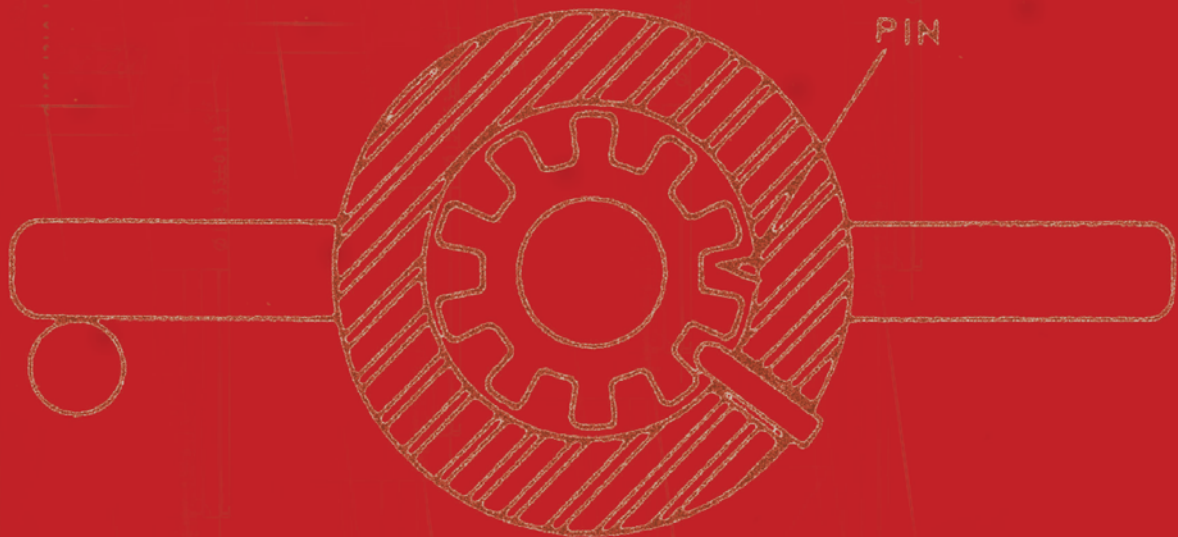




# SUNNEN<sup>®</sup> HONING TECHNIQUES

DATA FILE: #107

MAKING MANUAL HONING EASIER  
WITH WORKHOLDERS



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## USING WORKHOLDERS WITH MANUALLY-STROKED HONING MACHINES

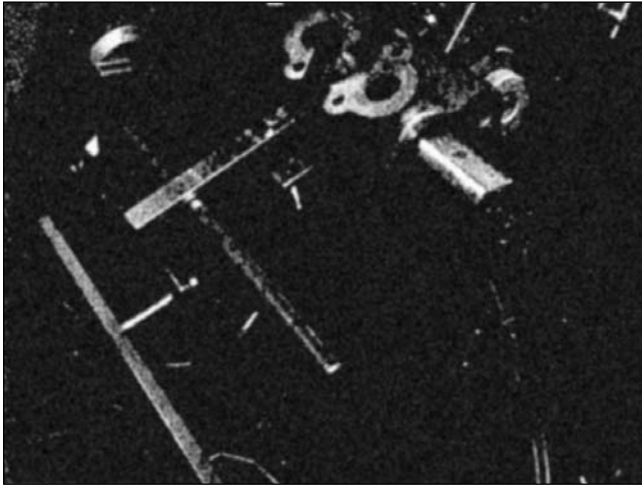


Figure 1, Hydraulic Valve Body

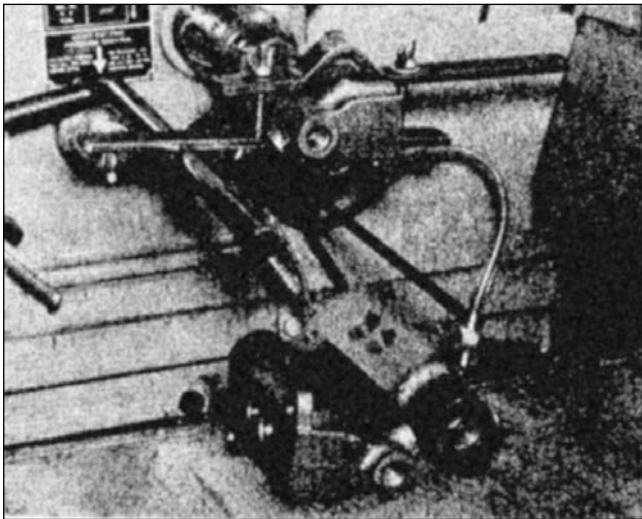


Figure 2, Clamp Holder

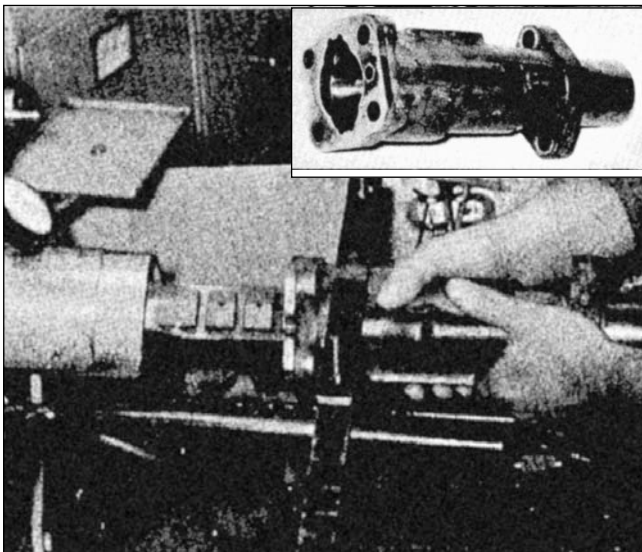


Figure 3, Stroking

In almost every case, a workholding fixture makes manual honing much easier and allows the operator to get the work out faster.

While the operator must still provide the "push" or thrust required to stroke the piece back and forth over the mandrel, a properly designed workholding fixture relieve him of holding the piece against honing torque. This eliminates a big part of the effort required in manual honing.

Let's take a look at a variety of samples honing jobs and how they are held best for efficient, precision honing on a manually stroked honing machine.

Parts with irregular surfaces often have a projection that can "ride" on the work support. No work dog or clamp is needed. Where the parts have no external projections to overhang a work support, then a simple clamp dog of some kind is usually sufficient (see Figures 1, 2, & 3).

