

Gantry Mill

Operating Manual

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ABOUT US

Superior Plant Rentals, LLC. (SPR) specializes in portable machining, bore welding, line isolation, and testing solutions, providing equipment and tools manufactured under the highest standards of quality control and engineering expertise along with 24/7 service and support. Designed with the operator in mind, our tools and equipment deliver dependable and precise performance, providing cost-effective solutions and reduced downtime, making them beneficial resources in the Oil and Gas, Mining, Heavy Construction, Shipbuilding, Aerospace, Defense, and Power Generation industries.

SPR rents and sells equipment and tools; we offer our own line of portable ID/OD flange facers, linear/gantry and rotary mills, end prep bevelers, isolation and test plugs, line boring, and bore welders, as well as custom-designed equipment and tools.

Our team includes machining, test and isolation, and engineering experts, all with a thorough working knowledge of applications to support you with our equipment on any job. We understand the urgency of your projects and are committed to delivering the highest quality equipment and tools to satisfy the requirements of your clients.

SPR delivers outstanding customer service, specialized training by seasoned professionals, and tools as tough as the jobs you need them to do.



WARNING:

SPR is committed to continued product improvement; therefore, the machine you received may be slightly different than the one described herein. This manual and the information provided is a basic guideline for our customers. SPR will do its best to ensure that the information and procedures contained in this manual are correct and up-to-date. Superior cannot guarantee that the information and procedures contained herein are correct for all applications or situations.

The contents of this manual are subject to change without notice. It is the obligation of the user to read all information in this manual, become familiar with the equipment to be used, and exercise the utmost care in equipment operation. **Do not make any modifications to this equipment. Any modifications will void all warranty claims, as well as increase the risk of injury or harm.** Do not operate this equipment if all parts are not functioning at 100% efficiency. Notify us immediately for any needed repairs.



Note: SPR will supply all repair and replacement parts necessary for maintenance and operation of this machine. For repair, service, or additional information, please locate repair and replacement part description/part numbers within the O&M manual in the exploded view section and contact us for ordering.

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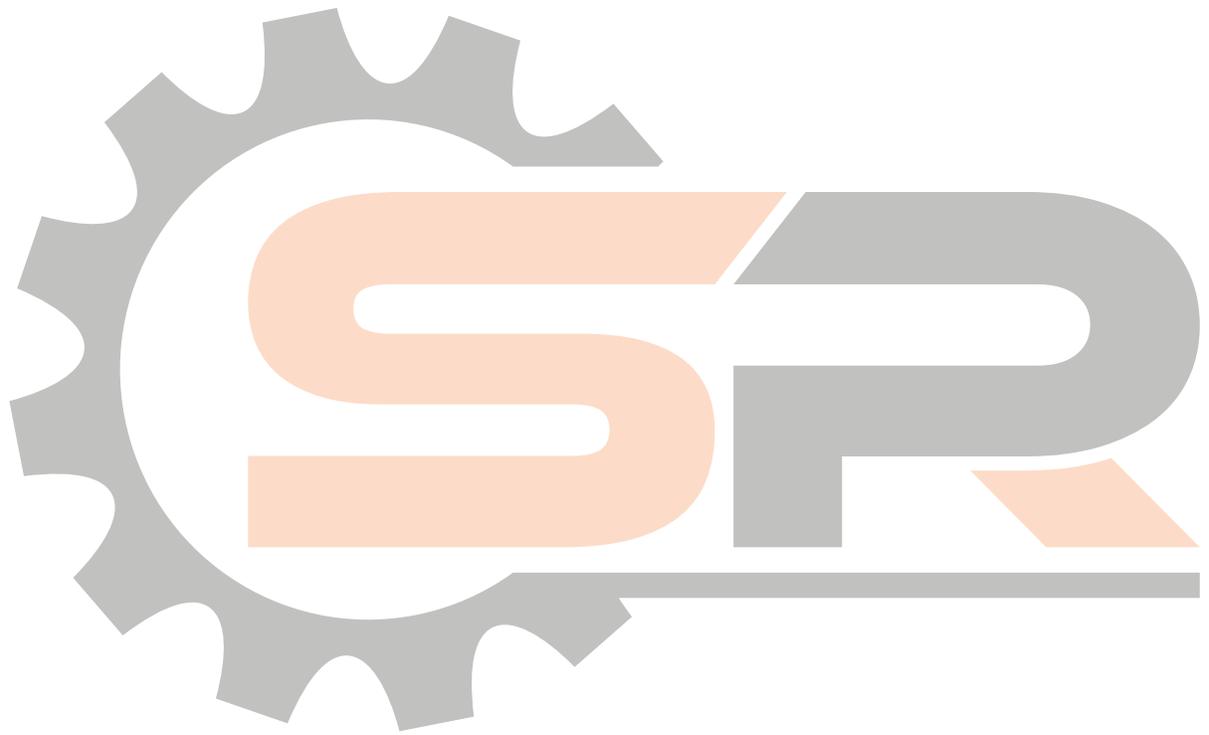
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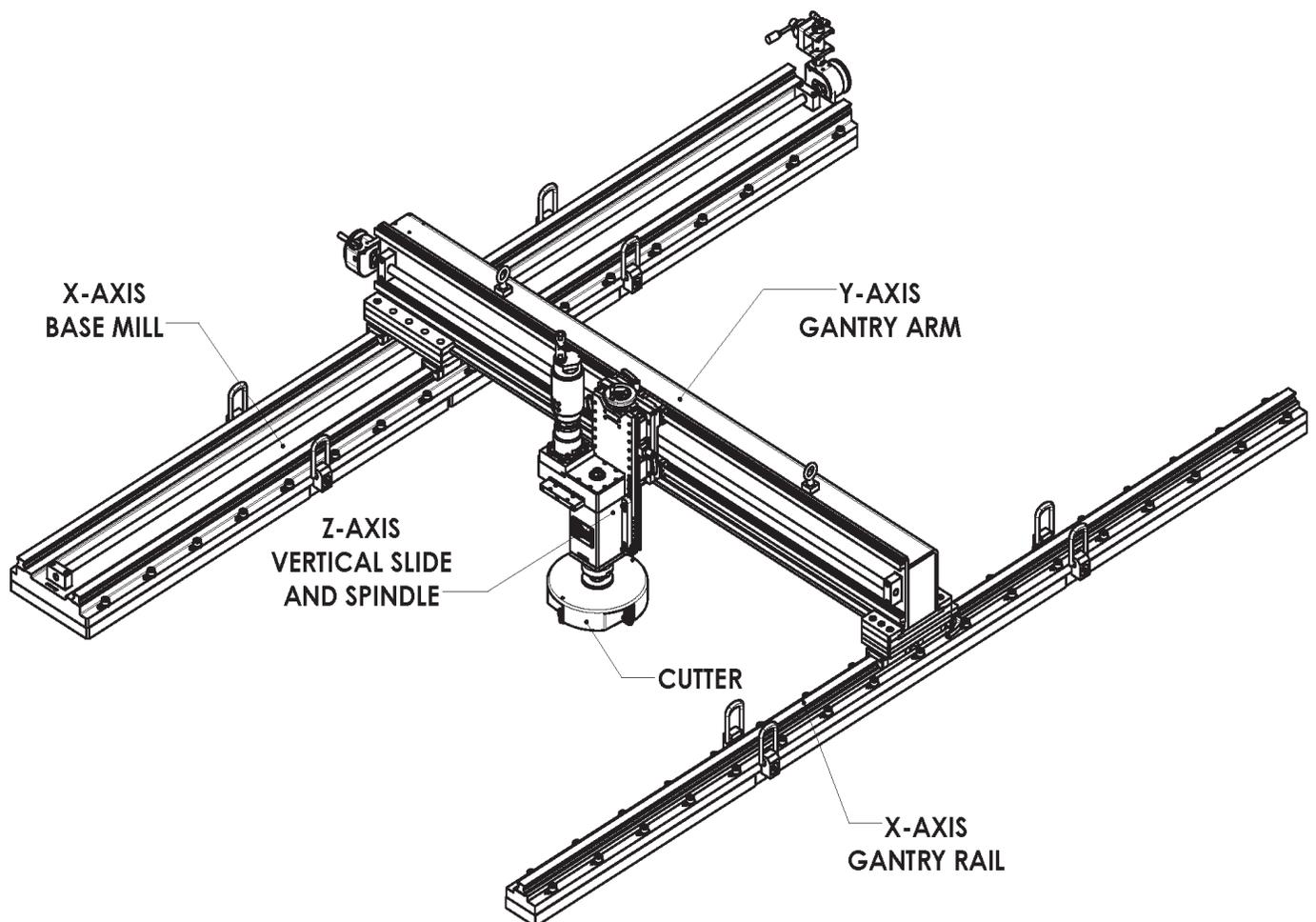
INTRODUCTION

