

PROGRAMMABLE HYDRAULIC STEADY REST FOR CNC LATHE

¹P. SREENIVASULU , ²Dr. R RAMACHANDRA

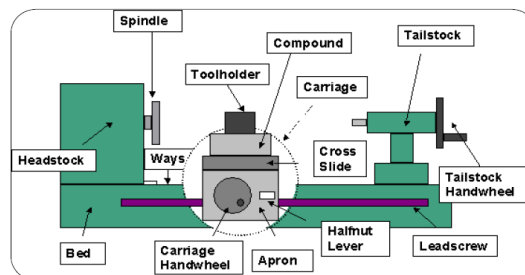
¹ M.Tech, Dept. of Mechanical Engineering, SKD Engineering College, Gooty.

²Supervisor , Principal & Professor, Dept. of Mechanical Engineering, SKD Engineering College, Gooty.

ABSTRACT

In the present scenario Automation plays a vital role in carrying on the production processes effectively in the production shop. Especially while carrying on machining operations the automation is very much essential. In most of the industries they are facing the problems such as vibration and other effects like deflection on work piece while carrying on machining operations on Axis centered CNC lathe or else on a normal lathe. Good surface finish also will not be obtained when proper support is not given on the slender work piece in performing machining operations.. Hence in order to overcome the problems of deflection and vibration effects on slender work pieces we tend to utilize the Self centering steady rest. The self centering steady rest will be arranged such that it will be placed between the rollers to give support to the work piece. A steady rest is disclosed for alternatively supporting the internal and external surfaces of a tubular work piece during a machining operation. Each outer end of a plurality of movable fingers includes first and second work piece contact devices such as rollers. The second contact device is offset from the longitudinal axis of the finger so that it may engage the inner periphery of the work piece. The opposite inner ends of the outer fingers ride in slots having opposing accurate cam surfaces. One cam surface provides backup support for its finger when externally contacting the work piece while the other cam surface insures stability when its finger is contacting the inner periphery of the work piece. It facilitates clamping activity automatically based on the position of the tool. When the tool reaches the clamp it automatically leaves the space to carry on the machining operations. The input to that device is given by hydraulic pressure. We can say that by means of facilitating the self centering steady rest we can increase the productivity by reducing cycle time, obtain higher accuracy and good surface finish and also overcomes the deflection and vibration problems.

INTRODUCTION



parts of CNC

Initially, the CNC technology was applied on lathes, milling machines, etc. which could perform a single type of metal cutting operation. Later, attempt was made to handle a variety of work pieces that may require several different types machining operations and to finish them in a single set-up. Thus CNC machining Centres capable of performing multiple operations were developed. To start with, CNC machining centres were developed for machining prismatic components combining operations like milling, drilling, boring and tapping. Gradually machines for manufacturing cylindrical components, called turning centers were developed.

CNC Programming Basics

- CNC instructions are called part program commands.
- When running, a part program is interpreted one command line at a time until all lines are completed.
- Commands, which are also referred to as blocks, are made up of words which each begin with a letter address and end with a numerical value

Typical Specifications of a CNC System

1. Number of controlled axes: Two/Four/Eight, etc.
2. Interpolation: Linear/circular/parabolic or cubic/cylindrical
3. Resolution: Input resolution (feedback)
: Programming resolution
4. Feed rate: Feed/min
: Feed/revolution
5. Rapid traverse rate: Feed rate override
: Feed/min
6. Operating modes: Manual/Automatic/MDI(editing)/Input/Output/
Machine data set-up/Incremental, etc.
7. Type of feedback: Digital (rotary encoders with train of pulses)
: Analog (transducers, etc.)
8. Part program handling: Number of characters which can be stored
: Part program input devices
: Output devices
: Editing of part program
9. Part programming: Through MDI
: Graphic simulation
: Blue print programming
: Background editing
: Menu driven programming
: Conversational programming
10. Compensations: Backlash
: Lead screw pitch error
: Temperature
: Cutter radius compensation
: Tool length compensation
11. Programmable logic controller: Built-in (integrated)/External
: Type of communication with NC
: Number of inputs, outputs, timers, counters and flags
: User memory
: Program organization
: Programming Languages
12. Thread cutting/Tapping: Types of threads that can be cut
13. Spindle control: Analog/Digital control
: Spindle orientation
: Spindle speed overrides
: RPM/min; constant surface speed
14. Other features: Inch/metric switchover
: Polar coordinate inputs
: Mirror imaging
: Scaling

PROGRAMMING EXAMPLE

Cylindrical Part

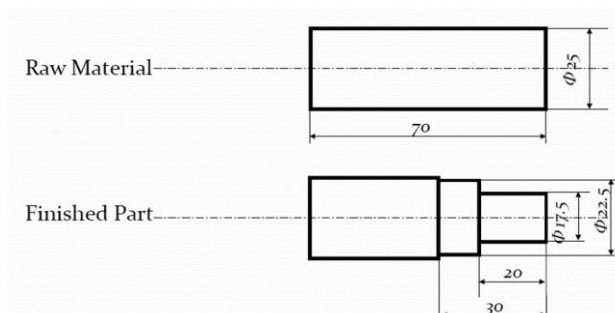


Fig 1.8 programming example

O0077
N0005
G28 U0.0 W0.0;
N0010 T02
N0020 G97 S1500 M03;
N0030 G00 X50.0 Z1.0 ;
N0040 G71 U1.0 R2.0;
N0050 G71 P0060 Q00 U0.5 W0.2 F0.2;
N0060 G01 X13.0;
N0070 X15.0 Z-1.0;
N0080 Z-30.0
N0090 X23.0
N0100 X25.0 Z-50.0;
N0110 X50.0;
N0120 G70 P0060 Q0110 S2500 F0.1;
N0130 G28 U0.0 W0.0,
N0140 M30

FEATURES OF CNC LATHE

- The tool or material moves.
- Tools can operate in 1-5 axes.
- Larger machines have a machine control unit (MCU) which manages operations.
- Movement is controlled by motors.
- Feedback is provided by sensors.
- Tool magazines are used to change tools automatically

The following two types of hydraulic systems are generally used

1. Fluid transport systems: Their sole objective is the delivery of a fluid from one location to another to accomplish some useful purpose. Examples include pumping stations for pumping water to homes, cross-country gas lines, etc.