**FIGURE 1:** FOR THIS HEAVY HYDRAULIC VALVE BODY A SIMPLE HOLDER IS MOST EFFECTIVE. Shown above is a double handled holder fitting a variety of sizes. The work support at left absorbs all torque as operator strokes the work.

**FIGURE 2:** A "UNIVERSAL" CLAMP HOLDER, VERY EASY TO MAKE. This clamp will hold either round or odd-shaped parts covering a wide size range. Clamp handle slides along the work support which absorbs all torque. Tu-bular shaped parts with thin walls should not be clamped like this - for such work use the Loop-Grip Sunnen Holder shown in Figure 17.

**FIGURE 3:** OPERATOR JUST STROKES THE WORK. The clamp shown in Figure 2 also can be used on this odd shaped part, shown in inset.

Thinwall, tubular shaped work that might deform under radical clamping should be clamped endwise to prevent distortion or marring of finished outside surfaces (see Figure 4).

**FIGURE 4:** STACKING SMALL PARTS FOR HONING. Inner races of miniature ball bearings are first lined up by their bores on an expanded mandrel, eleven to a stock, then clamped endwise in a holder. Handle is screwed into holder to absorb torque (not shown). Honing time per part is reduced greatly. Cross section of holder with parts in position for honing.

Odd-shaped parts such as bevel gears with spherical ends call for a special but very simple holder (see Figure 5).