APPLICATIONS

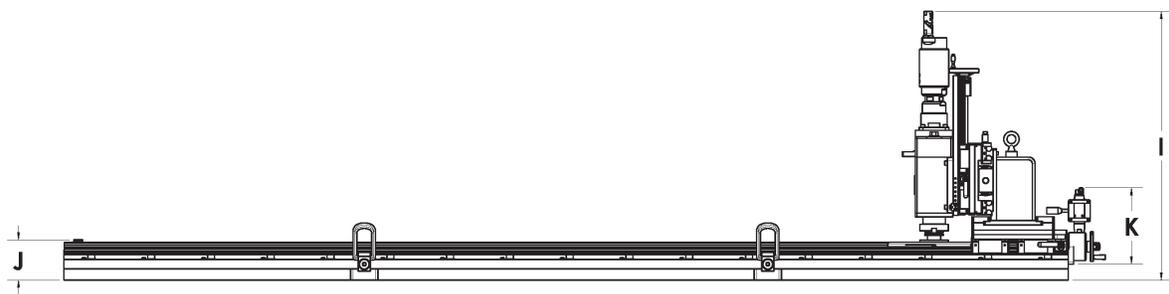
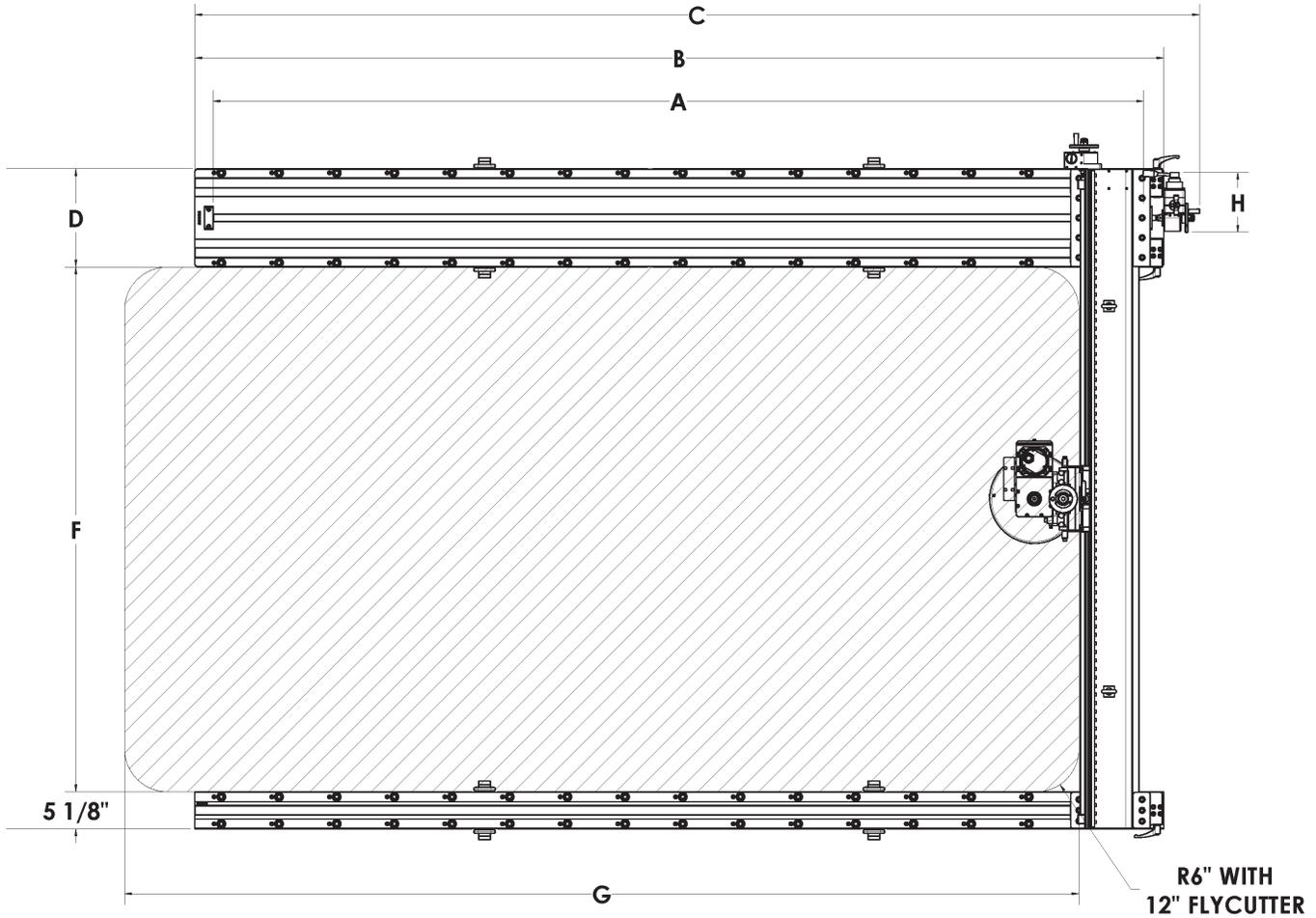
SPR's gantry mills are designed to be an extension of our standard linear mills, allowing for a larger area and range of cut in a shorter amount of time. By adding one of the gantry arms and rails to the base linear mill, the user can machine a multiple arrangement of pads or a larger rectangular area while maintaining precision tolerances. These mills are designed with ball screws and rails in all three axis, X-Y-Z, to replace older dovetail models. These gantry mills produce CNC-quality work in field / shop conditions depending on the job scope. By feeding the cutter in the X and Y axis, larger pads can be machined while maintaining the tolerances required for milling applications.

