Machining
Soft Blank Top Jaws

Standard hard top jaws can be used for most normal work. Soft jaws may be used for second operation work, for previously machined surfaces to prevent part marring and for improved concentricity. Soft jaws are generally machined to size, in position on chuck or formed into the desired shape for holding difficult shaped workpieces.

Soft jaws generally conform to existing industry standards or accepted standards to fit master jaws that may have fine, metric, acme or square serrations or have tongue and groove type cross tenon mount.

Steel used in making soft jaws is mostly mild, low carbon content capable of being case hardened through specific heat treating steps. Due to clamping force factors (heavy jaws reduce clamping force and rpm's) reducing weight thru use of lighter materials such as aluminum may be considered. All jaws should be designed and formed keeping in mind the potential grip force loss due to centrifugal forces.

The initial fitting of the top jaws to the chuck prior to machining is important if repeat accuracy is to be achieved. For all types except on chucks with fine serrated base jaws, the jaws should be loaded radially outward to take up any fitting clearance prior to tightening the jaw screws. This applies to top jaws which are intended to hold a workpiece externally. In the case of internal gripping the jaws should load inwards.

Operate the chuck several times gripping a suitable size piece of material to load the top jaws back and then lock the base jaws in their approximate mid-stroke position. On chucks which accept collet pads a suitable sized ring may be placed in the collet seating diameter of the chuck's base jaws. If extreme accuracy is not required the jaws may then be turned directly to the size required to suit the gripped workpiece diameter. On long grip faces a back taper should be allowed to ensure that the jaws initially contact the workpiece at their outer end. A back taper of .003"t per inch on jaw height will be found adequate in most cases.

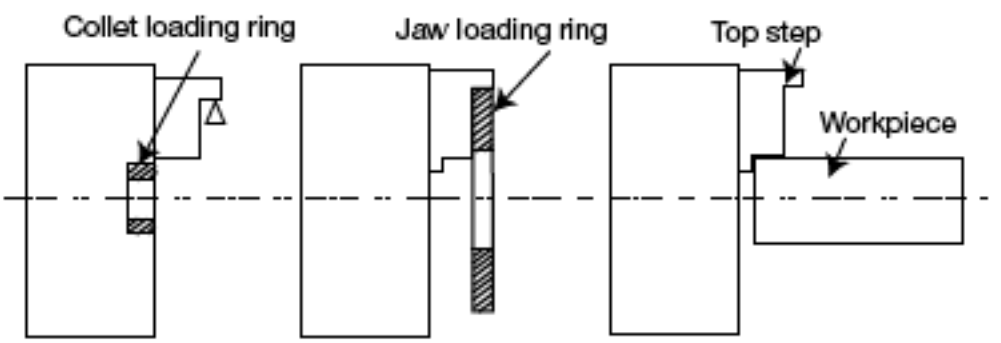
Where very accurate concentricity is required top jaws should be machined as described previously but to accept a suitable loading ring rather than the workpiece itself. The ring should be thin axially but of sufficient radial thickness to withstand the gripping force. A diameter is machined to receive the ring at the outer end of the jaws with the chuck in its mid stroke condition, master jaws are flush with the chuck body. The ring previously fitted to the base jaw collet seating diameter is removed after first opening the chuck. The jaws are then closed to grip the loading ring in the top jaws. This effectively pre-loads the top jaws in a similar manner to the loading which occurs when the workpiece is gripped.

The top jaws are then machined to hold the workpiece. Since the top jaws are fully loaded during machining it is generally unnecessary to include any back taper on the gripping face as this occurs automatically. The jaws are then opened and the loading ring removed. If the top step of the jaw used for holding the loading ring interferes with the workpiece then it may be machined away. Otherwise it should be left on to allow the jaws to be reskimmed at a later date with the loading ring in position. The procedure for carrying out this operation is shown in figure 3.

To obtain good concentricity it is important that the top jaws are loaded in an identical manner when holding the ring as when gripping the workpiece. Thus the same chuck operating pressure should be used and the ring should be held either externally or internally to suit the particular case.

If care is taken in machining top jaws, concentricity between a turned diameter and the gripped diameter of .001" TIR can be achieved. As an aid to improving concentricity it is better when loading the workpiece if the chuck is positioned with a single rather than two jaws at the bottom. Simultaneous location on two jaws can cause a trapping effect on large diameter workpieces as the workpiece is lifted to contact the third jaw. This may be detrimental if very accurate concentricity is demanded.

Figure 3 - Machining Soft Jaws



a) Machine step for jaw loading ring with collet loading ring in position and jaws at midstroke.

b) Insert jaw loading ring and machine step for workpiece

c) Insert workpiece. Top step may be machined away if desired