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IDENTIFIERS	*Quinmester Program; Structural Drafting

ABSTRACT

The course introduces the student to working welding drawings, both detail and assembly, as related to all fields of drafting and structural drafting, and provides him with the opportunity to work with various types of tools and equipment. Prior to entry in this course, the vocational student must display mastery of the skills indicated in Functional Drafting--9255.02. Requiring 135 clock hours, the course consists of four instructional blocks: (1) working drawings, (2) welding, (3) structural drafting, and (4) Quinmester posttest. The student will become familiar with welding symbols and the use of mechanical lettering devices to be used in illustration drafting. A bibliography and sample posttest conclude the document. (Author/MW)

AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

Course Outline
DRAFTING - INTERMEDIATE - 9255
(Working, Welding and Structural Drafting)
Department 45, 48 - Quin 9255.03

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION-1973

D A D E C O U N T Y P U B L I C S C H O O L S

1 4 5 0 N O R T H E A S T S E C O N D A V E N U E

M I A M I, F L O R I D A 33132

Course Outline

DRAFTING - INTERMEDIATE - 9255
(Working, Welding and Structural Drafting)

Department 45, 48 - Quin 9255.03

county office of

VOCATIONAL AND ADULT EDUCATION

THE SCHOOL BOARD OF DADE COUNTY

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Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

January, 1973

Published by the School Board of Dade County

Course Description

9255	45, 48	9255.03	Working, Welding, Structural Drafting
State Category Number	County Dept. Number	County Course Number	Course Title

This is a course in the method of drawing detail and assembly drawings for shop use, as are used in industry. The student will become familiar with welding symbols and the methods used in structural drafting. This course affords the student the use of mechanical lettering devices to be used in illustration drafting.

Indicators of Success: Prior to entry into this course, the vocational student will display mastery of the skills indicated in Functional Drafting - 9255.02.

Clock Hours: 135

PREFACE

The following quinmester course outline is presented as an introduction to working welding drawings, both detail and assembly, as related to all fields of drafting and structural drafting. It is intended that this course will cover more advanced subject matter than was previously covered. The student is introduced to various types of tools and equipment and provides him or her the opportunity for instruction and practice. Functional Drafting 9255.02 is a prerequisite to this quinmester course.

This course is taught in a two-hour block for 90 hours or a three-hour block for 135 hours. In each instance, the course consists of four instructional blocks; however, the three-hour session permits the student to cover each block in more detail and also provides additional opportunity to practice and increase his or her skills. The course is concluded by a post-test.

An adjunct to the listed instructional methods is provided through the instructor's utilization of audiovisual equipment and materials.

The bibliography lists the basic references used by the teacher in presenting the material. The books are available to the student through the instructor.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee and the Vocational Curriculum Materials Service, and has been approved by the Dade County Vocational Curriculum Committee.

TABLE OF CONTENTS
with Suggested Hourly Breakdown

GOALS

The student must be able to demonstrate:

1. The ability to develop and direct his or her activities along lines parallel to present day drafting practice.

2. Skills in the selection and handling of tools and equipment through organized practice sessions in the related field of fasteners of all types.

3. The skills needed to perform as a draftsman with assigned tasks that may require pictorial drafting. The student will become knowledgeable with drawings that require illustration in the industry.

4. The ability to advance his knowledge and skills in drafting to meet the requirements of the electrical and electronic industries.

5. The desire for advancement in his chosen vocation by introducing and keeping before him achievements of leading machine designers, engineers and draftsmen, especially in the piping field.

6. The use of tools and equipment to perform a task in a predetermined length of time and to the satisfaction of a drawing checker.

SPECIFIC BLOCK OBJECTIVES

BLOCK I - WORKING DRAWINGS

The student must be able to:

1. Perform tasks that require the knowledge and skills in the production of detailed working drawings.
2. Develop knowledge and skills in dimensioning and inking.
3. Use mechanical lettering devices.
4. Draw detail drawings in the manner which industry dictates and provide the planning to produce the results necessary to produce the part.
5. Use knowledge and skills previously learned in Functional Drafting in the effective production of working drawings.
6. Perform tasks that require the knowledge and skills in the production of assembly working drawings and coordinate these drawings with the detailed drawings that were produced in previous laboratory experiences.
7. Develop knowledge and skills in dimensioning and inking.
8. Demonstrate mastery of the use of mechanical lettering devices.
9. Draw assembly drawings in the manner that industry dictates and provide the planning to produce the results necessary to produce the part.
10. Use the knowledge and skills previously learned in Functional Drafting in the effective production of working drawings.