When you receive the Gantry Mill:

The Gantry Mill is generally shipped in several crates. Inspect the machine for shipping damage. Verify that all of the parts listed below, or on the Bill of Materials, are present. If any parts are missing, or if you have questions regarding the Gantry Mill, please contact a Superior Plant Rentals or SPR York location nearest you immediately.

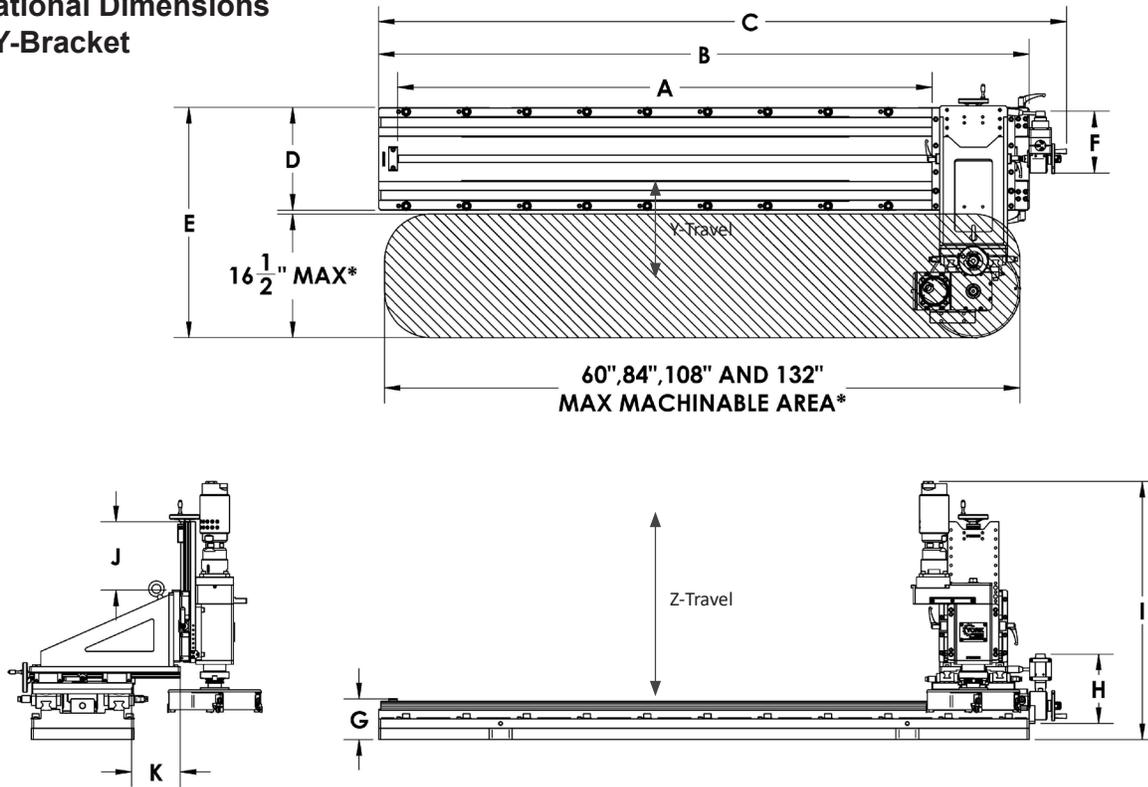


SPECIFICATIONS CHART

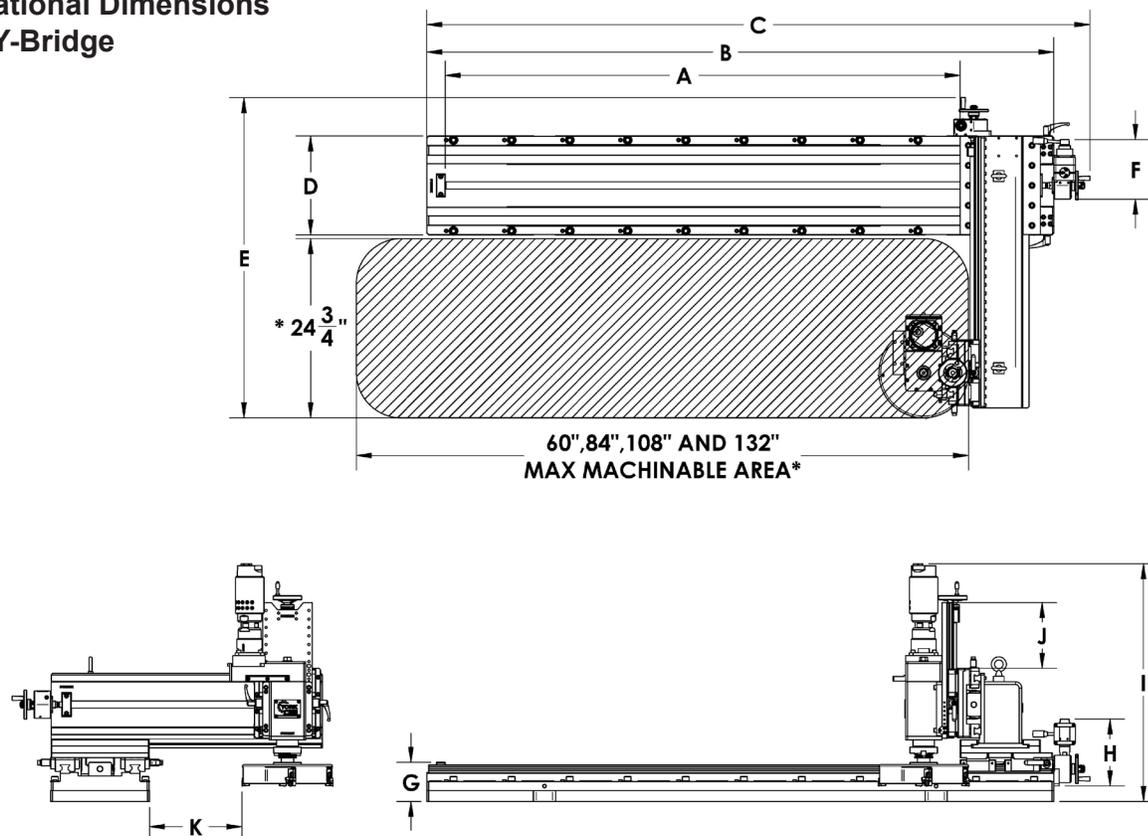


Gantry Mill Base	Gantry Arm Length (ft)	Travel Length (in)	Length of Base (in)	Overall Length (in)	Width of Base (in)	Width of Gantry Arm (in)	Y-Cutting Width (in)	X-Cutting Width (in)	Gear-box Width (in)	Height of Motor (in)	Height of Base Mill (in)	Height of Gearbox	Machine Weight
		A	B	C	D	E	F	G	H	I	J	K	(lbs)
LM-1000-6	4	72"	84.50"	89"	10"	67.625"	52.50"	60.375"	9"	31.625"	4.375"	10.625"	1700 lbs
LM-1000-6	6	72"	84.50"	89"	10"	91.625"	76.50"	60.375"	9"	31.625"	4.375"	10.625"	1800 lbs
LM-1000-8	4	96"	108.4"	113.40"	10"	67.625"	56.875"	108.375"	9"	32.25"	4.625"	10.625"	2067 lbs
LM-1000-8	6	96"	108.4"	113.40"	10"	91.625"	80.875"	108.375"	9"	32.25"	4.625"	10.625"	2168 lbs
LM-1000-8	10	96"	108.4"	113.40"	10"	144"	128.875"	108.375"	9"	32.25"	4.625"	10.625"	2392 lbs
LM-1400-6	4	72"	86.375"	91.375"	13.50"	67.625"	48.875"	84.375"	9"	32.25"	4.625"	10.625"	2115 lbs
LM-1400-6	6	72"	86.375"	91.375"	13.50"	91.625"	72.875"	84.375"	9"	32.25"	4.625"	10.625"	2215 lbs
LM-1400-6	10	72"	86.375"	91.375"	13.50"	144"	125.25"	84.375"	9"	32.25"	4.625"	10.625"	2440 lbs
LM-1400-8	4	96"	110.375"	115.375"	13.50"	67.625"	48.875"	108.375"	9"	32.25"	4.625"	10.625"	2533 lbs
LM-1400-8	6	96"	110.375"	115.375"	13.50"	91.625"	72.875"	108.375"	9"	32.25"	4.625"	10.625"	2635 lbs
LM-1400-8	10	96"	110.375"	115.375"	13.50"	144"	125.25"	108.375"	9"	32.25"	4.625"	10.625"	2858 lbs
LM-1400-10	4	120"	134.375"	139.375"	13.50"	67.625"	48.875"	132.375"	9"	32.25"	4.625"	10.625"	2990 lbs
LM-1400-10	6	120"	134.375"	139.375"	13.50"	91.625"	72.875"	132.375"	9"	32.25"	4.625"	10.625"	2990 lbs
LM-1400-10	10	120"	134.375"	139.375"	13.50"	144"	125.25"	132.375"	9"	32.25"	4.625"	10.625"	3345 lbs

**Operational Dimensions
with Y-Bracket**



**Operational Dimensions
with Y-Bridge**



* DIMENSIONS SHOWN USING 12" FLYCUTTER

Linear Mill	Travel Length (in)	Length of Base (in)	Overall Length (in)	Width of Base (in)	Overall Width (in) E		Gearbox Width (in)	Base Height (in)
	A	B	C	D	Bracket Assy.	Bridge Assy.		
LM-800-4	48	59.75	65	8	27.000	N/A	9	4.375
LM-1000-6	72	84.50	89	10	27.875	33.625	9	4.375
