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SECTION 7 Employment in Drafting

TO THE INSTRUCTOR

STRUCTURAL, CIVIL, AND PIPE DRAFTING is a comprehensive textbook that takes an innovative approach to the subject matter. Students learn entry-level job skills in the four basic types of structural and civil drafting as well as how to get and keep a job in structural and civil drafting. This employment component is one of the most important in the book due to the ever-increasing demands for accountability in placing graduates in jobs.

Structural and civil drafting is an occupational field that supports the heavy construction industry. CAD technicians prepare engineering, shop, and placing drawings under the direction of structural engineers for structures composed of steel, poured-in-place concrete, precast concrete, and wood. CAD technicians may work for firms concerned only with the design of structures and the preparation of drawings for them. In this case, they are called upon to prepare engineering drawings in the areas of steel, concrete, and wood. They may also work for firms such as structural steel companies or precast concrete companies that actually fabricate structural products. In this case, the CAD technicians prepare shop drawings for the types of products manufactured by their employers.

Organization of the Course

Structural and civil drafting is peculiar in that a CAD technician may work in a situation in which skill is necessary in all four types of products—steel, poured-in-place concrete, precast, or wood—or, the drafter may work in a situation in which one product is strictly dealt with. This course has been organized to allow the instructor to prepare students for all four types of structural and civil drafting or to select one, two, or three types for a more in-depth treatment.

Instructors expecting to cover all four types of structural and civil drafting will be able to do so by selecting several, but not all, of the Application Activities at the end of each unit for practical application assignments. Instructors choosing to select less coverage, but more in-depth treatment, will be able to assign all of the Application Activities provided for the sections of their choice.

All units have been developed in such a way as to help students develop entry-level job skills in structural, civil, and pipe drafting. A student completing all of the Application Activities in one of the specialized sections will have the equivalent of one full year of drafting experience in that specialty area. Instructors are encouraged to expand on the content of each unit according to their own interests and expertise. Suitable reference materials are listed in the lesson plans that follow.

Review Questions

Each unit concludes with several questions to be answered by students. For the convenience of the instructor, the questions and the answers have been included in this Instructor's Guide.

Instructors may find it helpful to require students to keep a notebook of their questions and answers for each unit, and use the questions as guides in classroom discussions.

Application Activities

The single most important instructional tool in STRUCTURAL, CIVIL, AND PIPE DRAFTING is the Application Activities. Numerous activities that have been classroom tested over a four-year period have been provided at the end of each unit to allow students to develop drafting knowledge and skills sufficient for entry into the world of work as a CAD technician.

Numerous activities that involve in-depth drawing projects have been provided in Units 6 through 28. There is a sufficient number in each unit to allow instructors to assign several different projects at the same time. This means that the students in a given class might be working on several different drafting projects at

the same time, thereby broadening their overall exposure to the field. It also means that every student is not required to be working on the same project at the same time. This helps instructors protect the instructional integrity of their classes.

In order to allow instructors maximum autonomy in the assigning and scoring of Application Activities, no attempt has been made in this Instructor's Guide to provide an answer for each activity. Completed projects may vary according to the depth required by individual instructors. Rather, four completed activities have been provided in this guide as samples of how a completed Application Activity might appear.

Related Readings

Structural, civil, and pipe drafting is a complex field that overlaps and intertwines with construction and architecture. Many units in this Instructor's Guide contain a list of related reading material the instructor may find useful. These readings will be valuable in helping the instructor expand the content of each unit to suit his or her own individual situation.

SECTION 1 Overview of Structural Drafting

LESSON GUIDE: Unit 1 Introduction to Structural Drafting

OBJECTIVES

After studying this unit, the student will be able to define structural drafting, identify the different types of structural drawings, list the most common employers of structural CAD technicians, demonstrate proper structural drafting techniques in the areas of linework, lettering, and scale use, and explain the use of CAD in structural drafting.

POINTS TO EMPHASIZE

- Structural CAD technicians may be called upon to prepare either engineering drawings or shop drawings. Engineering drawings provide an overall picture of a structure for sales, marketing, estimating, or engineering purposes. Shop drawings are used to actually fabricate the structural products for a job.
- Engineering and shop drawings are prepared for four different types of structural products: steel, poured-in-place concrete, precast concrete, and wood. CAD technicians may work for firms that deal with all four products or for firms that specialize in just one of these products.
- Good linework, neat lettering, and accurate use of the scale are important traits for the structural CAD technician to develop.

