STEADY REST 101
When You Need One & What To Look For

Although steady rests are used in a number of unique operations, the most common application is to support a workpiece during turning or milling and, increasingly, during secondary operations such as ID drilling, boring and producing end face bolt-hole patterns.

Steady rests are needed when the length and stiffness of a workpiece makes it difficult to machine without distorting or deflecting the part. This damage is the result of cutting or forming tool pressures that are simply too great for the part to withstand without additional support. In these cases, steady rests can help reduce finish problems, keep part dimensions within acceptable tolerances, increase tool life and improve productivity. Some clues that you need a steady rest are poor surface finish, excessive vibration or chatter during machining, difficulty in maintaining part tolerances, deflection of thin-walled parts from cutting tools, and out-of-roundness conditions.

Typically steady rests use roller bearings at three points of contact to support the workpiece. The length and stiffness of the part determines location and number of steady rests required. Common applications for steady rests include:

- Axle shafts
- Camshafts
- Crankshafts
- Gunbarrels
- Long Cylinder Rods
- Printing Rolls
- Piston Rods
- Pipe, Casings and Tools for the Oil and Gas Industry

The System Is The Solution

When people hear the term "steady rest" they often think only of the clamping device, itself. While this is, of course, the central work-holding piece, it is important to consider the rest of the components that create an effective steady rest system. These include brackets and bases, lubrication systems, hydraulic and electrical interfaces and more.

In fact, there is much to think about when looking for the right steady rest for your application. Here are some important considerations:

1. **Structural Attributes:** Make sure the materials used and the overall design insure precise, reliable performance and will hold up well under the rigors of the manufacturing environment. For example, the arms must be wide and sturdy enough to properly support the workpiece but also allow ample tool clearance.

2. **Manual vs. Automatic Positioning:** A manual steady rest requires individual adjusting of each point that contacts a workpiece. This process is labor intensive and requires the operator to make accurate adjustments. Improper centering or adjustment of the contact points may cause damage to the workpiece, the steady rest or even the machine tool. Automatic steady rests are self-centering and use hydraulics or pneumatics to clamp and unclamp parts. These systems have integrated cylinders that may be actuated by machine control M codes (preferable for greater productivity) or by manually operated switches.

3. **Size:** Careful consideration must be taken to match a steady rest to machine capacity and to the specific application. The steady rests must fit in the machine without interfering with the doors, cross slide cutting tools and sheet metal guards. It is also important to consider any size requirements that may change in the future. Your steady rest provider should offer a wide range of sizes and styles and be able to provide custom designs and configurations such as narrow arms and side mounted cylinders that permit additional clearance in the machine tool.

4. **Lubrication:** Is it automatic or must you lubricate the unit manually? A system that must be manually lubricated increases the risk of premature wear and failure. An automatic lubricating system is a better long-term solution. However, not all such systems are created equal. Make sure the lubrication system is fully programmable, designed and built to operate efficiently in a factory environment, and capable of providing the proper type of lubricant to all working parts, including the roller bearings, at recommended intervals.
Protection Against Contamination: The harsh environment of turning and milling operations can damage the moving parts of a steady rest. Look for pressurized, sealed construction that keeps harmful contaminants out. Some steady rests offer additional protection through an integrated inlet that allows air pressure to purge impurities from the unit. Contamination can also be an issue with hydraulic and pneumatic lines. These should be contained in flexible, durable channels called hose tracks to minimize damage from chips and other debris, and should be unobtrusively integrated with the steady rest.

Applications Expertise: There are no set rules for determining if you need a steady rest or how many rests are adequate for the application. That’s why it is important to work with a steady rest supplier who has broad and deep experience. Determining the size, placement and number of steady rests required by an application is critical. The key factors to consider when specifying steady rests are part length, weight, diameter, material composition and the kind of machining operations being performed.

Fully Integrated Systems: Because each application is unique, it is essential to seamlessly integrate all components of a steady rest system. This begins with careful analysis of your application, which determines the best way to mount and configure the system to work with your machine tool and manufacturing process. Next, 3-D modeling software allows a designer to create a system that successfully combines all of the components including the steady rest, automatic clamp base, brackets, tubing, valves, hose track assemblies, electrical connections to your machine control, and even way covers if required.

Mounting On Your Machine Tool: In order to function optimally, a steady rest system must be properly integrated into the machining process. Determining how to mount a steady rest system depends on the specific application and the nature of the machine tool, itself. Not only is it important to mount the steady rest for maximum machining efficiency, it is also critical to consider part loading and unloading, how the rest will effect the operating range of the machine tool, and if you need custom way covers or other modifications. Here are some of the more common machine tool mounting locations:

- Tail stock ways (traditional boxed style ways or newer linear ways)
- Cross slide
- Lower turret of a 4-axis machine (fixed, or using a rotary coupling to allow remaining tool positions to be used)

Special Considerations For Machines With Linear Ways: Newer machine tools with linear ways present multiple concerns for mounting and operating steady rests. The steady rest brackets and bases must be mounted on bearing blocks that fit the machine tool’s existing linear rails, and there must be a method devised to clamp the brackets and bases to the linear rails after they are moved into position. This operation may be manual or automatic. In a manual installation, the operator moves the steady rest to the desired location on the bed ways and then uses a lever to manually clamp the base to the rail. A fully automatic system requires no operator interaction, as the machine control uses M codes to locate the steady rest and automatically clamp the base to the rail. When installing a steady rest on a linear way machine, the original equipment guards may need to be modified and it is often necessary to create telescoping way covers to protect the linear rails and machine tool ball screw.

Safety: For the well being of both workers and the machine tool, there are important safety concerns when designing a steady rest. For example, careful consideration must be given to how the workpiece is loaded into and unloaded from the machine. Is it manually loaded? Robotically loaded? Is there any interference with any other moving parts of the machine tool? Are there any weight factors? When does the steady rest need to open or close? Depending on the variables, there are a number of positioning switches, pressure switches, timers, sensors and machine control interfaces that may need to be designed into the system.

As you see, with all of these factors to consider, selecting a steady rest is not a simple process. It requires an understanding of your manufacturing requirements, extensive applications experience, 3-D design capabilities, a broad assortment of quality steady rest components, and the expertise to design and install a complete system that integrates seamlessly into your machining process.

Note: Edward J. Peter of LNS America, Inc. is a recognized steady rest applications and design expert with more than 37 years of experience in the industry. LNS helps manufacturers improve productivity with industry leading steady rest systems, chucks, bar feeds, chip conveyors, coolant management systems and other production equipment. For more information of steady rest systems, visit www.LNS-america.com.