LM-1400-6	72	86.375	91.375	14	31.625	37.375	9	4.625
LM-1000-8	96	108.5	113.375	10	27.875	33.625	9	4.375
LM-1400-8	96	110.375	115.375	14	31.625	37.375	9	4.625
LM-1400-10	120	134.375	139.375	14	31.625	37.375	9	4.625

Linear Mill	Gearbox Height (in)	Overall Height (in)	Vertical Tool Travel (in)	Horizontal Tool Travel (in) K		Machine Weight (lbs)	Shipping Weight (lbs)	Shipping Dimensions (in)
	H	I	J	Angle Bracket Assy.	Y-Bridge Assy.			
LM-800-4	10.375	31.625	9	6	N/A	765	1165	26 x 41 x 76
LM-1000-6	10.375	31.625	9	6	16	1150	1520	27 x 42 x 101
LM-1400-6	10.625	32.250	9	6	16	1620	2050	22 x 39 x 99
LM-1000-8	10.375	31.625	9	6	16	1445	1690	22 x 39 x 123
LM-1400-8	10.625	32.250	9	6	16	1755	2500	22 x 39 x 123
LM-1400-10	10.625	32.250	9	6	16	1890	2750	32 x 43 x 156

SAFETY PRECAUTIONS

The customer shall ensure that only people thoroughly trained in safe work procedures operate this machine. Safe working procedures are required when operating rotating machine tools. The misuse of this machine could result in severe injury or death.



Proper training and safety precautions can help avoid accidents.



Please observe all company and Government work safety practices.

- Keep others clear from the machine when it is running.
- Keep clear of the cutting head and other moving parts. Never try to remove chips while the machine is running.
- Disconnect the power when inserting or adjusting the cutting tool.
- Wear protective goggles, footwear and ear plugs. Please observe all Company and Government work-safe practices
- Do not wear loose fitting clothing that could get caught up or wrapped in the machine.
- Flying chips can cut or burn you. Do not remove cuttings with bare hands.
- Do not operate in water. Watch for electrical hazards.

MACHINE SAFETY

- Do not leave machine unattended while in operation.
- Do not replace brass shear pin (1/8" brazing rod) with steel.
- Beware of pinch points. Keep all body parts clear of the machine while it is running.



Rotating machine parts can cause serious injuries, even death!



Running the X-Axis feed into End-Stops may damage machine.

For maximum safety and performance, read the entire instruction manual before operating this machine.



WARNING!
MOVING PARTS.

Keep hands, loose clothing, and hair away from rotating or moving parts. Disconnect the air supply from the machine and unplug all equipment prior to adjusting or servicing. If electric, remove power from the machine prior to adjusting or servicing.



WARNING!
ELECTRICAL SHOCK.

Possible shock if not handled properly.



WARNING!
KEEP DRY.

