Riten®

Hydraulic Face Driver User Guide

Introduction

With a Riten Face Driver, the entire work piece is exposed for machining. Since a face driver locates on the end face of the shaft, it is possible to machine the entire length of the work piece in one operation. In comparison, traditional machining requires multiple operations as the part is reversed to turn both ends. Accuracy and productivity suffer as the part is repeatedly chucked. By eliminating operations and setups the use of a face driver reduces costs, increases productivity and produces a part with a higher degree of accuracy.

The **hydraulic design** performs best in roughing applications where part accuracy is not as critical. It compensates for a higher degree of inaccuracy in the part face in comparison to the mechanical design. Although hydraulic face drivers require some minor disassembly, changing out a set of drive pins and a center point can be accomplished in five to ten minutes. Depending on the mounting, concentricity ranges from .0015 - .0025 inches TIR.

Face Driving Guidelines

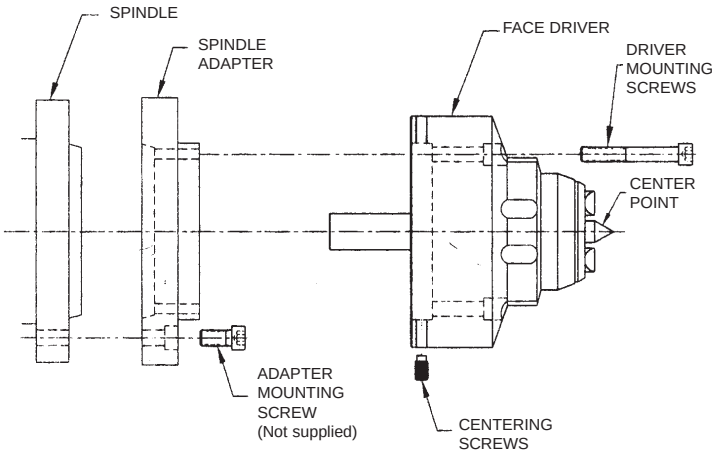
Following are some helpful pointers in the use of your Riten Face Driver:

1. When setting up for the first time, always use a new insert.
2. Make sure the rough diameter of the workpiece is not more than 3 times the driving diameter.
3. The end face of the workpiece should be square within .005. This is particularly important when using Face Drivers with only 3 drive pins.
4. Know the hardness of the workpiece material. For effective face driving, the hardness should typically be Rockwell C36 or less. Above this level, tailstock force must be increased and the cutting section area reduced because of the increased torque required. The practical upper limit with standrd drive pins is about Rockwell C42.
5. Make sure the workpiece center hole is within the diameter range of the selected center point.
6. **When installing the face driver, indicate in the center point as close to zero as possible to reduce runout.**
7. **IMPORTANT!** Before use, make absolutely sure the drive pins are oriented properly with respect to driver rotation (clockwise or counter-clockwise). Incorrect orientation will result in immediate damage to the face driver.
8. The first cut should always be toward the driver. This will help to firmly embed the drive pins into the workpiece.
9. On the initial clamping and before the operation, remove the workpiece and inspect the drive pin indentations for uniformity. Penetration depth should range from approximately 0.003” - 0.005”. Adjust tail stock pressures accordingly. Pin penetration after machining should range from 0.010” - 0.020”. Visually inspect the first piece and adjust tail stock pressures accordingly.
10. Periodically check the indentations during subsequent operations. If the penetration line begins to have a raised edge on one side, or there is other evidence that the pin is slipping, the drive pins should be changed immediately.
11. If a live center is needed, consult the current Riten catalog and refer to the CNC Heavy Duty Live Center page, or to the CNC Sprint page if high tailstock forces are required.

