Introduction to Jigs and Fixtures

Prepared by:
KZJ
Lecturer
Mechanical Engineering Department
Polytechnic of Seberang Perai
(Manufacturing)
References

- Erik K. Henriksen, Jig and Fixture Design Manual, Industrial Pres Inc.
- Herman W. Pollach (1998), Tool Design (2nd ed.) Prentice Hall
Introduction

Mass production aims
- High productivity to reduce unit cost
- Interchangeability to facilitate easy assembly

Production devices
- Increase the rate of manufacture
- Inspection devices to speed-up inspection procedure
Types of Tools

- Cutting Tools
- Workholding Devices
- Bending, Forming and Drawing
- for Inspection and Gaging
- for Casting

for Casting
workholders with/without tool guiding/setting arrangement

JIGS <-> FIXTURES
Definitions

**Jig:**
- A Jig is defined as the device which holds and positions the workplace, locates or guides the cutting tool related to the workplace and usually
- is not fixed on the machine table

**Fixture:**
- A fixture is a work holding device which holds and positions the workplace,
- but does not guide or locate or position the cutting tool.
What are Jigs and Fixtures

Why they are important

Specific Application

Basic jigs and fixtures

Resources for selecting & purchasing

Tool Engineering
Jigs and Fixtures
What are Jigs and Fixtures

- Anything used to hold a workpiece in a desired location
- Repeating process on a series of parts
- Locate parts for precision
- Holding parts for machining, painting, assembly
Provided with tool guiding elements such as drill bushes

Guiding the tool to the correct position on the workpiece

Jigs

Rarely clamped on the machine table because it is necessary to move the jig on the table to align the various bushes in the jig with the machine spindle.
Hold the workpiece securely in the correct position with respect to the machine/cutter during operation

Not used as guided in a jig

Used for setting the tool with respect to the workpiece/fixture

Often clamped to the machine table
Parts should be designed to accommodate standard fixturing components.

Designs should accommodate fast and repeatable fixturing.

Decreases expenditure on quality control of machined parts as fixtures facilitate uniform quality in manufacturing.

Increases machining accuracy because of precise location with fixtures.

Why are they important in Machine design?
Basic categories jig & Fixtures

- Modular Fixtures
- Clamps
- Chucks
- Bushings
Chucks
Vises
Bushings
Modular Fixturing
**Jigs:**
- Jigs are lighter in weight.
- Jigs hold the work piece, locate and guide the tool.
- Used for particularly drilling, taping operations.

**Fixtures:**
- Hold the work and position the work but do not guide the tool.
- Generally heavier and are bolted rigidly on the machine table.
- Utilized for holding the work in milling, grinding, planing or turning operation.
Elements of Jigs and Fixtures

Locating elements
position the workpiece accurately with respect to the tool guiding or setting elements in the fixture

Tool Guiding and Setting Elements
Guide accurately to the workpiece

Clamping Elements
hold the workpiece securely in the located position during operation.
Advantages

Interchangeability
fit properly in assembly and all similar components are interchangeable

Skill Reduction
It eliminates marking out, measuring and setting methods before machining.

Productivity
facilitate uniform quality in manufacture (machinery accuracy).

Advantages
Examples - I

High Rise Clamps

- High-Rise Clamps can be stacked on Narrow Riser Blocks and Spacer Blocks to reach tall workpieces
Examples II

• Swing Clamp

Knob Handle
Post Mounted
Automatic Reversible Cam Action Workholding Assemblies

Examples III

Automatic Reversible Roller Cam Action Assemblies

Top View with Handle Drawing for Flange Nut Style

Bottom View Spherical Washer Style

All machinery parts are manufactured from steel and hardened. Black Oxide finish per Mil-Spec CB 924A.
Milling Fixture
The end