**FIGURE 5:** USE OF A HOLDER IN HONING AN ODD-SHAPED PART. Part was not suitable for stacking, but was hard to hold free hand. This holder was devised to absorb torque and make holding easy. Part is not clamped in the holder but is held in place by light thumb pressure.

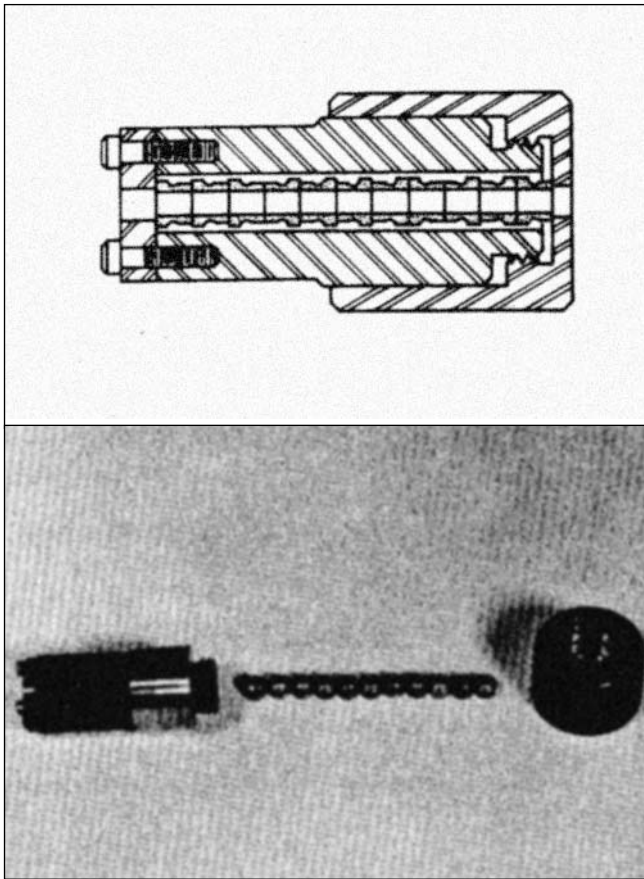


