CHAPTER 6

ASSEMBLY AND FIXTURING

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Components that are to be joined by means of brazing must be assembled and held in fixed relation to each other and maintained in position throughout the brazing cycle. The faying surfaces of the components must be spaced with the proper joint clearance.1

Joint clearance must be maintained during the brazing cycle so that the brazing filler metal can be pulled into the joint by capillary action and fill the joint at the brazing temperature. The method of assembly and fixturing employed for brazing is therefore of the utmost importance.

ASSEMBLY

The assembly of parts to be brazed depends on the brazing process to be used, the materials being joined, and the configuration of individual parts in a brazement. Components are often assembled and held together by intermittent resistance spot welds; capacitor-discharge welds; tack welds with gas tungsten arc, electron beam, or laser welding; rivets; or straps of thin foil. Assembly by means of welding requires the use of a flux or an inert atmosphere at weld locations to prevent surface oxidation that would inhibit the flow of brazing filler metal.

Aluminum sheet metal components that are to be brazed are sometimes held together with interlocking tabs and slots. Complex sheet metal assemblies are commonly built up from individual subassemblies. The subassemblies are held together either with tie rods or with strips that are welded directly to the appropriate subassembly or attached to fixture plates. The connecting rods or strips are removed after brazing. Figure 6.1 shows a brazed plate oil cooler assembly made from various subassemblies that are held together for brazing in the fixture shown.

Cylindrical parts, tubing, and solid members are assembled for brazing using a variety of methods. These include staking, expanding, flaring, spinning, swaging, knurling, and dimpling. In all cases, the fixture should be as simple as possible to ease part removal and minimize costs. The assembly method should provide a uniform joint clearance that can be maintained throughout the brazing operation so that proper joint fill occurs.

When joining dissimilar metals, it may be necessary to control room-temperature clearance to provide extremely tight or overlapping fitups. This will then allow for the proper braze clearance at the brazing temperature. Accomplishing this fitup could require heating one component and cooling the other to allow assembly. The force of gravity and the part weight should be used wherever possible to (1) assist in holding the parts together, (2) control the flow of the brazing filler metal during brazing, and (3) reduce the amount of fixturing required.

Complex structures usually require elaborate assembly methods. Such methods should be designed to maintain the joint clearance at the brazing temperature. Proper joint clearance is dependent upon the brazing filler metal, the base metal, and the brazing process. Recommended joint clearances are given in Table 2.1 in Chapter 2, “Brazement Design.”

The minimum joint clearance may be maintained using shims made of wire, ribbon, or screen material that are compatible with the base metal and the brazing filler metal. Dimpling, pinning, gluing, and crimping may also be used to locate or fit parts within a component. The assembly of components

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1. For further information on joint clearances, see Chapter 2, “Brazement Design.”