

BPR 121
BLUEPRINT READING MECHANICAL

COURSE DESCRIPTION:

Prerequisites: BPR 111

Corequisites: None

This course covers the interpretation of intermediate blueprints. Topics include tolerancing, auxiliary views, sectional views, and assembly drawings. Upon completion, students should be able to read and interpret a mechanical working drawing. Course Hours Per Week: Class, 1. Lab, 2. Semester Hours Credit, 2.

COURSE OBJECTIVES:

To develop the ability to read drawings skillfully with the same degree of speed and accuracy found in industry; and to understand the function and relationship of members in a mechanism.

- a. Interpret orthographic projection.
- b. Interpret dimensioning standards.
- c. Interpret auxiliary views encountered by individuals in the machinist trades.
- d. Interpret geometric tolerancing standards.

OUTLINE OF INSTRUCTION:

- I. Introduction
 - A. Bases for interpreting drawings
 - B. Third angle projection
 - C. ISO projection symbols
 - D. Title block
 - E. Drawing standards
 - F. Drawing revisions
 - G. The drafting office
 - H. Computer-sided drafting
 - I. Drawing reproduction
- II. Sheet metal drawings
 - A. Development drawings
 - B. Arrangement of views
 - C. Primary auxiliary views
 - D. Secondary auxiliary views
 - E. Straight line development
 - F. Joints, seams and edges
 - G. Sheet metal sizes
 - H. Stampings
- III. Welding drawings
 - A. Welding symbols
 - (1) Tail of welding symbol
 - (2) Multiple reference lines

- B. Supplementary symbols
 - (1) Back and backing welds
 - (2) Melt through symbol
- C. Fillet welds
- D. Groove welds
- E. Other basic welds
 - (1) Plug welds
 - (2) Slot welds
 - (3) Spot welds
 - (4) Seam welds
 - (5) Flange welds

- IV. Piping drawing
 - A. Piping
 - (1) Kinds of pipe
 - (2) Pipe joints and fittings
 - (3) Valves
 - B. Types of piping drawings
 - (1) Single-line drawings
 - (2) Drawing projection
 - C. Pipe drawing symbols
 - (1) Dimensioning
 - (2) Orthographic piping symbols

- V. Drawing for numerical control
 - C. Dimensioning for numerical control
 - D. Coordinate system

- VI. Materials and surface coatings
 - A. Steel specifications
 - (1) SAE and AISI systems of steel identification
 - (2) Effect of alloys on steel
 - B. Cast irons
 - C. Types of cast iron
 - D. Surface coatings

- VII. Castings
 - A. Sand mold castings
 - B. Full mold castings
 - C. Casting design
 - (1) Simplicity of molding from flat back patterns
 - (2) Irregular or odd shaped castings
 - (3) Set cores
 - (4) Coping down
 - (5) Split patterns
 - D. Cored castings
 - E. Machining lugs

- VIII. Fits
 - A. Inch fits
 - (1) Clearance fits
 - (2) Interference fits
 - (3) Transition fits
 - B. Description of fits
 - (1) Running and sliding fits
 - (2) Locational fits
 - (3) Drive and force fits
 - C. Standard inch fits
 - (1) Running and sliding fits
 - (2) Locational clearance fits
 - (3) Locational transition fits
 - (4) Locational interference fits
 - (5) Force or shrink fits
 - (6) Basic hole system
 - (7) Basic shaft system
 - D. Metric fits
 - (1) Metric tolerance symbol
 - (2) Fit symbol
 - (3) Hole basis fits system
 - (4) Shaft basis fits system
 - (5) Drawing callout

- IX. Cams
 - A. Types of cams
 - B. Cam displacement diagrams

- X. Ratchets
 - A. Ratchet wheels
 - B. Mechanical advantage

- XI. Gears
 - A. Spur gears
 - (1) Gear terms
 - (2) Chordal thickness and corrected addendum
 - (3) Working drawings of spur gears
 - (4) Examples of spur gear calculations
 - B. Bevel gears
 - C. Gear trains
 - (1) Center distance
 - (2) Motor drive

- XII. Bearings
 - A. Plain bearings
 - B. Antifriction bearings
 - (1) Ball bearings
 - (2) Roller bearings

- XIII. Other commercial components
 - A. Retaining rings
 - B. O-ring seals
 - C. Clutches
 - D. Belt drives
 - (1) V-belt sizes
 - (2) Sheaves and bushings

- XIV. Modern engineering tolerancing
 - A. Geometric tolerancing
 - B. Feature control frame
 - C. Form tolerances
 - D. Straightness
 - E. Modifying symbols
 - F. Definitions
 - G. Straightness RFS and MMC
 - (1) Straightness RFS
 - (2) Straightness MMC
 - H. Form tolerances
 - I. Flatness
 - J. Circularity
 - K. Cylindricity

- XV. Datums and three plans method of tolerancing
 - A. Datums for geometrical tolerancing
 - (1) Primary datum
 - (2) Secondary datum
 - (3) Tertiary datum
 - B. Datum identifying symbol
 - (1) ANSI symbol
 - (2) ISO symbol
 - (3) Multiple datum features
 - (4) Combined feature control and datum identifying symbol

- XVI. Orientation tolerancing
 - A. Tolerance of first surfaces-RFS
 - B. Tolerancing of lines related to surfaces RFS
 - C. Control in two directions
 - D. Control of center lines

- XVII. Positional tolerancing
 - A. Tolerancing of features by position
 - B. Tolerancing methods
 - C. Coordinate tolerancing
 - D. Type of positional tolerancing
 - (1) Symbol of position
 - (2) Positional tolerancing-RFS
 - (3) Positional tolerancing-MMC
 - (4) Positional tolerancing-LMC
 - E. Projected tolerance zone

- F. Variations of form (envelope principle)
- G. Datums for tolerancing by position
- H. Datum targets

XVIII. Profile tolerancing

- A. Profile of a line
 - (1) Bilateral and unilateral tolerances
 - (2) Extent of controlled profile
 - (3) Dual tolerances
- B. Profile of a surface

XIX. Correlative tolerances

- A. Coplanarity
- B. Coaxiality controls
- C. Positional tolerance controls
- D. Runout tolerance control
- E. Runout
- F. Concentricity tolerance control
- G. Symmetry

REQUIRED TEXTBOOKS AND MATERIALS:

Taylor, David L. Blueprint Reading for Machinists. Delmar Publishers.

Pencil and calculator

SUGGESTED REFERENCES, PERIODICALS, AND VISUAL AIDS:

Spencer, Henry, and J.T. Dygdon. Basic Technical Drawing. MacMillan Publishing Company, Inc.

STATEMENT FOR STUDENTS WITH DISABILITIES:

Students who require academic accommodations due to any physical, psychological, or learning disability are encouraged to request assistance from a disability services counselor within the first two weeks of class. Likewise, students who potentially require emergency medical attention due to any chronic health condition are encouraged to disclose this information to a disability services counselor within the first two weeks of class. Counselors can be contacted by calling 686-3652 or by visiting the Student Development Office in the Phail Wynn Jr. Student Services Center, room 1309.