Figure 4, Small Parts

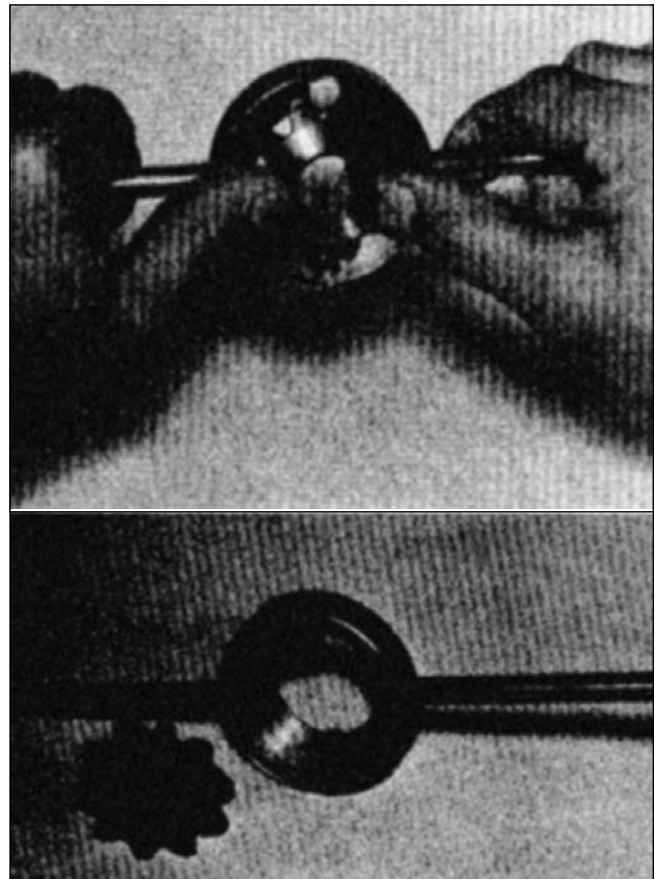


Figure 5, Odd Shaped Parts

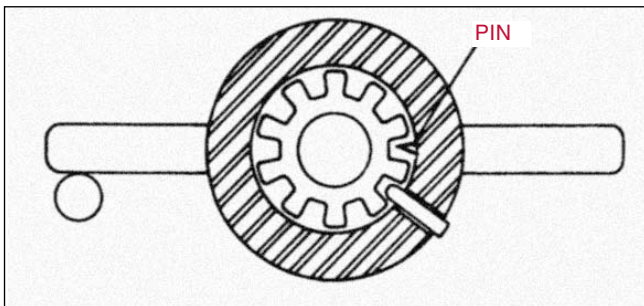


Figure 6, Holding Fixture

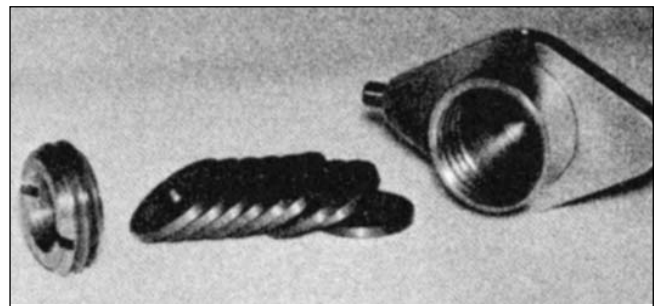


Figure 7, Holder Diameter

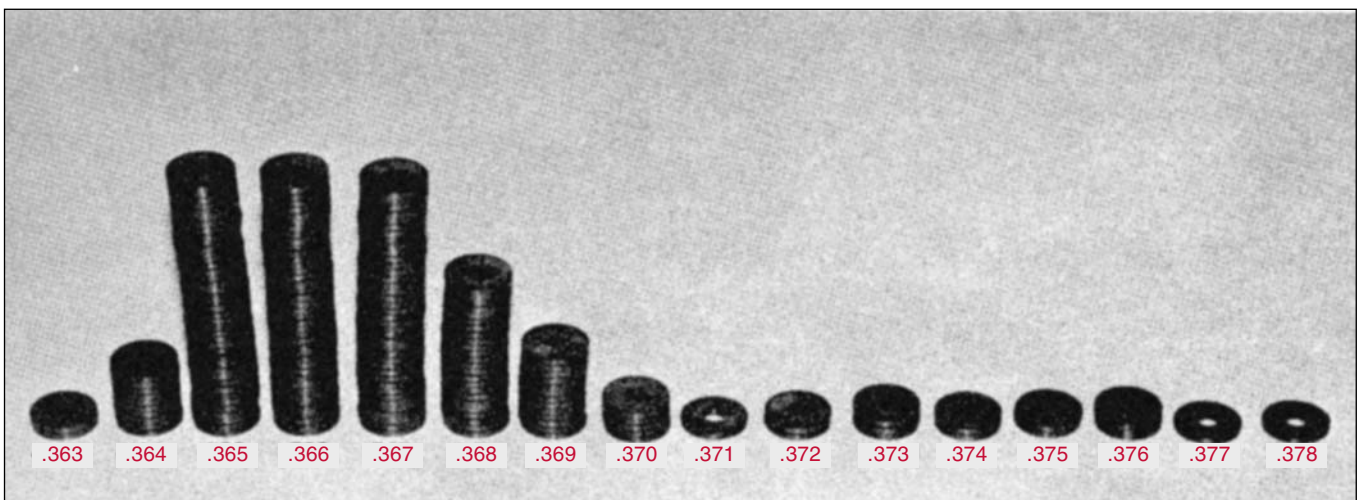
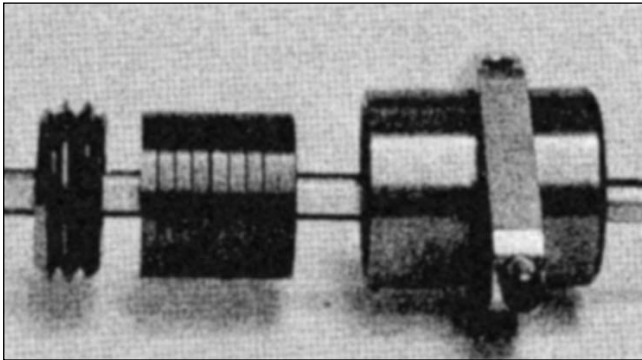