Keep all equipment and components away from any water source.



WARNING!
EYE PROTECTION.

Eye protection must be worn while operating or working near powered equipment.



WARNING!
EAR PROTECTION.

Ear protection should be worn while operating or working near loud equipment.

TOOL REQUIREMENTS AND SETUP

TOOL REQUIREMENTS

- Dial gauge and magnetic dial gauge stand
- Imperial Hex Keys
- 15/16 Box Wrench
- Welder
- Machinist Level



GANTRY MILL SETUP

1. Carefully remove all components from their crates. Note: For a gantry mill machining set up, there are four components that will be needed, the Base mill, Gantry arm, Gantry Rail and the Vertical Slide and Spindle with cutter.



Lift X-BASE using all four EYE-BOLTS keeping X-BASE in a horizontal position (Figure 1).



DO NOT allow lifting straps to push down on BALL-SCREW (Figure 1).

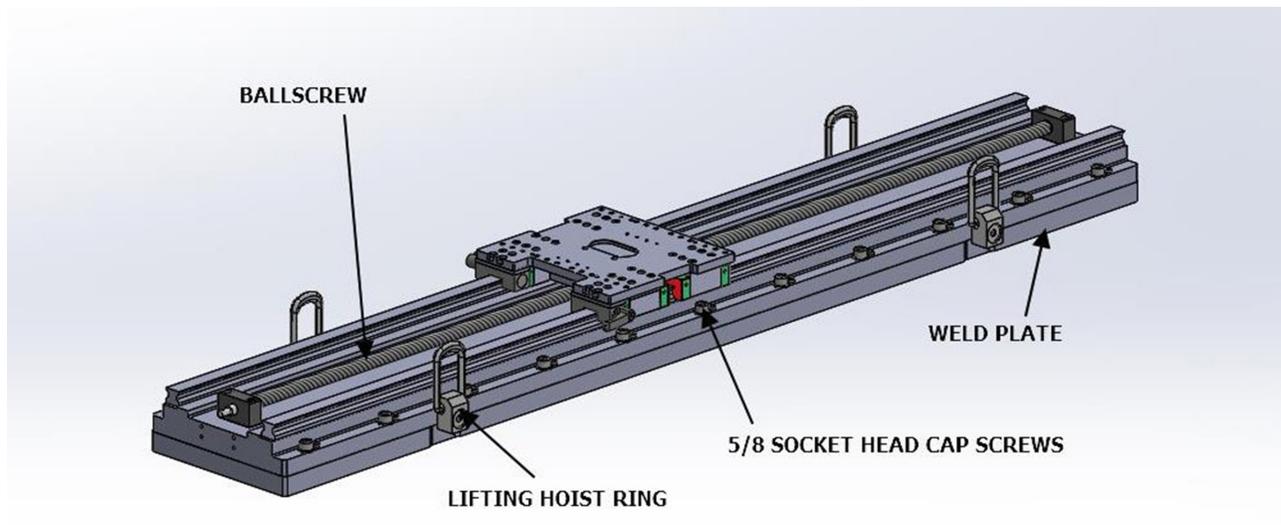


FIGURE 1

2. Lift the base mill by using the four lifting Hoist rings with the weld plate attached and set the x-base mill into position.
3. Now lift the gantry rail in the same manner as above using the lifting hoist rings and place it parallel to the base mill, across the pads to be machined.
4. Now push by hand and slide the saddle on the gantry rail into the same location as the saddle on the base mill.

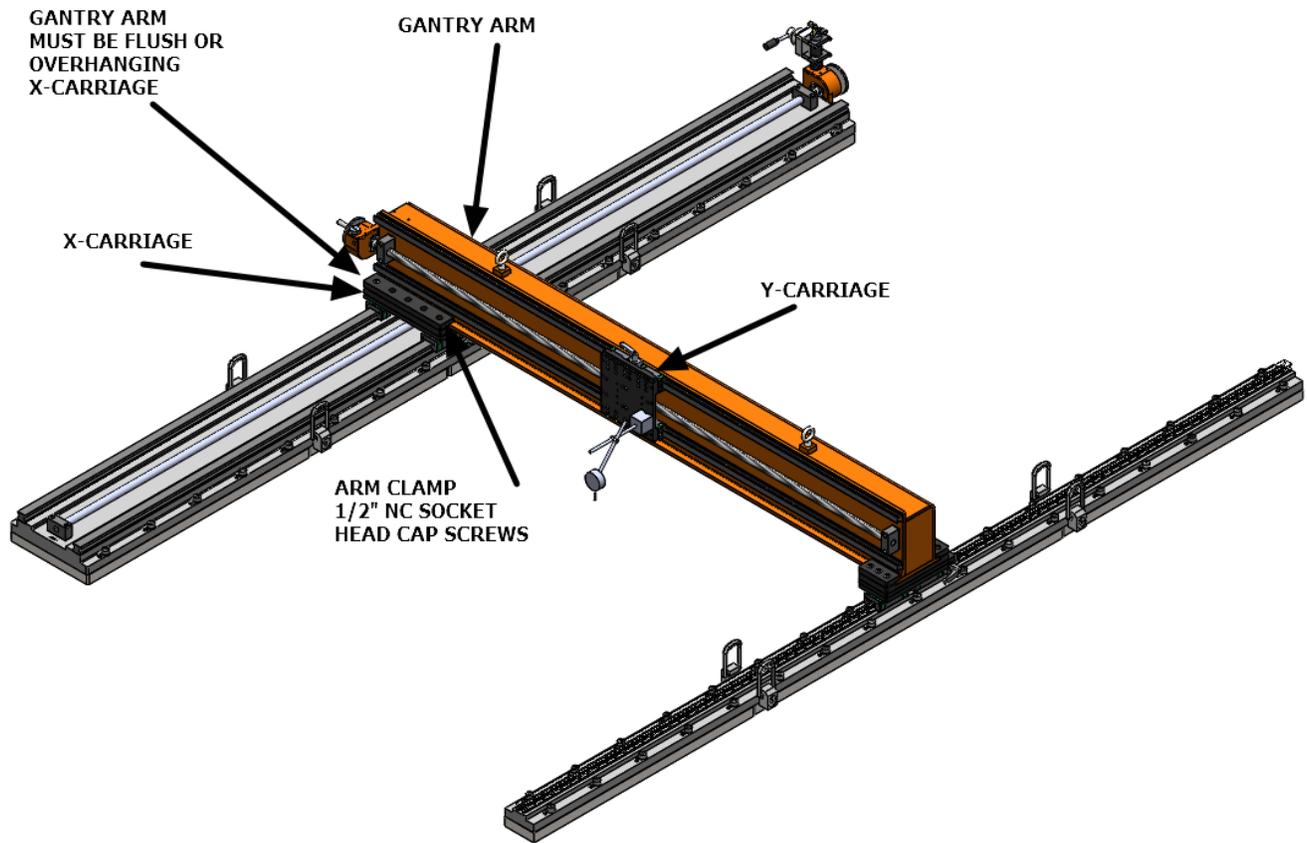


FIGURE 2

5. Remove GANTRY ARM-CLAMPS from X-CARRIAGE. Using the provided EYE-BOLTS, place GANTRY - ARM on X-CARRIAGE and reattach the ARM-CLAMPS, ensuring that the end of GANTRY - ARM is flush or not overhanging with the edge of X-CARRIAGE. Tighten the $\frac{1}{2}$ -13X1 SOCKET HEAD CAP SCREWS on both ARM-CLAMPS (Figure 2).