Mounting of Face Drivers

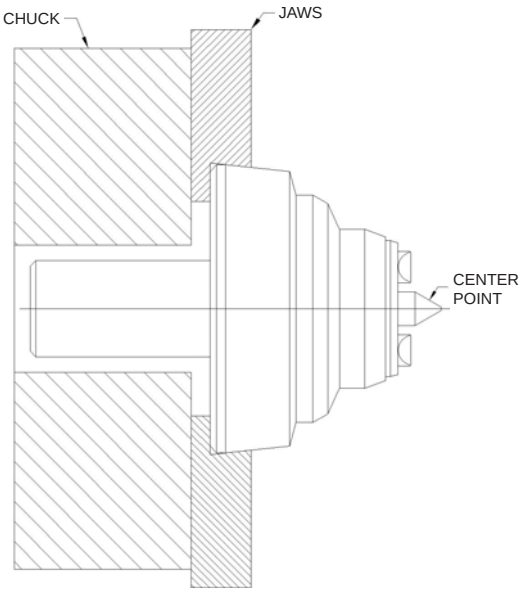
Flange Mount (Spindle Adapter required)

1. Before mounting, indicate on machine spindle to verify accuracy of machine bearings and spindle.
2. Mount spindle adapter onto spindle with adapter mounting screws. Indicate on spindle adapter face where the face driver will be mounted. Make adjustments if necessary to achieve approximately .0002" (.005mm) or less. This number may vary depending on machine characteristics.
3. Mount the face driver to the spindle adapter with the driver mounting screws. Snug the screws, but do not tighten yet. Indicate on the center point nose angle (usually a 60° nose angle). If necessary, make adjustment with the centering screws to achieve approximately .0003" (.008mm) or less. This number may vary depending on machine characteristics.
4. Tighten the driver mounting screws and assemble center point.



Chuck Mount

1. Machine the soft jaws to accept the face driver. Bore the jaws with a 6° (12° included) back taper to match the face driver. Provide a positive stop when boring the jaws to prevent movement when tailstock axial forces are applied.
2. Chuck on the major diameter of the face driver.
3. A Morse Taper mount can be jaw chucked by inserting the driver in a straight shank adapter sleeve and chucking on the sleeve.



Whichever mounting method is used, the intent is to indicate the driver as close to zero as possible. Indicate on the center point angle, and make adjustments as needed to achieve .0003" or less. Inaccuracies in the mounting will be reflected in the part.

Calculation of Tailstock Forces

Proper tailstock force is vital for satisfactory face driving. The force can be calculated using the following 7 steps:

1. To determine the ratio of the workpiece diameter to the face driver driving diameter, divide the rough workpiece diameter by the driving diameter.
2. To determine the chip cross section multiply the depth of cut (inches) by the feed per revolution (inches).
3. Using the results from steps 1 and 2, find the appropriate tailstock force in Table 1. These values are a starting point and can be adjusted to meet specific variables in the machining operation.
4. The table assumes that the direction of feed is toward the face driver. If the feed direction is away from the driver, the tailstock pressure must be increased by 100%. For plunge cutting, the tailstock pressure must be increased by 50%. If only one operation is to be performed at a time, then the operation with the highest axial force should be chosen for the calculation.
5. To adjust for the type of workpiece material, multiply the force obtained in step 4 by the material factor in Table 2.

(Continued on next page)

Table 1.
BASIC TAILSTOCK FORCE (LBS.)

Chip Cross Section	Ratio of Rough Workpiece Diameter to Driving Diameter								
	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
0.0002	450	450	562	674	787	900	1012	1124	1236
0.0003	450	505	618	731	843	955	1124	1236	1405
0.0005	450	562	674	787	900	1012	1236	1349	1574
0.0006	506	618	730	843	955	1124	1348	1517	1742
0.0008	562	674	787	900	1012	1236	1461	1686	1910
0.0009	618	730	843	955	1124	1348	1574	1798	2023
0.0011	674	787	900	1012	1236	1461	1686	1910	2136
0.0012	730	843	955	1124	1348	1574	1798	2023	2248
0.0014	787	900	1012	1236	1462	1686	1910	2135	2360
0.0016	843	955	1124	1348	1574	1798	2023	2248	2472
0.0019	900	1012	1348	1574	1798	2023	2248	2472	2698
0.0023	955	1124	1574	1798	2023	2248	2472	2698	2922
0.0031	1012	1348	1798	2023	2248	2472	2698	3034	3372
0.0039	1124	1573	2023	2248	2472	2698	3147	3484	3822
0.0047	1348	1798	2248	2472	2698	3147	3597	3934	4271
0.0054	1574	2023	2472	2698	3147	3597	4046	4496	4946
0.0062	1798	2248	2698	3147	3597	4046	4496	4946	5395
0.0078	2248	2698	3147	3597	4046	4720	5170	5732	6294
0.0093	2698	3034	3597	4046	4496	5170	5844	6519	7081
0.0109	2922	3372	3934	4496	4946	5620	6294	6968	7643
0.0124	3147	3709	4271	4946	5395	6070	6744	7418	8092
0.0140	3372	4046	4608	5282	5844	6519	7194	7868	8542
0.0155	3597	4271	4946	5620	6294	6968	7643	8318	8992