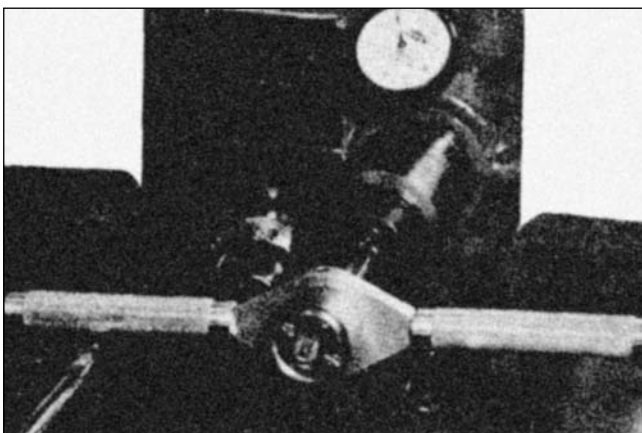
Figure 8, Inside Diameter of Parts



**Figure 9, Center Short Parts**



**Figure 10, Align Bores**



**Figure 11, Double Handle**

Some parts have such short lengths that they must be lined up and clamped in a stack for axial stability and honed as one long bore. (This also increases production greatly.) (See Figures 6, 7, 8, 9, 10, & 11.)

**FIGURE 6:** Cross-section of holding fixture in which short parts are stacked for honing. Note Pin that keeps parts from turning.

**FIGURE 7:** INSIDE DIAMETER OF HOLDER MUST BE LARGER THAN THE OUTSIDE DIAMETER OF PARTS. Lining up a stock of parts should be by I.D.'s when concentricity with O.D.'s cannot be depended upon. There must be sufficient clearance inside the holder to permit lining up by I.D.'s. This holder used double handles for stroking as shown in Figure 12.

**FIGURE 8:** PARTS WITH VARYING INSIDE DIAMETERS CAN BE SORTED BEFORE STACKING. This group of 189 washer shaped sintered carbide parts has been sorted by inside diameters before honing. They are stacked in-groups of 9 parts each, and clamped in a holder for honing. This permits centering of the rough bores within close limits and prevents misalignment in the holder. Starting from the left, stocks of 9 parts would come from groups .363-.365", .365-.366", .367", .368-.370", .370-.373", and .374-.378". They were all honed to .385" final finished bore size.

**FIGURE 9:** ONE METHOD OF CENTERING A STACK OF SHORT PARTS. If there is considerable stock to be removed by honing and no close concentricity to be maintained, the bores can be centered roughly on a solid plug. A better method is to use an expanding mandrel for lining up the bores (see Figure 10).

**FIGURE 10:** USE THE HONING TOOL FOR PRECISE BORE ALIGNMENT. The honing tool can be used as an expanding mandrel. Slip the holding cup on first, then the stock of parts, followed by the jam nut. Expand the stone, slip cup over the stock, screw -in the jam nut and tighten sufficiently to keep parts from slip-ping. Remove complete assembly from honing tool and tighten securely before honing.

