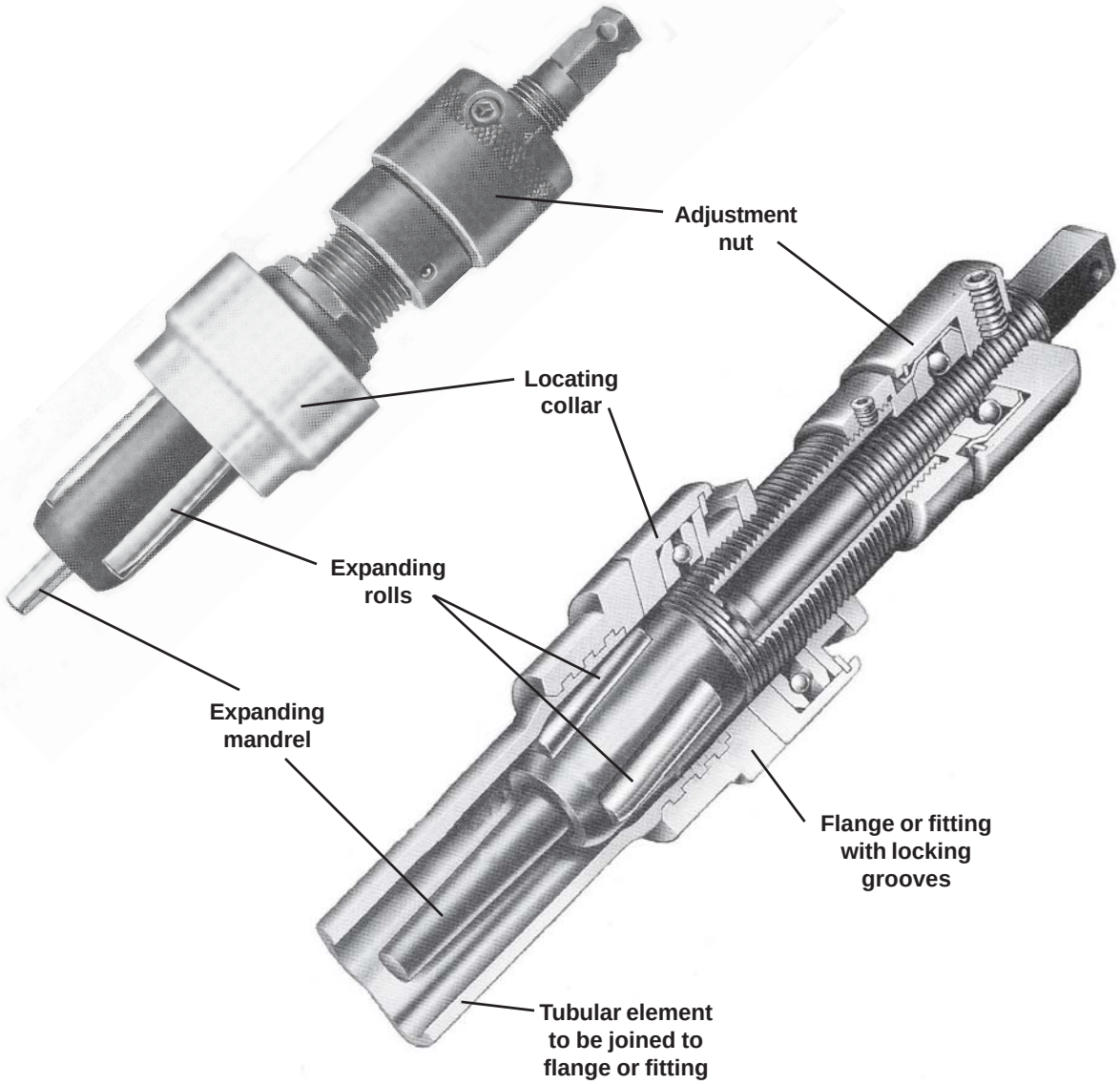
# Mechanical Joining Tools

**An approved method of joining tubular elements to flanges or fittings. Elliott Mechanical Joining Tools have a wide range of applications in the aerospace, hydraulics and automotive industries.**



# A simple method for joining metal tubes to fittings and flanges

Because the mechanical joint will not leak, vibrate loose or pull off when properly installed, engineers who design hydraulic or pneumatic systems consider it superior to welded or brazed joints.

Practically every tubing material, except plastic, can be mechanically joined, providing the tube is annealed or is ductile. Copper, cupro-nickel, carbon steel, stainless steel, admiralty brass, titanium, Inconel and other high-strength materials have been successfully joined to fittings by this cold rolling process.