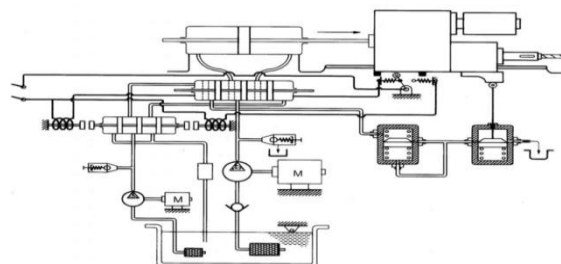
2. Fluid power systems: These are designed to perform work. In fluid power systems, work is obtained by pressurized fluid acting directly on a fluid cylinder or a fluid motor. A cylinder produces a force resulting in linear motion, whereas a fluid motor produces a torque resulting in rotary motion.

WORKING PRINCIPLE OF HYDRAULIC COPYING LATHE

Hydraulic drive is often preferably used in some machine tools for smooth motions without jerk and noise, self-lubrication, flexible transmission system and step less variation in speed and feed despite the limitations like larger space requirement, oil leakage, difficult maintenance etc.

Fig 2.6 typically shows the circuitry of a hydraulically driven (tool travel) drilling machine. The direction and length of travel of the drilling head fitted on the moving piston are controlled by movement of the spool of the direction control valve which is actuated by the pilot valve and governed by the electromechanical stop as indicated in the figure. The rate of travel of the drill head i.e., the feed rate is governed by the throttle or metre controlling valve which is again controlled by a template like cam and a follower coupled with the spool of the throttle valve as shown in Fig2.4.

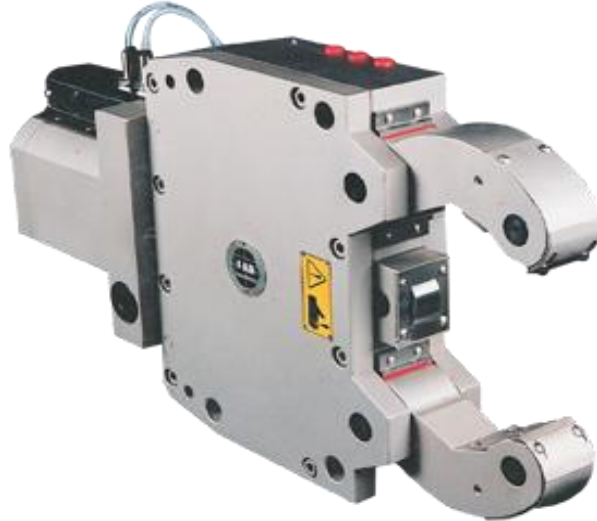
To keep feed rate constant irrespective of the working force on the piston, a pressure reducing valve is provided prior to the throttle valve. The pressure reducing valve helps keep its exit pressure i.e., input pressure of the throttle valve fixed to a preset value irrespective of the input pressure of the pressure reducing valve which varies with the working load on the drill piston. Constant pressure difference keeps constant fluid flow rate through the throttle valve resulting constant feed rate irrespective of the cutting force



circuitry of a hydraulically driven (tool travel) drilling machine

STEADY REST FOR CNC LATHE

Arms self centering steady rests are specially designed to get the optimum result in automatic holding of cylindrical jobs. Arms steady rests provide best centering accuracy & repeatability in microns. Arms self centering steady rests can be used as replacement of any other models of self centering steady rests due to interchange ability in mounting dimensions. Arms steady rests are hydraulically operated and can be interfaced with the CNC system, save the setting time and give better productivity. The special rollers used in Arms steady rests help for running the job in high rpm and give best surface finish.



Steady Rest for CNC Lathe

With wide expertise in the domain, we have come up with a remarkable gamut of Steady Rest for CNC Lathe. Making uses of optimum-grade raw-material and cutting-edge technologies, our products meet all the quality norms set by the industry. These products are rigorously examined under the guidance of our qualified quality expert's team.

PRODUCTS ARE AVAILABLE IN FOLLOWING GRADES

- Hydraulic self centering steady rest with rear mounted cylinder
- Hydraulic self centering steady rest with side mounted cylinder
- Pneumatic self centering steady rest
- Self centering steady rest with servo control
- Hydraulic self centering steady rest for grinding
- Hydraulic self centering steady rest for crank shaft grinding
- Hydraulic self centering steady rest for crank shaft turning
- Hydraulic self centering steady rest for cam shafts
- Hydraulic self centering steady rest for special purpose

APPLICATIONS

- Machining of long slender shafts
- Automatic holding of jobs in CNC turning machines
- Crank shaft machining
- For grinding applications

WORKING PRINCIPLE

The steady rest consists of 3 arms assembled in a steel body with rollers at the arms for holding the work piece. The centre one brings the other two arms in a circular movement to hold the center of the work piece. This helps to get the repeatability and consistency in getting the centering accuracy. The centre arm is operated by a hydraulic cylinder. The job holding rollers are lubricated through centralized lubricating system.