Do not extend GANTRY-ARM inwards past the edge of the X-CARRIAGE to obtain more travel.

6. Lift the gantry arm into place using the two eye bolts provided. Swing the gantry arm into place so that it spans across from the base mill saddle plate to the gantry rail saddle plate.
7. Place the gantry arm onto both saddles so that it is flush with the outer edges of each saddle plate.
8. Place the hold down clamp plates on the base mill into place and screw the $\frac{1}{2}$ " - 13 x 1" socket head cap screws back into place. Lightly snug the screws.

9. Place the hold down clamp plates on the gantry rail into place and screw the ½" - 13 x 1" socket head cap screws back into place. Lightly snug the screws.
10. Using the hand crank wheel on the base mill gearbox, hand crank the mill so that the gantry arm travels completely down the X – Base Mill bed from one end to the other. This will push and align the gantry rail parallel to the base mill.
11. Now both the base mill and the gantry rail can be welded into place.
12. Place a series of stitch welds about 1" long around the outside on the bottom of the weld plate to securely attach the base mill and weld plate into position.
 -  Do not weld directly on any parts of the machine other than the WELD-PLATES.
 -  While welding, cover/protect machine to prevent weld splatter from damaging rails, runner-blocks, ball-screw and other critical components.
13. Repeat step 12 above to weld the Gantry Rail into place
14. Loosen all 5/8-11 SOCKET HEAD CAP SCREWS in WELD-PLATE to allow adequate room for leveling.
15. Once the weld plates on both the rail and the base mill are welded into place, tighten all the ½" 13 x 1" socket head cap screws holding the gantry arm to the saddle plates in place
16. The mills can now be indicated or leveled into place.
17. There are two different methods that can be used to level the mill for machining. One is to use an indicator as described below, and the other is to use either a machinist level or transit level to level the rails to the world.
18. Place a DIAL-INDICATOR on the GANTRY-ARM (Figure 2) and level the machine by adjusting the JACKING SCREWS while running the DIAL-INDICATOR along both X and Y-axis.