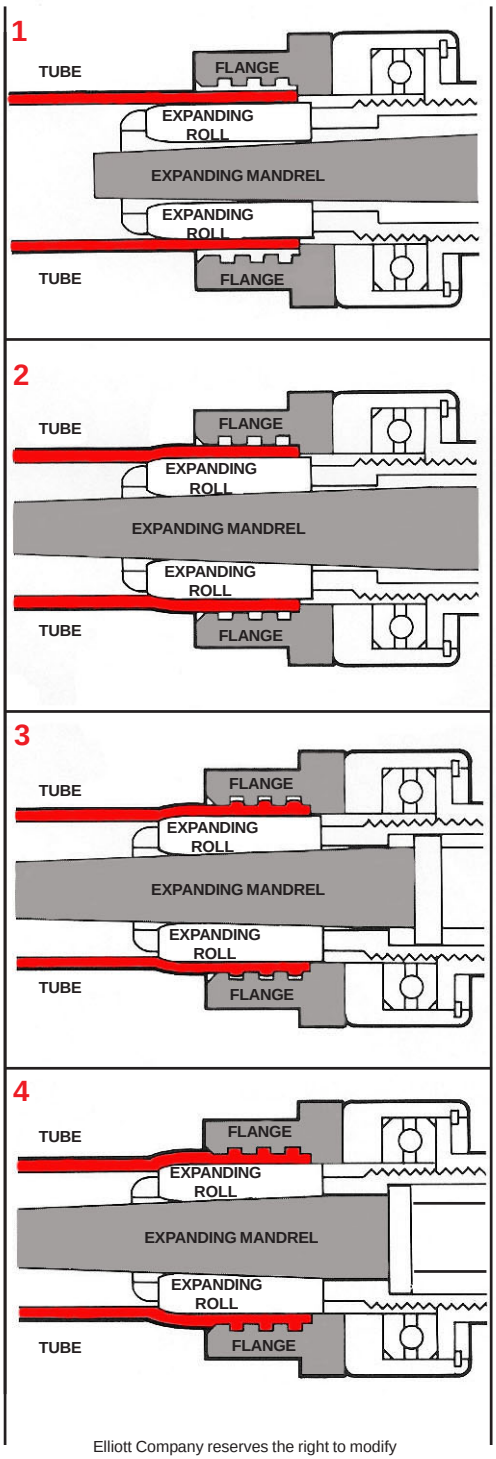
The tool itself is a tube expander consisting of a cage, rolls and mandrel and is driven by hand with a suitable wrench, air or electric drills, drill units or standard shop machines. The tool components are modified to meet the needs of the job.

Factors affecting design are the size, thickness, hardness and configuration of the tube and flange or fitting.

After the tool is inserted in the tube, the rotating rolls force the tube wall into the machined grooves or serrations of the fitting. Because the tube is thus "locked" into the fitting, it cannot move as a result of temperature changes, internal pressures or vibration.

The amount of compression required for an optimum joint varies with the tube material.

Tubes with 0.015" to.500" (0.38 to 13mm) wall-thickness and .500" to 12.000" (13 to 305mm) diameter have been cold rolled successfully with Elliott Mechanical Joining Tools.




**1** 0% EXPANSION. Tube is inserted into flange and mechanical joining tool is then inserted into tube. A generous radius should be provided at back side of flange. At the opposite end, there should be a shoulder against which the tube can butt. Grooves may vary in width and spacing, but they should always have sharp corners at the top edge and the bottom of the groove. Width of the grooves can be 1/16" to 3/8" (1.6 to 9.5mm); depth can be from .005" to .032" (0.13 to 0.81mm) - both dimensions are dependent on flange width, thickness and hardness of tube.

**2** 25% EXPANSION. When the tube has been rolled to about 25% of total expansion required, it makes metal-to-metal contact with flange.

**3** 50% EXPANSION. Now the tube metal has begun to flow into the grooved serrations of the flange.

**4** 100% EXPANSION. Grooved serrations are now completely filled and tube metal has flowed to the point of least resistance beyond the flange. So effective is this method of joining that, in one test, a .035" (0.89mm) thick stainless steel flange withstood hydrostatic pressures of up to 20,000 pounds (1380 bar). The same joint was subjected to 1,250,000 cycles at various temperatures. Under a straight tensile test, the tube pulled apart - about a foot (0.3m) beyond the end of the flange - while the joint remained in tact.



ELLIOTT TOOL TECHNOLOGIES

**1-800-732-4565**
**(937)253-7706 Fax (937)259-9241**

MONAGHAN & ASSOCIATES, INC.

**1760 Tuttle Avenue**
**Dayton, Ohio 45403-3426**