SPECIFICATIONS

Model no.	Diameter range	Model no.	Diameter range
AAU 1	4 to 64mm	AAU 6	125 to 460mm
AAU 2	8 to 101mm	AAU 7	200 to 530mm
AAU 3	12 to 152mm	AAU 7.1	230 to 630mm
AAU 3.1	20 to 165mm	AAU 6	300 to 750mm
AAU 4	50 to 200mm	AAU 9	400 to 850mm
AAU 5	45 to 310mm	AAU 9	500 to 950mm
AAU 5.1	85 to 350mm	AAU 10.1	600 to 1100mm

Specifications

MACHINE TOOL ACCESSORY

Supplier & Trader of a wide range of products which include Machine Tool Accessory such as Sliding Steady Rest, Live Tool, Spindle Speeder, Heavy Duty Angle Head, Variable Multi Spindle Head, Angle Head and many more items.



Sliding Steady Rest

Being perfectly shaped and swift movement of our organization, we are instrumental in offering a wide gamut of Sliding Steady Rest. The offered product is precisely engineered with the help of quality approved components and advanced machines in compliance with set industrial norms at our vendors' end. This product is made available in a number of sizes, dimensions and shapes as per the information laid down by our clients.

Features

- Robust construction
- Heat resistance
- Hassle free performance

Live Tool



Live Tool

We are engaged as a trader and supplier of superlative quality Live Tool. The offered tool is manufactured using supreme quality material and ultra-modern tools in compliance with set industrial norms at our vendors' end. Further, it is tested on different quality parameters assuring its flawlessness at the user's end. This tool is widely used in a number of mechanical, automotive and heavy duty industries for cutting and milling work.

Features:

- Precisely engineered
- Easy to install
- Sturdy construction

Spindle Speeder



Spindle Speeder

With an aim to stand tall on the expectations of our esteemed clients, we are actively engaged in offering a wide gamut of Spindle Speeder. The offered speeder is manufactured with the help of supreme quality material and modular tools in compliance with set industry standards at our vendors' end. It is widely used in a number of industries to allow the maximum output and productivity of machines. Clients can avail.

Features:

- High performance
- Corrosion resistance
- Easy to install

Heavy Duty Angle Head

The below fig shows a superior quality range of Heavy Duty Angle Head. Widely demanded for different industrial application, this angle head is manufactured by our professionals by making use of excellent quality raw material and advance engineering concepts at our vendor's end. Offered in various specifications as per the needs of clients, this angle head is precisely engineered to ensure smooth starts and effective & trouble free functioning.



Heavy Duty Angle Head

Features:

- Precisely engineered
- Compact size
- Simple mounting

Variable Multi Spindle Head



Variable Multi Spindle Head

Owing to a long-term destination for our business, we are engaged in offering a wide gamut of Variable Multi Spindle Head. The offered spindle head is manufactured with the help of finest grade raw material that is sourced from authentic vendors in the market and advanced tools in compliance with set industrial norms at our vendors' end. We offer this spindle head in a number of specifications as per the information laid down by our clients. Further, it is strictly tested on different quality parameters assuring its flawlessness.

Features

- High level of rigidity
- Anti-corrosive
- Durability

Angle Head



Angle Head

We are the dynamic, business-oriented organization, ranking among the utmost entities in providing a wide assortment of Angle Head. The offered range is manufactured with the help of supreme quality metal and sophisticated machines in compliance with set industry standards at our vendors' end. This angle head is widely used in a number of mechanical, automotive and heavy duty industries for different purposes. Clients can avail this range from us at pocket friendly prices.

Features

- Rugged construction
- Heat and abrasion resistance
- Long working life

Slotting Tool Holder



Slotting Tool Holder

With the extensive knowledge and experience in this respective domain we are engaged in offering high quality **Slotting Tool Holder**. The offered holder is manufactured with the help of finest grade material and sophisticated machines in adherence to set industry standards. Further, it is thoroughly tested on different quality parameters assuring its flawlessness at the user's end. It is used for staking tools in a number of workshops and mechanical industries.

Features

- Rugged construction
- Unmatched quality
- Corrosion resistance

Gear Hobbing



Gear Hobbing

We are an acclaimed name engaged in offering our precious clients a superior quality range of **Gear Hobbing**. The offered hobbing is manufactured with the help of finest quality raw material and cutting-edge technology in compliance with set industry standards at our vendors' end. This hobbing is made available in a number of sizes and designs as per the information laid down by our clients. Widely used for making gear, splines and sprocket, this hobbing is highly demanded by our clients for its robustness and low maintenance.

Features

- Rugged construction
- Durability
- Sturdiness

Static Tool



Static Tool

We are instrumental in offering **Static Tool**. The offered tools are manufactured with the help of finest grade metal and sophisticated tools in compliance with set industrial norms at our vendors' end. These tools are widely used for cutting, drilling and milling work. We offer these tools in different specifications as per the information laid down.

Features

- Ductile
- Simple installation
- Anti corrosive

Quick Change Tap Holders & Adaptors

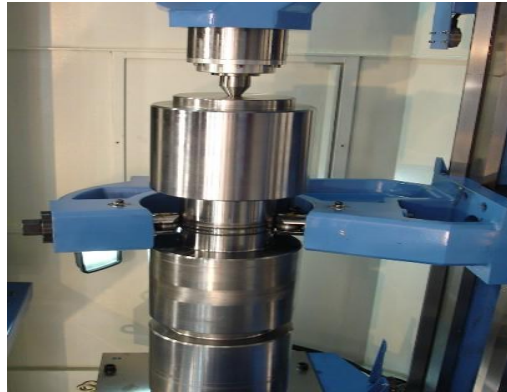


Quick Change Tap Holders & Adaptors

We offer EMUGE India make KSN series Quick Change Tap Holders and Attachments. These are top of the line quick change attachments with German Quality at Indian Prices. Tapping range covers sizes from M1 to M36 in various models

SALIENT FEATURES OF THE PRODUCT

- EMUGE Patented Pressure Point Mechanism
- Length Compensation on Compression & Tension
- Front Release Mechanism
- Tool Holders are available in various machine couplings
- MT Type Taper (MT1, MT2, MT3, MT4)
- Side Lock System (Shank - 16, 20, 25 & 32)
- Tr Type (20 x 2, 28 x 2, 36 x 2)
- ISO,BT Tpaers in 40 & 50
- Wide range of Tap Adaptors for Quick Change System available in DIN and ISO shank series.