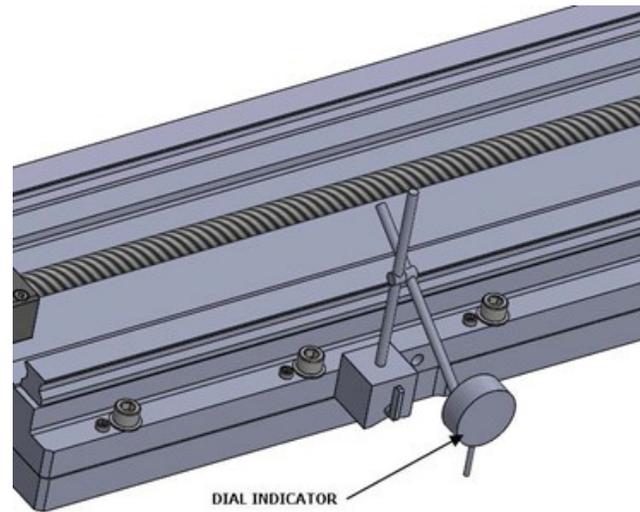


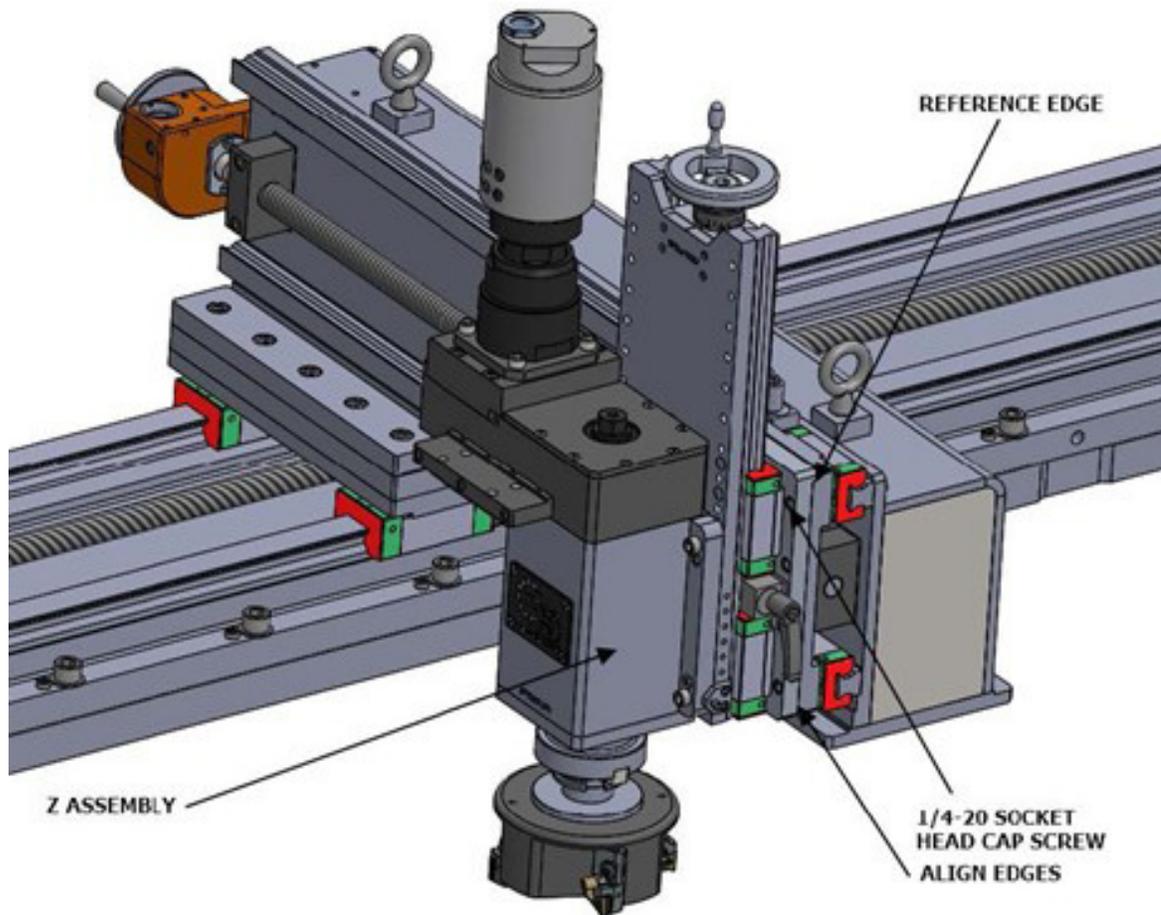
FIGURE 3

19. Once the mill is level, attach the dial indicator next to one set of JACKING SCREWS with the dial indicator referencing the ground (Figure 3).
20. Carefully tighten the 5/8-11 CAP-SCREWS and the JACKING-SCREWS ensuring that the DIAL-INDICATOR doesn't change the position. Repeat for the other sets of JACKING SCREWS.
21. Lightly "Finger Tighten" JACKING-SCREWS into the remaining 8 positions and repeat the tightening procedure of both JACKING-SCREWS and 5/8-11 CAP-SCREWS using the DIAL-INDICATOR at each new position (Figure 3) to maintain level position.

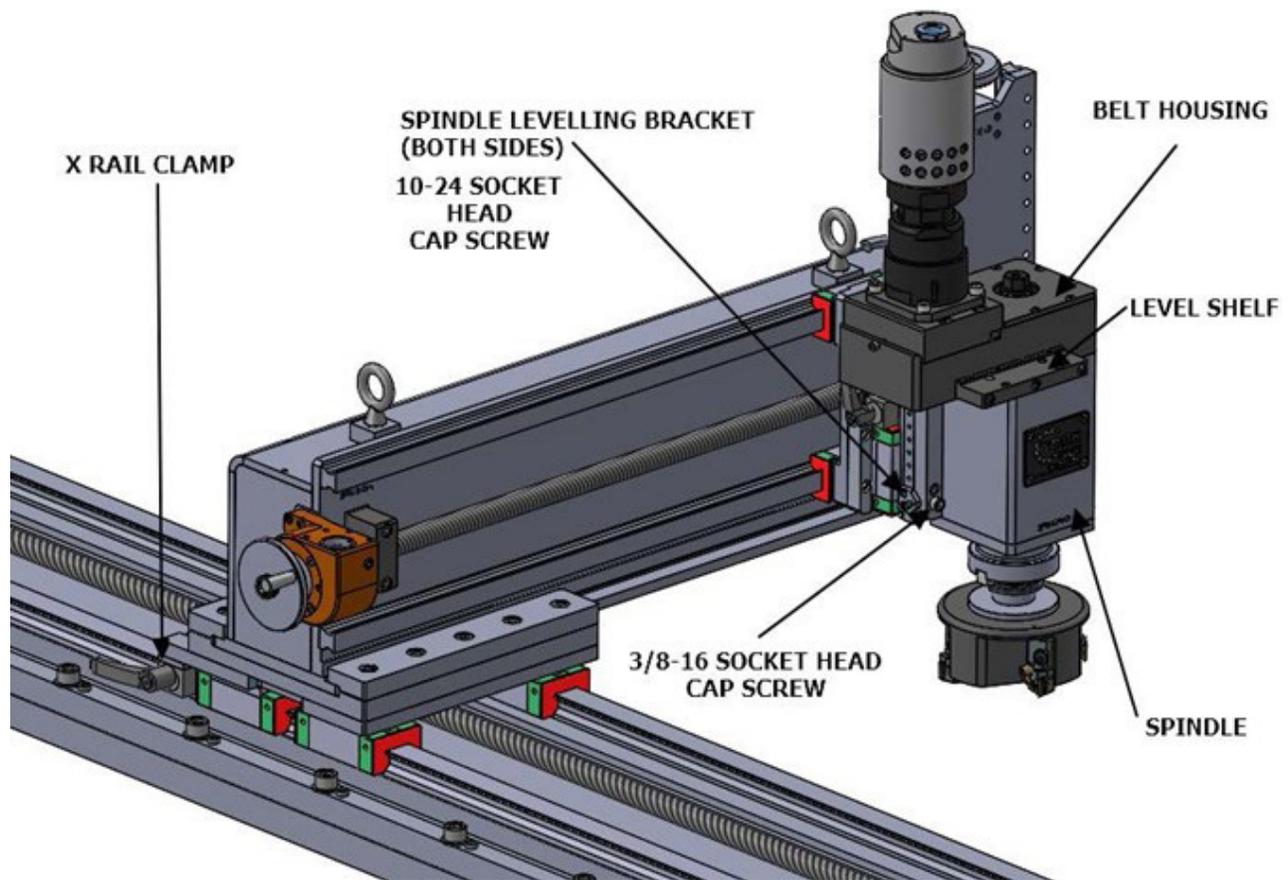


Tightening the screws without the DIAL-INDICATOR can cause the X-BASE to bend, reducing flatness and potentially damaging the machine.

22. The second method to align the machine for cutting is to use a laser or machinist's level and level the machine to the world.
23. Take the level and place it on the rails on the base mill and level the base using the jack screws mentioned above, or shoot points along the rails with a laser to level the mill.
24. Next, place the level on the Gantry rail and level it down the x – axis using the jack screws.
25. Now place the level on the gantry arm and raise or lower the gantry rail until the gantry arm is level.
26. Now go back and check to make sure all three parts, the base mill, the gantry rail, and the gantry arm are all level and within tolerance.
27. Now the vertical slide Z ASSEMBLY and spindle can be bolted onto the gantry arm saddle plate.

**FIGURE 4**

28. Align the top reference surface of the Z-ASSEMBLY onto the Y-CARRIAGE and align edges prior to inserting and tightening the 1/4-20 SOCKET HEAD CAP SCREWS on either side of the Z-ASSEMBLY (Figure 4).
29. Note: There are different options for the SPINDLE position depending on desired height and if milling downwards, upwards or sideways. Additionally, the BELT-HOUSING can be disassembled and rotated to the left, right or center if clearance is required. This will require loosening and removal of timing pulleys.

**FIGURE 5**

30. Place the user-provided CAT40 TAPER inside SPINDLE and draw up by tightening the DRAWBOLT.

31. The mill is now ready for the cutting operation.

OPERATION

1. The Gantry Mill is similar in operation to any 3-Axis Milling Machine.
2. Before operating ensure all mounting fasteners are secure.
3. Ensure all pneumatic lines are connected correctly.
4. Start-up milling spindle away from job to check for correct rotation.
5. Adjust speed and feed to suit tooling and material.
6. To feed the X-Axis manually, loosen both X-RAIL-CLAMPS (Figure 5) and pull the CLUTCH outwards to disengage from the GEAR-BOX (Figure 6).