Table 2.
WORKPIECE MATERIAL FACTOR

Material Hardness (HB)	350	290	230	170	110	90	Aluminum, Bronze, Brass, etc.
Material Tensile Strength (psi)	174,000	145,000	116,000	87,000	58,000	43,000	
Material Factor	**1.2**	**1.2**	**1.1**	**1**	**1**	**1**	**0.7**

Calculation of Tailstock Forces (cont.)

6. Compare final force result with the drive pin selected in Table 3 below. The result should be between the minimum and maximum required force specified for the chosen drive pin. If the final force result is below the minimum required force, choose a drive pin with a shorter edge length or increase the tailstock force. If the result is above the maximum force, choose drive pins with longer edge length or, if possible, chose a larger face driver. The driving diameter chosen should generally be as large as possible in relation to the finished workpiece diameter.

Table 3.
DRIVE PIN TABLE

Series	Part No.	No. of Pins	Pin Edge Length	Min. Required Force (lbs.)	Max. Required Force (lbs.)
	P6201	5	0.118	842	1178
	P6202	5	0.118	842	1178
62	P6203	5	0.252	1798	2517
	P6204	5	0.252	1798	2517
	P6205	5	0.200	1427	1998
	P6206	5	0.492	3510	4915
	P6401	5	0.179	1277	1788
	P6402	5	0.179	1277	1788
63	P6403	5	0.326	2326	3256
	P6404	5	0.326	2326	3256
	P6405	5	0.262	1869	2617
	P6406	5	0.649	4630	6483
	P6401	6	0.179	1532	2145
	P6402	6	0.179	1532	2145
64	P6403	6	0.326	2791	3908
	P6404	6	0.326	2791	3908
	P6405	6	0.262	2243	3140
	P6406	6	0.649	5556	7780
	P6801	8	0.224	2557	3580
	P6802	8	0.224	2557	3580
66	P6803	8	0.381	4349	6089
	P6804	8	0.381	4349	6089
	P6805	8	0.313	3573	5003
	P6806	8	0.767	8756	12260
	P6801	10	0.224	3196	4475
	P6802	10	0.224	3196	4475
68	P6803	10	0.381	5436	7612
	P6804	10	0.381	5436	7612
	P6805	10	0.313	4466	6253
	P6806	10	0.767	10945	15324

7. It is important to monitor drive pin penetration. In the initial clamping stage, penetration is approximately .008 deep, and after the operation it may be up to .030 deep. After the initial clamping but before the operation, remove the workpiece and inspect the indentations for uniformity.

Care and Maintenance

Periodic maintenance may be required to insure that your Riten mechanical face driver functions as designed. The drive pins and center point are the primary wear parts. Changes in drive pin penetration are an indication that the drive pins may need to be replaced.

Center point wear is easily identified by scoring or galling on the contact angle. Once this occurs the center point should be replaced.

Detailed instructions on diagnosing wear problems and replacing pins, center points, and other components can be found on www.riten.com.

If you have any questions or need technical assistance, call Riten at 1-800-338-0027 and ask to speak to a face driver technical specialist.

Solutions, not excuses

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