HYDRAULIC STEADY REST FOR CNC LATHE

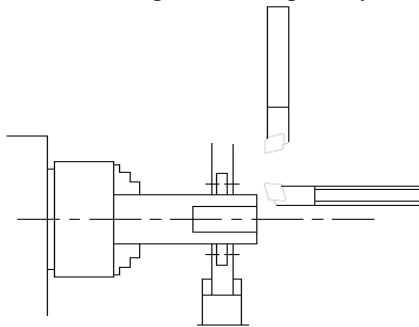
SALIENT FEATURES OF SELF CENTERING STEADY REST

The various models of self centering steadies have been carefully selected to optimize the clamping ranges for the various sizes of lathes and work piece diameters.

- The hardened and ground parts of the self centering Steady Rest made from high quality materials ensures highest precision, robust and vibration free construction gives long service period.
- The durable and compact design of the self centering Steady Rest guarantees highly economical machining.
- Steady Rests are suitable for both stationary and travelling applications.
- Replaceable swarf guards made from special material protects the rollers and other internal parts from the dirt and swarf during the production.
- The compressed air connection eliminates the coolant entry into the Steady Rest.
- Cylinder can be actuated either by hydraulic pressure or by pneumatic pressure.
- The integral check valve provided with the Steady Rest ensures the roller support in case of a sudden drop in pressure.
- The stroke of the cylinder can be controlled by a limit switch and switch rod.
- The centralized lubrication ensures proper lubrication for the rollers and guide way.
- An adjustable three piece swarf guard for the front rollers provides minimal reduction in centering range.
- The self centering Steady Rest has been designed and developed to suit the modern compact CNC lathes where space is at premium. Steady Rests can be provided with a cylinder mounted on the side of the steady housing instead of at the back (if required) to save space.

Steady rests are normally used for support during internal and end machining operations, and also as a support for the machining of long and slender components.

On conventional Steady Rests three screws 120° apart are adjusted manually, to precisely place the work piece in line with the machine axis. These machines face a few problems, especially when used with high speed CNC machines.



Support For Internal And End Machining

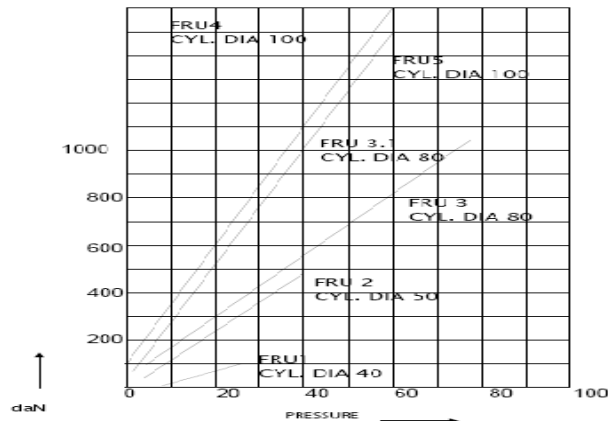
The centering process is not reliable and depends largely on the operator's expertise. This also adversely affects the repeatability of the component's accuracy.

The steady screws, though made of softer materials, frequently leave scratch marks, on the finished component thus affecting the surface finish.

MODE OF OPERATION
Operating Principle

The working pressure of the Steady Rest is determined by the cutting operation and the selected size of the steady operating cylinder. The extent to which the work pieces can be turned through the gap between the rollers is naturally limited to slow feed rates and shallower depths of cut.

- Fig. 4.3 gives the clamping forces acting on the work piece for various actuation pressures for the full range of KEL self centering Steady Rests. The required pressure is determined by the piston area of the Steady, the service life of the rollers, the size and weight of the work piece as well as its length/diameter ratio. During the machining operation the workpiece must be sufficiently firm. High in feed forces will roll the running contact of the Steady Rest in.



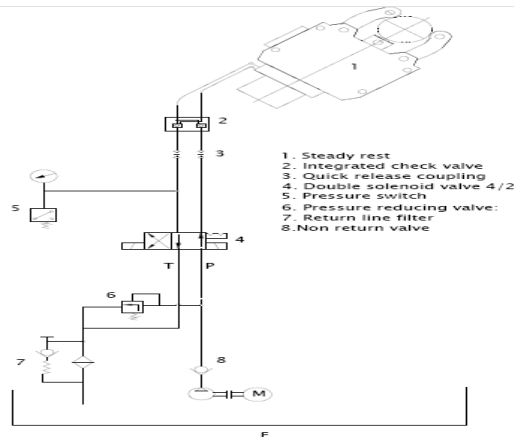
Clamping Force Graph for KEL Steady Rests.

The Steady Rest itself does not restrict the clamping action of the rollers arms by means of the hydraulic or pneumatic actuating cylinder. The steady rollers adjust their hold positively and automatically to the work piece diameter.