**FIGURE 11:** WHEN STACKED WORK HAS SUFFICIENT LENGTH, A DOUBLE HANDLE CAN BE USED. The operator can use both hands for stroking when the ratio of bore length to diameter is great enough to provide stability and resist "cocking" from uneven thrust



**Figure 12, Honing Fixture**

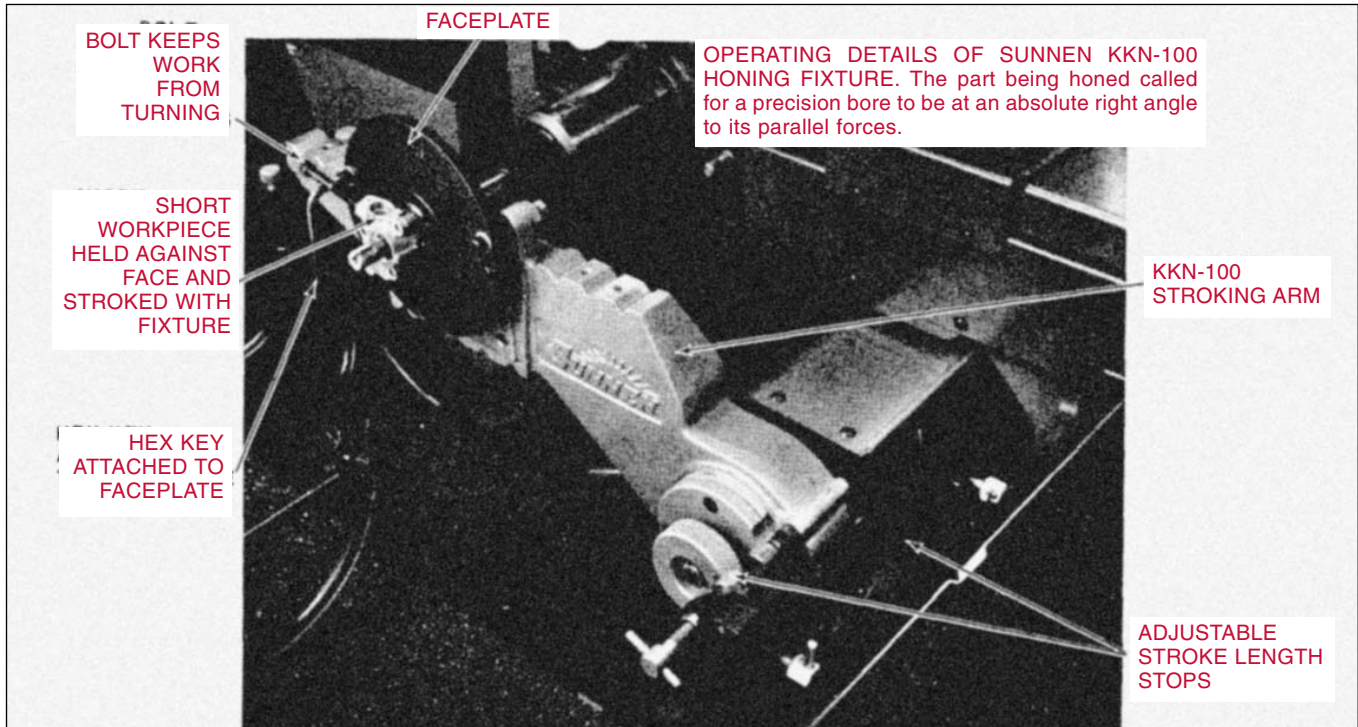


Figure 13, Honing Fixture

forces in stroking. Turn the holder upside down to reverse the work. Note that this handle assembly pivots top and bottom on the cup, acting like a universal joint - it allows the work bore to be self-aligning on the honing tool.

There are extremely short bores that, although they may have parallel end surfaces and could be stacked, have tolerance specifications so close that they are best honed one part at a time while being held and stroked with a right angle face plate such as the Sunnen KKN-75 or KKN-100 Honing Fixtures (see Figures 12, 13, and 14).

**FIGURE 12:** SUNNEN KKN-100 HONING FIXTURE USED FOR HONING EXTREMELY SHORT HOLES. Some purchasers of gears call for such close tolerances on size and roundness that they are hone-finished one at a time. Honing in multiple stacks to form one long bore is not practical because the "set" in the teeth prevents end clamping without distortion.

