Require less space than a 12-foot bar feeder
- Fewer problems with material straightness
- Quick set up

Although not as versatile at running profiled material as a short loader, the right six-foot bar feeder is capable of effectively loading many kinds of shaped material.

A Six-Foot Bar feeder is a good alternative to a short loader for machines with short spindles. In these applications it will reduce materials waste, increase production capacity and allow easy handling of heavy bars.

Connectivity

In addition to deciding on the size and type of bar feeder that fits your applications, it's important to consider how the device will integrate into your overall manufacturing process. This is especially significant as we continue to refine production through the use of real time data.

Many LNS bar feeders, for example, are equipped with Parts Libraries capable of storing up to 500 parts programs. Using the LNS e-Connect system, that shares data with the machine tool control, the bar feeder automatically detects the part program that the CNC lathe is using and then transmits the correct setup data for that part from the Parts Library to enable changeovers on the fly, with no operator involvement. In this way production of a large family of parts or a group of unrelated parts proceeds with little or no intervention by the operator, for truly unattended operation.

This sharing of data between the bar feeder and CNC lathe can also significantly reduce material costs by enabling the bar feeder to continuously tell the machine tool how much bar stock is available for machining. If the CNC machine is equipped with a production-scheduling program, after each part is machined it can check the remaining parts to be produced and determine if there is enough bar stock for the next scheduled part to be made. If not, the system checks the CNC machine's production list for another part that can be made from the remaining material. If the parts are prioritized within the list, the system identifies the highest priority part the machine can make from the remaining stock.

Fitting Your Budget

Bar feeders come in a wide range of features, benefits and price tags. LNS, for example, offers affordably priced short bar loaders, bar feeders for six-foot and 12-foot bar lengths that provide the performance you need for automated machining at the most common spindle speeds and feed rates. On the other end of the spectrum are even higher-performing bar feeders with advanced technology and more automatic features that make setups simpler, faster and easier.

How much you should invest in a bar feeder depends on your specific applications and overall production requirements. Because the true cost of owning any piece of manufacturing equipment goes far beyond the initial price tag, it's wise to look the other issues that impact the ROI of a bar feeder:

- Reliability – all bar feeders load bar stock, but they vary widely in how consistently they can perform. Look for a bar feeder that has a solid track record of field-proven performance and that incorporates rugged, rigid materials and construction. Does it have electronic synchronization to prevent turret crashes? Is the loading mechanism capable of long, continuous operation? Is there adequate support between the bar feeder and the machine tool?
- Ease of use – the control system should be intuitive, prompting and easy to read. Changeovers are quicker and easier if the bar feeder is equipped with automatic adjustments and does not require tools to change liners or pushers.
- Technical service and customer support – all machines require routine maintenance, so be sure you choose a bar feeder from a company that has factory trained service people that can respond quickly, anywhere in the world. It's also helpful to have knowledgeable people available that you can call for immediate support.
- Product warranty – be sure to choose a bar feeder manufacturer that stands firmly behind its products and has a global support team to back up its promises.
- Parts availability – downtime is a profit killer, so if you need a replacement part you want it now, not when the next shipment makes it across the seas. So choose a bar feeder manufacturer that maintains substantial local stocks of spare parts.
- Applications experience – a global company that has been building and installing bar feeders around the world for more than four decades is more likely to have people with in-depth applications knowledge than less experienced suppliers.

Finally, consider this: No bar feeder can optimize the performance of your CNC machine tool unless the two are completely compatible. LNS proactively works with CNC machine tool builders throughout the world to ensure that the bar feeders and machine tools are well matched for maximum productivity.