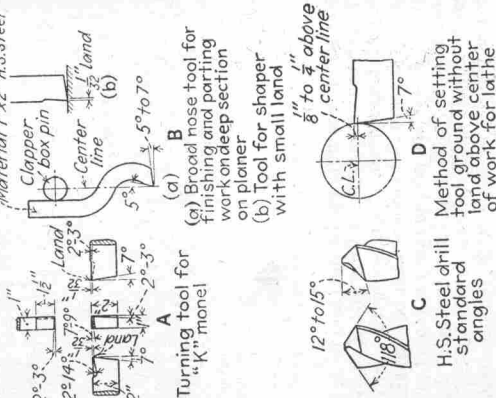


In tapping, use a drill of slightly larger diameter than standard National standard, four-fluted high-speed steel, plug taps, with ground threads and 7-degree helical flutes or four-fluted helical pointed plug taps are best for machine tapping. The plug taps have a four- or five-thread chamfer, more is better. The flutes give a 15-degree lip, and the tap should be "backed off." On 1 1/4 inch and larger sizes, the skip-thread tap gives excellent results. Regular monel and nickel may be tapped at a speed of 20 to 25 feet per minute; K monel that has not been heat-treated and Inconel at 12 to 15 feet per minute; R monel at 25 to 35 feet per minute in automatic machines.

Lathe and Planer Work

The only instruction is that the cutting edge of the tool be set above the center of the work. But, when turning K monel or

Material 1 1/2 x 2" H.S. steel



DRILL ANGLES LATHE TOOL SET-UP
FIG. 15.—Tools for High-Nickel Alloys

Inconel with tools ground with a land, the cutting edge of the tool must be set on center. The cuts, feeds, and speeds given for lathe turning in Table 8 are merely guides. They are based on wet cutting and should be reduced 20 to 35 per cent for dry cutting. These speeds must be reduced for boring operations. The setup for planing or shaping is no different than for mild steel. Roughing is usually done dry, but a cutting oil for finishing cuts and for parting gives a better surface.

Correct designs of planer and shaper tools are shown in Fig. 14 at H, I and J, and in Fig. 15 at B. Table 11 lists some feeds, speeds, and speeds used on production jobs and will serve as a guide setting up for planing.

To facilitate the removal, the cutter should be ground with a 15-degree back rake from the cutting edge. Coarse-tooth cutters are preferred. Plain or barrel milling cutters should be of heavy-duty helical-fluted type. Alternating tooth or interlocking side millers are best for deep holes or for slitting. If only light-tooth milling cutters are available, the sides of the teeth should be cut on a slight taper, widest at the cutting edge. For grow slotting, high-speed-steel slitting saws with alternate teeth numbered are most satisfactory. This type of circular saw, which is used for cutting copper, is ground concave on the side for clearance. For general practice, in milling monel metal and nickel, use an average cutting speed of 50 to 65 feet per minute, with a feed of .005 to .010 inch per tooth, depending on the depth of cut. With Inconel and K monel that has not been heat-treated, the surface speed of the cutter must be reduced to around 40 feet per minute with a feed of from .003 to .006 inch per tooth.

TABLE 10.—RECOMMENDED CUTS, FEEDS, AND SPEEDS FOR LATHE TURNING

Material	Feed, in. per rev.	Speed, ft. per min.	Feed, in. per rev.	Speed, ft. per min.
Monel	.005	170, 140	.005	170, 140
K monel (unhardened)	.005	135, 90	.005	135, 90
Inconel	.003	75, 65, 50	.003	75, 65, 50

Lathe speeds in feet per minute.

TABLE 11.—FEEDS AND SPEEDS FOR PLANING (HEAVY WORK)

Material	Roughing Tool, Fig. 7	Finishing Tool, Fig. 8	Parting Tool, Fig. 6
Monel	.005	.005	.005
K monel	.005	.005	.005
Inconel	.003	.003	.003

Planing speeds in feet per minute.

Monel metal shrinks 1/4 inch to the foot in castings; should be preheated at 2800°F. Cores should be made of washed silica sand and covered with oil, about 25:1 for large cores and 60:1 for small cores. For heavily scaled monel, soak in 10 per cent (by weight) hydrochloric acid for 30 minutes at 180°F., then dip in a