**FIGURE 13:** OPERATING DETAILS OF SUNNEN KKN-100 HONING FIXTURE. The part being honed called for a precision bore to be at an absolute right angle to its parallel faces.

**FIGURE 14:** KKN-100 HONING FIXTURE IS USED FOR HONING VANE PUMP CYLINDERS. Five cylinders with different diameters and lengths, but all with the same requirements - sides must be parallel, bores must have fine surface finish and must be straight and at absolute right angle to end surfaces. The cylinder at lower left is the one shown being honed in Figure 13.

While the majority of parts that call for a holder can be held in very simple "universal" type holders, there are times when it pays to make up a special fixture having quick-loading and unloading features to save time on a production run job (see Figures 15 and 16).

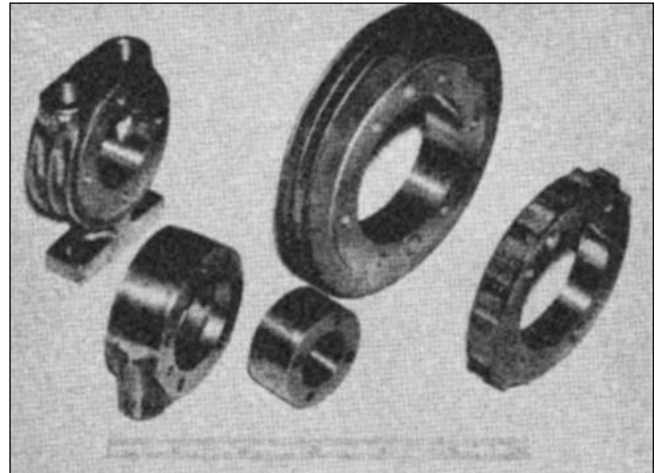


Figure 14, Vane Pump Cylinder

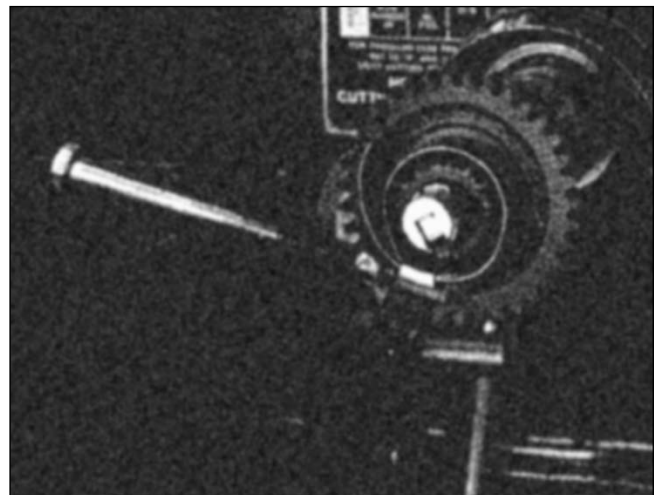
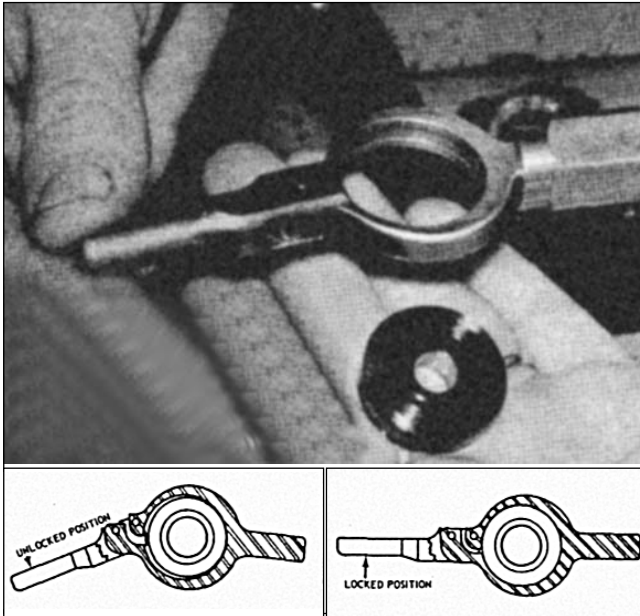