BLOCK II - WELDING

The student must be able to:

1. Demonstrate knowledge and skills in making assembly drawings which involve the use of various types of welds and joints.
2. Determine welding drawing characteristics and welding processes and explain them.
3. Use the handbook and explain kinds of welds and types of joints that are required to complete the tasks assigned.
4. Demonstrate the use of welding symbols in a way that is used by the industry in every field of engineering.
5. Exhibit the ability to determine the type of weld in almost any situation and to determine the strength of weld needed.
6. Explain the certification for welders needed to work in industry.
7. Dimension welds and determine the size and location of all the welds used on the drawings that the student will draw.

BLOCK III - STRUCTURAL DRAFTING

The student will be able to:

1. Prepare drawings of structural building frames with both steel and reinforced concrete.
2. Demonstrate an understanding of the drafting building standard used by many firms in the structural steel industry.

3. Demonstrate an understanding of steel framing systems as wall-bearing, beam and column and long span.
4. Draw shop drawings, construct bill-of-materials and work with design drawings used in the structural steel drafting profession.
5. Explain beam connections and dimensioning practices that are used in this trade.
6. Prepare drawings that detail sloping beams, column drawings, beam detail, riveting, bolting and detailing truss members.
7. Prepare drawings for the construction of reinforced concrete buildings and use the drawing standards and schedules related to structural steel construction.
8. Demonstrate an understanding of design drawings and typical bar bends and slants.
9. Use the handbook that is used by the structural steel industry and become proficient in the use of this handbook.

BLOCK IV - QUINMESTER POST-TEST

The student must be able to:

1. Satisfactorily complete the quinmester post-test.

Course Outline

DRAFTING - INTERMEDIATE - 9255
(Working, Welding and Structural Drafting)

Department 45, 48 - Quin 9255.03

I. WORKING DRAWINGS

A. Detail
1. Determining need and use
a. Basic requirements
(1) Number of details to sheet
(2) For who and for what
b. Scale
c. Establishing specifications
(1) Notes
(2) Bill-of-material
2. Source of information
a. Sketch
b. Marked print
c. Other

B. Detail Drawings
1. Planning placement of part
2. Executing procedure
3. Need of
4. Features
a. Construction
b. Inspection
c. Item call-out
d. Sheet number
(1) Correspond with assembly
(2) Sequence
5. Simplicity

C. Assembly
1. Types
a. Design or layout
b. Outline or installation
c. Sub-assemblies
d. General
2. Selecting view
a. Placement
b. Simple
3. Scale necessary
4. Information required
a. Functional drafting
b. Source
(1) Sketch
(2) Marked print
c. For who and for what
5. Bill-of-material

D. Assembly Drawings
   1. Planning view requirements and placements
   2. Identifying requirements - features
      a. Notes
         (1) Installation
         (2) Assembly
      b. Item call-out
         (1) Correspond with bill-of-material
         (2) Location
   3. Final drawing
   4. Functional
      a. For who and for what
      b. Simplicity

II. WELDING

A. Welding Representation
   1. Studying welding drawing characteristics
   2. Welding processes
      a. Kinds of welds
      b. Handbooks
      c. Types of joints

B. Symbols
   1. Handbook
   2. Importance

C. Strength of Weld
   1. Certification
   2. Test sample

D. Dimensioning Welds

III. STRUCTURAL DRAFTING

A. Types of Structural Building Frames
   1. Steel
   2. Reinforced concrete

B. Steel Frame Buildings
   1. Steel framing systems
      a. Wall-bearing
      b. Beam and column
      c. Long span
   2. Steel structural shapes
   3. Design drawings
   4. Shop drawings
   5. Erection and shipping marks
   6. General dimensioning practices
   7. Bills-of-material
   8. Beam connections
   9. Beam detail drawing
   10. Column detail drawing

11. Detailing skewed members
12. Detailing sloping beams
13. Riveting and bolting
14. Riveted truss members
15. Detailing truss members

C. Reinforced Concrete Buildings
   1. Reinforced concrete drawing standards
   2. Concrete building symbols
   3. Schedules
      a. Horizontal
      b. Vertical
   4. Design drawings
   5. Placing drawings
   6. Typical bar bends and slants
   7. Column ties

D. Use of Handbooks

IV. QUINMESTER POST-TEST

BIBLIOGRAPHY
(Working, Welding, Structural Drafting)

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Supplementary References:

4. French, Thomas E. and Vierck, Charles J. Engineering Drawing. 10th ed. New York: McGraw-Hill Book Company, Inc., 1966. Pp. 850.