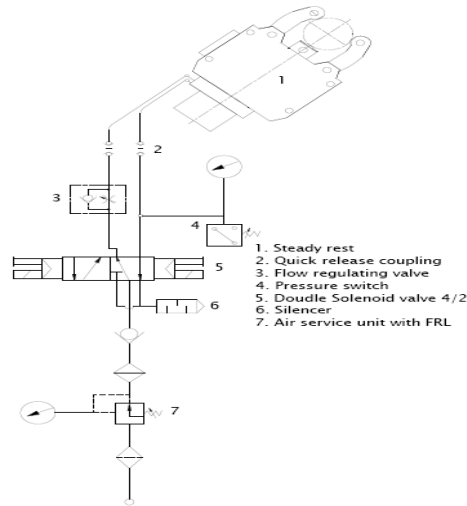
CONTROL SYSTEM

All cylinders can be operated hydraulically or pneumatically. Fig. 4.4 and Fig. 4.5 show typical control circuits for hydraulic and pneumatic operation.

- Operation of the Steady Rest is via a 4/2 way double solenoid valve. This valve can be controlled manually from a foot operated impulse generator or directly by the CNC system.



Control circuits for hydraulic operation.



Control circuits for pneumatic operation

FEATURES

Lubrication

Manual Lubrication: (FRU-M/ FRU-A-M)

This lubrication system is used for light duty working conditions and low building of swarf. Under normal working conditions and a maximum peripheral speed of 600 M/min the roller bearing assembly should be lubricated every 4 hours. This can be done by applying a grease gun to the grease nipples on the roller and pivot pins. The old grease must be pumped out as far as possible and supplemented by the new grease. However, during lubrication care should be taken to avoid over-lubrication or excessive working-in of the grease. A precondition of the lubrication is that the superfluous grease should always be allowed to escape from the bearing. The following grade of grease is recommended for use with self centering Steady Rests: **“DIN 51402”**

Centralised Oil Lubrication: (FRU-Z / FRU-A-Z)

This lubrication system is used in heavy working conditions with a high build of swarfs as well as travelling steady rest applications. The KEL self centering steady can be supplied with centralised lubrication. The G1/8" lubrication point is located on the narrow side of the housing and must be on the top when the steady is mounted. The roller assemblies and pivot pins are fed via lubrication channels and the moving surfaces of the middle arm are supplied via a large oil groove. The operating pressure for the centralised oil lubrication should be between 10 and 30 bars and should be set so as to provide approximately 0.4 cc of oil per point every 5 minutes.

At the time of commissioning each new steady rest or after long periods of continuous operation it is necessary to give it several shots of oil. Seals fitted to the moving parts guarantee full lubrication oil pressure at the rollers. Recommended grade of lubrication oil: **SERVO WAY 68**

Steady Rollers

Standard Steady Rests are equipped with high accuracy roller bearing assemblies which are sealed laterally. These rollers are spherical (R = 500) for tapered work pieces so as to avoid a wide surface contact and to reduce the marking of the work piece.

- Frequent lubrication of the steady rollers is essential for the long and trouble free operation of these rollers. (More details regarding lubrication is given in Section 6 of this manual.)

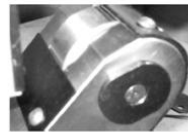
- The KEL self centering Steady Rests have been designed and developed to suit the modern compact CNC Lathes, where space is at a premium. Steady Rests can be offered with the cylinder mounted on the side of the steady housing instead of at the back, (if required) to save space.

Swarf Protection for the Steady Rest

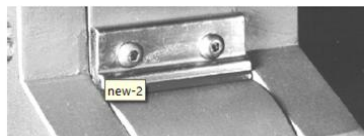
It is recommended that the Steady Rest should be protected from the swarfs during the machining operation. If swarf falls on the roller clamping area it could be picked up by the roller and ground into the surface of the workpiece. The result could be a broken tool or unsatisfactory surface finish on the work piece. The self centering Steady Rest as shown in fig 4.6 is provided with a 3-piece swarf guard for the rollers of the arms and a roller stripper for the cam lever. Wipers are also provided to wipe-out the swarf on the pivot arms area.



Swarf guard for middle arm



3 piece swarf guard for arms



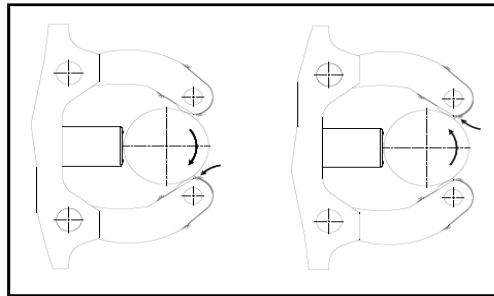
Wiper for arms

Swarf Protection for the Steady Rest

The middle arm swarf guard is factory set and does not have to be adjusted.

The swarf guard has to be adjusted with respect to the job diameter for proper swarf guarding.

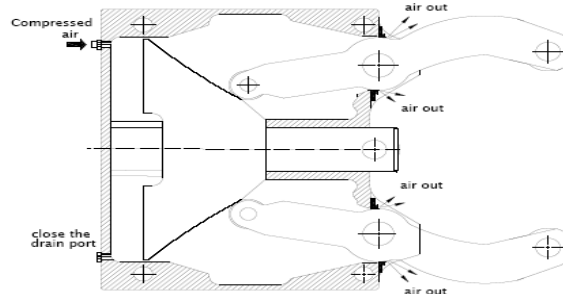
The 3-piece swarf guard is consumables and should be replaced when damaged



Piece swarf guard arrangement and component

Compressed Air Connection

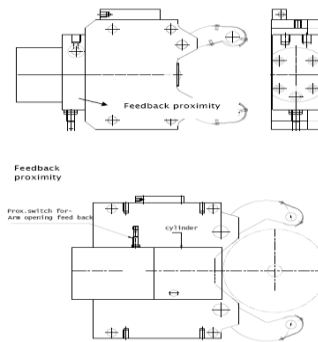
Corrosive and contaminating substances may enter into the main body during operations. The self centering Steady Rest is provided with a connection for compressed air as shown in fig 4.8. The compressed air produces pressure inside the Steady Rest and excludes the small area between the arms and wiper, and removes the coolant and other substances.