Figure 15, Special Holder

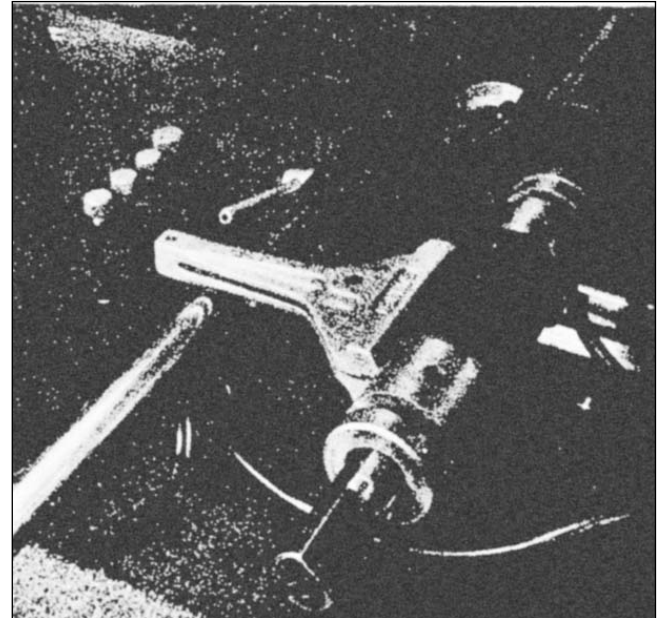


**Figure 16, Holding Fixture**

**FIGURE 15:** SPECIAL HOLDERS FOR PRODUCTION RUNS. Gears, with teeth that would tear up the emery cloth on the Loop-Grip Holder (see Figure 17), being honed in production quantities calling for fast loading and unloading. Twisting the handle of this hose clamp fixture quickly clamps or releases the part. The handle slides along work support during stroking, and absorbs honing torque.

**FIGURE 16:** SELF-LOCKING HOLDING FIXTURE FOR SHORT LENGTH CAM ROLLER. This fast-operating self-locking fixture paid off in increased production on a hardened steel roller. Note that for rapid locking and unlocking, the right end of the fixture is inserted in a stationary holder for leverage.

The Sunnen Loop-Grip Holder is a most versatile and useful workholder, made in three widths, and often saves the trouble of making a special holder for a short run job (see Figure 17).



**Figure 17, Loop-Grip Holding Fixture**

**FIGURE 17:** SUNNEN LOOP-GRIP HOLDERS SERVE A VARIETY OF SIZES AND SHAPES. Sunnen Loop-Grip Holders can be used on a great variety of shapes and sizes. Honing torque locks the workpiece in the holder loop. The direction of honing tool rotation is counterclockwise - as the work attempts to rotate with the tool, leverage locks the loop tightly on the work, preventing it from turning. The operator does not grasp the handle, but holds and strokes the work itself. The handle takes the honing torque as it slides along the bar.

Work done on a manually stroked honing machine does not call for elaborate fixtures. Any shop can easily design and make simple holders similar to the above suggestions for their own parts.

## data files

- 101 - Honing Bores With Keyways And Splines
- 102 - Honing Short Bores
- 103 - Honing Blind Holes
- 104 - Obtaining Specified Finishes By Honing
- 105 - Choosing the Right Stone
- 106 - Honing Tandem Holes
- 107 - Making Manual Honing Easier With Workholders
- 108 - Fixturing Parts For Power Stroking
- 109 - Vertical Hone Fixture
- 110 - Honing Small Bores
- 111 -
- 112 - External Honing
- 113 - Fixturing Design Considerations For Automatic Crossgrinding® Machines

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