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7. United States Department of Defense. Military Standard. Mil-Std-8C. Washington, D.C.: U.S. Government Printing Office, 1963. Pp. 84.

8. _____. Military Standard. Mil-Std-12B, Rev. ed. Washington, D.C.: U.S. Government Printing Office, 1959. Pp. 101.

9. _____. Military Standard. Mil-Std-100. Washington, D.C.: U.S. Government Printing Office, 1965. Pp. 138.

APPENDIX

QUINMESTER POST-TEST SAMPLE

Quinmester Post-Test

Name _____ Date _____ Score _____

True-False Test Items

Each of the following statements is either true or false. If the statement is true, draw a circle around the letter T following it; if the statement is false, draw a circle around the F. If a statement is false in part it is entirely false.

1. Detail drawings should contain the following information:

   a. Installation specifications T F
   b. Assembly instructions T F
   c. Machining notes T F
   d. Bill-of-material T F
   e. Fabrication dimensions T F

2. Assembly drawings should contain the following information:

   a. Bill-of-material T F
   b. Item circles T F
   c. Location dimensions T F
   d. Notes needed to fabricate part T F
   e. Enough hidden lines to complete part T F

3. Detail drawings are used to build the part and are used by the shop or field T F

4. Installation drawings are used by the field to redesign machine parts T F

5. Assembly drawings should have only important information and should not contain detail T F

6. Select the proper size drawing sheet since most of the drawing should contain information and therefore utilize all the space for economic reasons T F

7. The bill-of-material should contain machining specifications because it is only used by the engineering department T F

Completion Test Items

Fill in the blank or blanks with the word or words that make the statement correct.

1. Welding is being used for an ever-increasing variety of mechanical and structural purposes, such as building up and _____ parts together.

2. The greater strength of steel in tension is often an advantage that permits a design of less weight and complication for parts that were formerly made of _____.

3. Sheet metal work can be simplified by welding instead of _____ the joints.

4. The _____, _____ and _____ industries have developed welding as a major fabricating method for steel, aluminum and magnesium.

5. The two basic processes are _____ and _____ welding.

6. Welding drawings make use of ideographic (picture writing) _____ to give the necessary welding information.

7. Every drafting room should have a _____ which has the latest edition of welding symbols and instructions for their use.

Multiple Choice Test Items

One of the words or phrases following each statement is significant to that statement. Place the correct answer in the space provided.

___ 1. Structural drafting has to do with the drawings made for the framework and supporting members of structures:

a. Columns
b. Floor members
c. Roof trusses
d. Bridge trusses
e. All of the above

___ 2. Listed below are various types of structural steel shapes but there is one shape that is not a standard structural shape:

a. Angle
b. Channel
c. Extrusion
d. Tee
e. Zee

___ 3. Rivets are identified by the type of head and listed below are several kinds of rivets. However, one of the items below is a machine screw:

a. Button
b. Cap
c. Countersunk
d. Brazier
e. Flat

___ 4. Reinforced concrete design requires a good knowledge of mathematics, mechanics and materials and is a specialized field of structural engineering. The proportions of the materials to be used to give the required strength are listed below but there is one type material <u>not</u> used:

a. Sand
b. Cement
c. Gravel
d. Fill
e. Crushed rock
f. Water

___ 5. There are several methods for fastening structural steel parts and some are listed below but one method is <u>not</u> used in this field:

a. Rivets - cold
b. Welding
c. Bolting
d. Cotter pins
e. Rivets - hot

ANSWER KEY TO QUINMESTER POST-TEST

True-False Test Items

1. a. F
   b. F
   c. T
   d. F
   e. T

2. a. T
   b. T
   c. T
   d. F
   e. F

3. T

4. F

5. T

6. F

7. F

Completion Test Items

1. Fastening
2. Cast iron
3. Riveting
4. Aircraft, automotive, ship building
5. Fusion, resistance
6. Symbols
7. Handbook

Multiple Choice Test Items

1. e
2. c
3. b
4. d
5. d