Steady Rest with a connection for compressed air

Feedback System

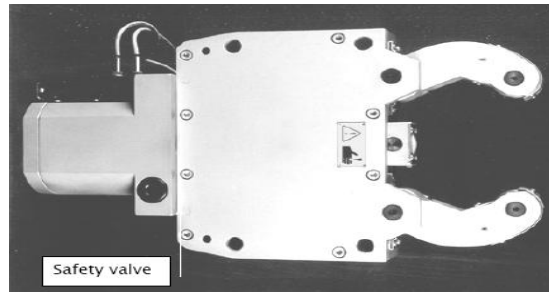
The KEL self centering Steady Rest is equipped with a feedback system for the opening signal. This is achieved via a limit switch integrated in the actuating cylinder Cover.



Feedback proximity arrangement for rear mounted and side mounted steadies

Safety Valve

The actuating cylinder of the KEL self centering Steady Rest is provided with an integral safety valve. In case of an unexpected fall in pressure or a leakage in the hose during the operation, the workpiece remains fully supported.



The safety valve system with FRU steady

- The safety valve should not be dismissed or tampered with.
- The guarantee does not cover damages to the Steady Rest if the safety valve is dismissed or tampered with.

BRACKET FOR STEADY MOUNTING

Brackets

The trouble free operation of the Steady Rest depends to a large extent on it being rigidly and accurately mounted on to the machine tool.

The basic conceptual design of the Steady Rest mounting brackets for flat and slant bed lathes are shown in Fig. 19 and Fig. 20 respectively. The brackets should have a wall thickness of between 40 to 50mm and have supporting webs for strength of the upright section. The Steady Rest can be mounted on the left or right hand side.

The design of the bracket is determined by the size of the Steady Rest and prevailing conditions:

- Space available on the machine.
- Centre height of the machine tool
- Shape of the machine bed (if the Steady Rest is to be used for fixed application).
- Relative position of the cutting tool (cutting forces must always act on the middle roller).

After the mounting bracket has been firmly mounted on the bed guide way or on the tool side and checked for accuracy, the Steady Rest is attached to the bracket with four fixing screws.

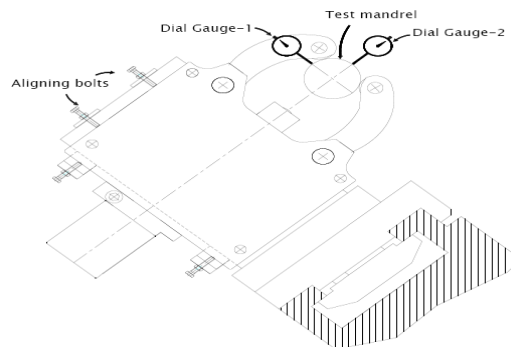
Alignment Procedure for the Steady Rest

The steady must be aligned accurately to the machine spindle axis. The performance of the Steady Rest depends entirely on how accurately it is aligned. The following steps may be taken to align the Steady Rest;

- Clamp the test mandrel between centres (the bar should be a hardened and ground shaft).
- Check the test bar in both the planes. To achieve the best accuracy, the diameter of the rest bar must match that of the workpiece exactly.
- Place two dial gauges with a reading accuracy of 0.01mm as shown in Fig. 4.11 against the test bar and set to 0.
- Loosen the four fixing screws on the Steady Rest mounting bracket a little so that the Steady Rest is held only friction tight.
- Extra alignment aids may be required for Steady Rests of more than 200mm diameter range.
- Close the Steady Rest on the test bar.
- Check the readings of the dial gauges to see whether the test bar has been shifted from the centre line. If it has, the Steady Rest must be moved by hand or by the alignment aid until the dial gauges once again read 0.
- Retighten the fixing screws and observe the dial gauges to check that the pointers stay at 0.
- Loosen the fixing screws of the Steady Rest and close it on the test bar once more.

Check the dial gauges to see whether the test bar has stayed in position. If the pointers move, the aligning operation must be repeated.

- Open the Steady Rest; remove the two dial gauges and the test bar.
- The Steady Rest is now aligned.



Alignment Procedure for the Steady Rest

Auxiliary Procedures

1. Roller changing
2. Grease packing
3. Swarf guard adjusting
4. Seal changing

For Cam Lever

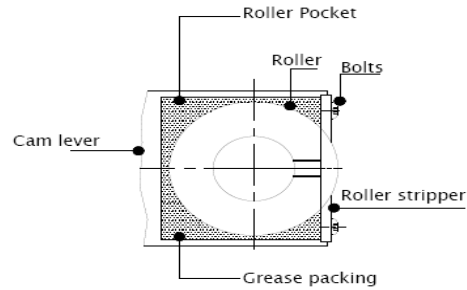
1. Remove the four bolts on the roller stripper.
2. Remove the roller stripper.
3. Remove the grub screw at the bottom side of the cam lever.
4. Push the roller pin from the top and remove it.
5. Remove the roller.

For Arms

1. Remove the swarf guard.
2. Remove the grub screw at the bottom side of the arm.
3. Remove the bolts on the spacer for the roller pin.
4. Remove the spacer.
5. Push the roller pin from the arm and remove it.
6. Remove the roller.

