

# WELDMENT TOOLING AND POSITIONING

**Prepared by the  
Welding Handbook  
Chapter Committee  
on Weldment Tooling  
and Positioning:**

N. R. Helton, Chair  
*Pandjiris, Incorporated*

R. W. Ellig  
*Bluco Corporation*

R. M. Folkmann  
*Melton Machine &  
Control Company*

E. D. Levert, Sr.  
*Lockheed Martin Missiles  
& Fire Control*

---

**Welding Handbook  
Committee Member:**

L. C. Heckendorn  
*Intech R&D USA, Inc.*

---

## Contents

Introduction	396
Fixtures	396
Positioners	403
Conclusion	419
Bibliography	419
Supplementary Reading List	419



Photograph courtesy of Melton Machine and Control Company

---

## CHAPTER 9

---

# WELDMENT TOOLING AND POSITIONING

---

## INTRODUCTION

---

One requirement common to all forms of welding is the need to position and hold workpieces accurately. Welding fixtures are typically the most common devices used to align and retain parts for welding. Nearly all welding fixtures are designed and built to suit the specific requirements of a single assembly. For this reason, most welding fixtures are quite expensive and often only justified when fabricating many units.

When a limited number of fabricated units are needed for a very small batch or prototype work, other methods of positioning and holding workpieces are usually employed. For example, they may be positioned and held manually or fixtured with any arrangement of C-clamps, bar clamps, magnets, or framing squares on cast iron platens. Temporary fixturing may be used, time and economics permitting. Regardless of the quantity involved, each weldment must be properly fixtured to ensure that it is constructed correctly.

This chapter is intended to serve as a guide with respect to the selection of appropriate tooling and positioning devices, providing suggestions to facilitate improved fixturing applications. The challenge involves the selection of the method of fixturing best suited for the application in terms of cost and fitness for purpose. These criteria vary widely from application to application as they relate to the various fixturing and positioning selections.

---

## FIXTURES

---

In welding engineering, the terms *fixture*, *jig*, and *tooling* have essentially the same meaning. The function of a fixture is to facilitate a positional relationship between the workpieces themselves or between the

workpieces and a tool during the assembly of a weldment. The use of fixtures promotes good fit-up tolerances, resulting in consistently high-quality weldments produced at a higher rate of productivity with less distortion and at lower costs. Weldments can be joined either partially or completely in the fixture. If the assembly is tack welded together and removed prior to welding, the device used is typically called a *tacking* or *fitting fixture*.

Fixtures serve three major purposes. They are used as tacking fixtures, welding fixtures, and holding fixtures. The benefits of fixturing include the following:

1. Minimized decision making and measurements required of the operator with respect to the location and orientation of the weldment,
2. Improved identification of workpieces that are out of tolerance,
3. Enhanced fitup of workpieces to achieve tighter tolerances,
4. Minimized weld distortion,
5. Less manufacturing labor needed to produce the weldment,
6. Improved weld consistency and quality, and
7. Fewer product errors as a result of appropriate fixture identification.

Fixtures and positioners enhance the execution of manual, semi-automatic, and fully automated welding processes by maximizing the orientation of the weld joint to permit welding in the flat position. Depending on the complexity of their design, fixtures can be expensive to build. Nonetheless, they are cost effective due to the higher productivity and improved weld quality that result from their use.

The design and manufacture of fixtures should reflect the number of weldments to be produced. Small quantities may be produced on temporary fixtures