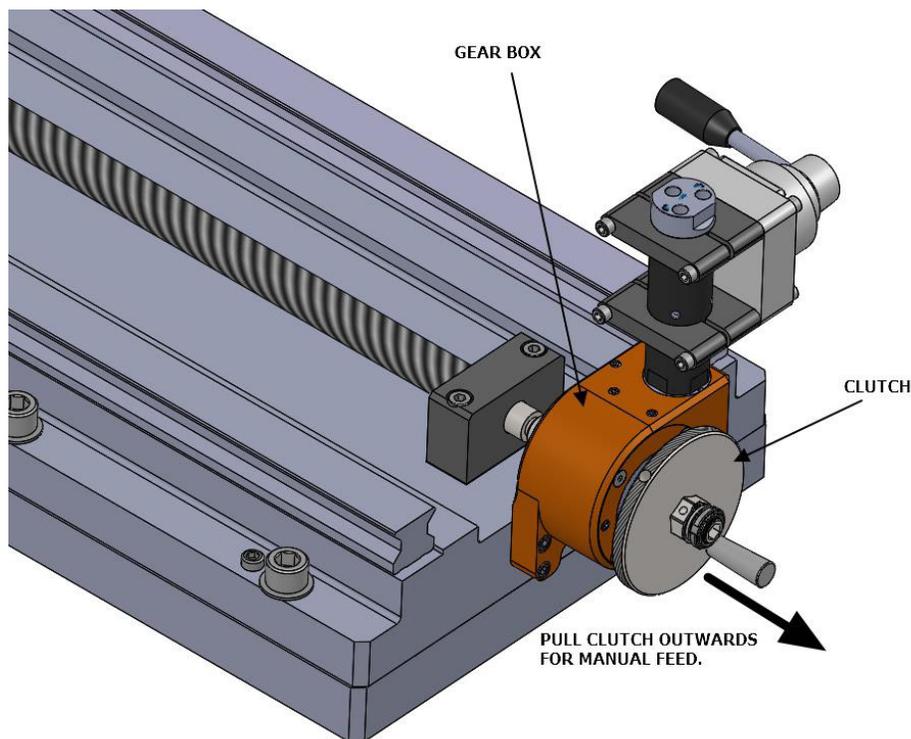


FIGURE 6

7. To feed the Y-Axis or Z-Axis, loosen RAIL-CLAMPS and turn HAND-WHEEL.



NOTE: Z-AXIS will drop when loosening RAIL-CLAMPS

8. To power feed the X-Axis, ensure CLUTCH is engaged by snapping it inwards towards the GEAR-BOX.
9. Lock out all the RAIL-CLAMPS in non-feeding axes when cutting material.



Vibrations from cuts which are too deep or too fast can cause the RAIL-CLAMPS to slip.

TIPS FOR BEST RESULTS

1. Whatever axis is used for auto feed during cutting, lightly snug the brake clamps on that mill bed to help reduce vibration during the cutting process.
2. Make sure to touch off and start the machining process on the high point.
3. Take a series of small depth of cuts until and the material is cleaned up.
4. Slower feed on cuts will produce less vibrations and a better surface finish.
5. Conventional milling will produce less vibrations and a better surface finish.
6. Narrower cuts will produce better flatness by minimizing misalignment of cutter tool
7. It is recommended that with the pneumatic gantry mill, a max depth of cut of 0.020" or less will achieve the best results.
8. Positioning the Linear Mill as close as possible to the material to be cut will produce better surface finish.
9. Hand-wheels can be placed on either end of the X and Y-axis feeds.
10. Clear chips while machining (Do Not use your hands to clear chips)

MAINTENANCE & TROUBLESHOOTING

MAINTENANCE

Ensure during setup and operation that the X-BASE (Figure 1) is in an unstressed state. Failure to do so may result in damage to the machine components and undesired results to the work.

Timing belts will stretch over time and should be checked occasionally to ensure proper tension is maintained.

Ensure all machined surfaces are cleaned and lightly lubricated as assembled. Wipe off excess oil as oil will attract dirt and debris.



DO NOT weld directly to any part of the machine other than the WELD-PLATE (Figure 1).

While welding, cover exposed parts of the machine to prevent damage from weld splatter.



DO NOT use air to clear debris as debris may be forced into running components resulting in damage.

When not in use, machine should be stored in its crate and kept in a clean and dry environment.

TROUBLESHOOTING

SPINDLE NOT ROTATING

- Check pneumatic hose connections.
- Check air source

X-AXIS NOT FEEDING

- Check clutch is engaged
- Check shear pin hasn't sheared
- Check pneumatic hose connection
- Check air source

MACHINE DOESN'T HOLD POSITION

- Tighten RAIL-CLAMPS
- Reduce cut depth, cut width or feed speed to reduce vibrations

MACHINE AXIS HARD TO MOVE

- Disengage RAIL-CLAMPS

WARRANTY

Superior Plant Rentals, LLC (SPR) warrants that the equipment manufactured by it will: (i) conform to SPR's written specifications and descriptions, and (ii) be free from substantial defects in design, materials, and workmanship for a period of one year from date of shipment to the original buyer, or six months from date of placing in service by buyer, whichever date is earlier.

During this period, if any equipment is proved to SPR's satisfaction to be defective, SPR will, at our sole and absolute discretion, and as SPR's sole warranty liability and buyer's sole remedy, repair, replace, or credit buyer's account for any equipment that fails to conform to the warranties, provided that: (i) SPR is notified in writing within 10 days following discovery of such failure with a detailed explanation of any alleged deficiencies; (ii) SPR is given a reasonable opportunity to investigate all claims; and (iii) SPR's examination of such equipment confirms the alleged deficiencies and that the deficiencies were not caused by accident, misuse, neglect, improper use, unauthorized alteration, repair, or improper testing.

Shipping cost of the alleged defective equipment to SPR is to buyer's account. However, if SPR agrees that the equipment is defective, then pursuant to this warranty, SPR will reimburse buyer its shipping cost to return the equipment to SPR.

The warranty against defects does not apply to: (1) consumable components or ordinary wear items, and (2) use of the equipment with equipment, components, or parts not specified or supplied by SPR or contemplated under the equipment documentation.

The following actions will void the one-year warranty:

1. Repairs or attempted repairs have been made by persons other than SPR personnel, or authorized service repair personnel;
2. Repairs are required because of normal wear;
3. The tool has been abused or involved in an accident;
4. There is evidence of misuse such as overloading of the tool beyond its rated capacity, use after partial failure, or use with improper accessories.
5. Damage to the motor due to lack of oiler/mister while tool was in use (pending motor type).

NO OTHER WARRANTY IS VALID



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