Grease Packing

1. Remove the 4 bolts.
2. Remove the roller stripper.
3. Fill the roller pocket with grease.
4. Replace the roller stripper and bolt to the cam lever.

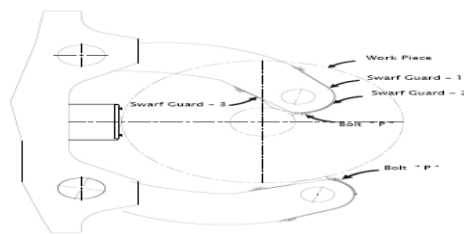


Grease Packing

Replace grease once a year, or while changing the roller.

Use **SERVO JEM RR3** grease.

SWARF GUARD ADJUSTING



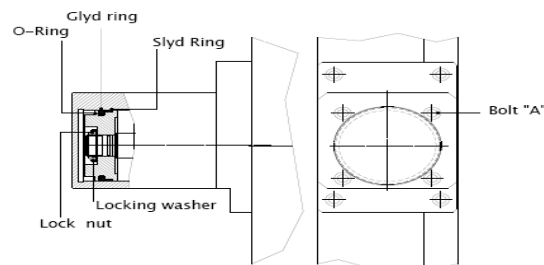
Swarf Guard Adjusting

1. Loosen the bolt P.
2. Adjust the swarf guard 2 to maintain a minimum gap of 0.2 mm with the component.
3. Tighten the bolt P.

SEAL CHANGING

Piston Seal

1. Loosen the bolts "A" (4 No's) and remove the cylinder.
2. Unfold the locking washer.
3. Loosen the lock nut.
4. Remove the locking washer.
5. Remove the piston.
6. Remove the piston seal and O-Ring.
7. Replace the O-Ring to the groove.
8. Load the piston seal using the taper loading mandrel and pusher.
9. Size the Glide ring using the sizing ring by pressing gently.
10. Replace the piston on the piston rod and tighten using locking washer and lock nut.
11. Replace the cylinder and bolt it to the end cover.



Piston Seal

GENERAL INSTRUCTIONS FOR INSTALLATION OF SEALS

1. Check the groove dimensions before seal assembly.
2. Cylinder and piston rod to be chamfered with a 15° chamfer for easy entry.
3. All sharp edges to be round off.
4. Any dust particles, splinters and other foreign particles to be removed carefully and grooves to be cleaned thoroughly.
5. Tools with sharp edges should not be used for assembly of the seals. Use only plastic tools.
6. Cylinder piston rod and seals must be oiled before assembly.
7. Always assemble Teflon seals with care to avoid nicks and scratches on the sealing surface.
8. Keep tools and seals clean as contamination will cause leakage.
9. In case of closed grooves configuration loading tools are recommended for easy and accurate assembly.

SHOOTING

Steady not clamping / unclamping:

- Check system pressure
- Check hose pipe, joints for leakage
- Check solenoid valve
- Check all electrical connections

No Lubrication of rollers:

- - If lubrication is not reaching any of the rollers, check following.
- - Check oil level in oil sump
- - Check functioning of timer and solenoid valve in lubrication circuit.
- - Check if system pressure is normal
- - Disconnect the inlet to distributor block and check if oil is flowing out.

Damaged work piece, poor surface finish, variation in dimensions:

- - Check surface of rollers
- - If chip breakage is not proper, they get in between roller and work piece and damage roller and work piece.
- - Replace rollers if damaged
- - Check cutting tool
- - Check system pressure
- - Check all rollers are in contact with component.
- - Check alignment of steady
- - Check all bolts that clamp the steady on the bracket on to machine.

APPLICATIONS OF HYDRAULIC STEADY REST

Steady Rest on lathe Machine



Steady Rest on lathe Machine

Hydraulic self centering steady rest are compact in size. We have different types of steady rests for turning steady rest, lathe steady rest, hydraulic steady rest, steady rest for cnc lathe, steady rest for crank shaft turning, steady rest for crank shaft grinding, steady rest for cam shaft turning, steady rest for cam shaft grinding, steady rest for spline milling, steady rest for gear shaving, steady rest for gear hobbing etc..

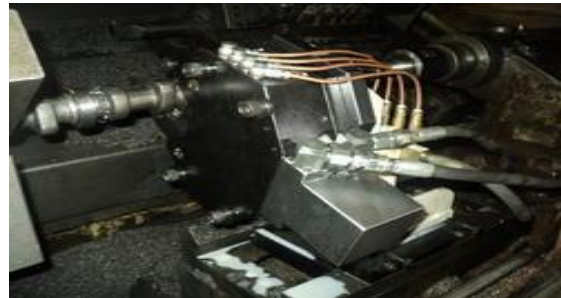
CNC Steady Rest



CNC Steady Rest

Hydraulic self centering steady rest can be interfaced with CNC system to run in automatic cycle. These steady rest can be installed on conventional machines also.

Steady Rest for Cam Shaft Turning



Steady Rest for Cam Shaft Turning

Steady rest for special applications lock cam shaft turning, cam shaft grinding, crank shaft turning, crank shaft grinding etc.

Lathe Steady Rest



Lathe Steady Rest

Steady rests for end operations of shafts and pipes

Steady Rest for Turning



Steady Rest for Turning

Turning steady rests & cam shaft steady rests are essential accessory for supporting long and slender shafts during machining, as the slender shaft have a tendency to bend or deflect due to cutting loads. The use of steady rest will confirm the accuracy, concentricity and surface finish on the shafts. These Turning steady rest & cam shaft steady rest high precision steadies can be mounted on any CNC or conventional machines even the space available is critical.

Work Holding Steady Rest

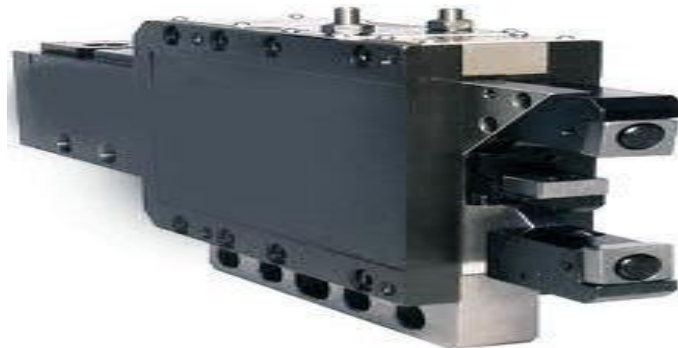


Work Holding Steady Rest

We are counted as the trusted organizations, involved in manufacturing and supplying a superior quality range of Steady Rest. Our offered gamut is fabricated in conformity to the defined industry standards, using quality tested raw materials that are sourced from authentic vendors of the industry. These are highly demanded in the national market for providing 3-point support on the cylindrical grinding machine. Further, these can also be customized as per the requirement of the customers.

Steady Rest (Work holding steady)

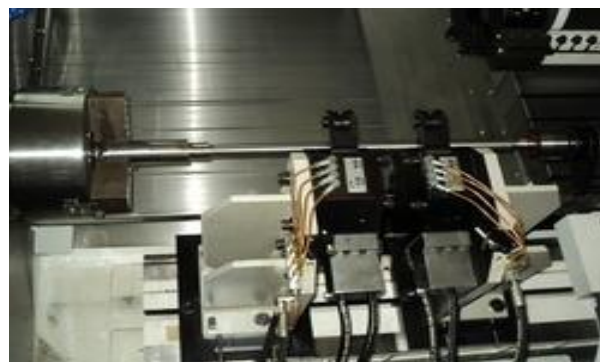
Arms Retracted Steady Rest



Arms Retracted Steady Rest

In this Grinding steadies Gripping arms can go inside the body to avoid the interference of steady while loading of components to the machine clamping range can be modify according to the customer requirements

Steady Rest Tandem Self Centering



Steady Rest Tandem Self centering

We are one of the prominent manufacturers and suppliers of an optimum quality range of Hydraulic Steady Rest. Our team of experienced and qualified professionals, develop these according to the defined industry standards, using best quality raw materials and latest technology. The offered products are straightened with concentric circles for ensuring efficient functioning. These are widely used in various industrial sectors for protecting the work piece from being dislocated under the adverse clamping pressure.

Steady Rest for Cam Shaft Grinding



Steady Rest for Cam Shaft Grinding

We have wide range of Steady Rest for Cam Shaft Grinding applications. We can design and manufacture crank shaft steady rests according to customer requirements. We have developed a 2 point 3 contact steady rest for crank shaft grinding application where vertical loading of crank shaft in to machine will be a problem. We can easily accommodate in process gauge on the cranks shaft journal where the steady held.

RESULTS AND CONCLUSIONS

RESULTS

1. Good surface finishing has been obtained by using Self centering steady rest between the cam rollers.
2. Higher accuracy will be there in measurement due to preciseness in utilization of the supporting material.
3. Productivity will be increased in terms of output and can reach the objectives and goals of production such as increasing Productivity, Reduced cycle time and reliability in the service provided by resources.
4. Operational efficiency will be achieved in utilizing the steady rest.

CONCLUSIONS

1. As the manual centering process is very slow this cam actuated self centering steady rest is the best option on Axis centered CNC Lathe to give support to the slender work pieces while carrying machining operations on it.
2. It reduces the Vibration effect on the work piece.
3. It reduces the damping effect on the work piece.
4. It reduces the deflection on the slender work pieces.
5. Higher accuracy will be obtained in utilizing Hydraulic or Pneumatic pressure as input.
6. Setting time also will be less for this such that productivity can be achieved.

REFERENCES

- 1 Paul J. Owsen, 1772 Indian Woods, Dr., Traverse City, Mich. 49684 “multipurpose steady rest”, Oct. 15, 1985.
- 2 Richard J. Lessway, Farmington Hills, Mich., “remote gage steady rest head”, Oct. 22, 1991.
- 3 Richard J. Lessway, Farmington Hills, “steady rest with independent vertical and horizontal”, May 24, 2005.
- 4 K. ADARSH KUMAR “Optimization Of Surface Roughness In Face Turning Operation In Machining Of En-8” international journal of engineering science & advanced technology
- 5 Ilham Ary Wahyudie ,Prof. Dr.-Ing. Ir. Suhardjono, “ Modification Of Follower Rest With Seismic Damperto Improve The Stability Limit (Chatter)In Slender Bar Turning Processes”,
- 6 Salisbury Wiltshire, Hydraulic “ Self Centering Steady Rest manual”,
- 7 Pain’s “ The Practical Wood turner also appeared in Fine Woodworking”, in the 1970’s
- 8 Steen W.M., “ Steady Rest For CNC Lathe”, *Springer*, London, 1991.
- 9 Jasbir S.A., “Introduction to steady rest”, *McGraw-Hill*, 1989.
- 10 Groover., “Computer Integrated Manufacturing ”, *Mcgraw-Hill*, New York,.
- 11 R K Jain., “machine tools”, Dhanapati rai.
- 12 PC Panday & Shah “modern manufacturing methods”.
- 13 A comparison b/w hydraulic and pneumatic rock drills by T.c. Marshall ,pr. Eng.(member)
- 14 www.mechanical engineering projects.com
- 15 www.springer.mechanical engineering.com
- 16 www.ebooks.com
- 17 www.mechanical engineering blogspot.com
- 18 R K Jain “ machine tools”.,