REVIEW QUESTIONS AND ANSWERS

1. Why are structural drawings needed in the heavy construction industry?
   Any structure that is built results from the efforts of a number of specialists in several different areas. Drawings are needed so that all of the various people who build can build what the designer designs, who in turn needed drawings to design what the owner had in mind.

2. Name two types of structural drawings.
   Engineering and shop drawings

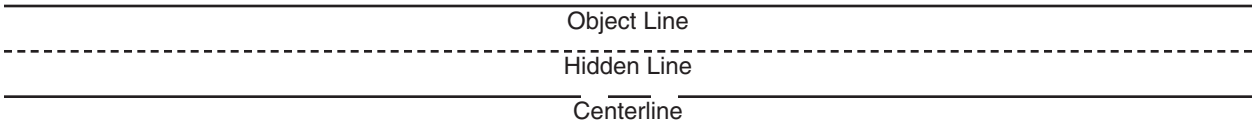
3. What do engineering drawings and shop drawings form when combined into one set?
   Working drawings

4. Name four different situations in which a structural CAD technician would be called upon to prepare engineering drawings.
   When employed by an architect
   When employed by a contractor
   When employed by a structural engineer
   When employed in a sales department

5. Shop drawings are prepared by what types of companies?
   Companies that actually fabricate structural products—for example, structural steel and precast concrete companies

6. Name the two most common employers of structural CAD technicians.
   Consulting engineering firms and structural building product manufacturers (steel and precast concrete companies)

7. Sketch an example of an object line, a hidden line, and a centerline.



8. List the three most commonly used sizes of paper in structural drafting.
   B, C, and D sizes
9. Explain the impact CAD has had on structural drafting.
   CAD has improved drawing quality in structural drafting.

LESSON GUIDE: Unit 2 Typical Structural CAD Department

OBJECTIVES

After studying this unit, the student will be familiar with the organizational chart for a typical structural CAD department, the job descriptions for the entry-level structural CAD technician, and the primary duties of the various positions found in a typical structural CAD department.

POINTS TO EMPHASIZE

- Though position titles may vary from company to company, the responsibilities and duties required for positions are fairly constant. So, whether a beginning structural CAD technician is called a junior drafter or a detailer, the duties will be very similar.
- Students satisfactorily completing all of the activities in this book are qualified to begin work at the junior drafter or drafter level.

REVIEW QUESTIONS AND ANSWERS

1. What positions are usually found in a typical structural CAD department?
   Drafting clerk, junior drafter, drafter, senior drafter, checker, and chief drafter
2. List the primary responsibilities of the drafting clerk.
   Running prints, typing internal and external correspondence, filing, running errands, and maintaining the supply room
3. List the primary responsibilities of the junior CAD technician.
   Running prints, preparing elementary drawings, drawing details, performing revisions and corrections, and preparing bills of materials
4. List the primary responsibilities of the CAD technician.
   Preparing engineering and shop drawings, assisting junior drafters assigned to cooperative projects, ensuring adherence to projected timetables and work schedules

5. List the primary responsibilities of the senior CAD technician.
   Preparing more complicated engineering and shop drawings in accordance with company standard drafting procedures and the raw data available for a job, supervising drafters and junior drafters assigned to a job or drafting team, ensuring that projected timetables and work schedules are met, performing minor checking duties, and acting as liaison between the checker and project engineer assigned to a job
6. List the primary responsibilities of the checker.
   Checking drawings for dimensional accuracy, adherence to company drafting procedures, adherence to information presented in the raw data for the job, and general drafting technique
7. List the primary responsibilities of the CAD manager.
   Supervising all drafting department personnel, scheduling and assigning all work, ensuring that all functions of the drafting department are carried out properly and on time, reviewing new projects and estimating the amount of time that will be required to complete drawings, requisitioning supplies for the drafting department, and conducting interviews of prospective drafting department employees

LESSON GUIDE: Unit 3 Drawing, Checking, Correcting, and Revising Processes

OBJECTIVE

After studying this unit, the student will be able to explain the various steps a structural drawing passes through from its origin to the completed stage.

POINTS TO EMPHASIZE

- Structural CAD technicians begin the drawing process by preparing drawings from raw information supplied by architectural drawings, engineer's sketches, or information provided by contractors or sales personnel.
- Corrections are the result of a drafting or engineering mistake. Revisions are the result of the owner, architect, engineer, contractor, or other parties changing their minds about some aspect of a job.

REVIEW QUESTIONS AND ANSWERS

1. Explain where structural CAD technicians get the raw data they use in preparing the structural drawings for a job.
   From the architect's drawings, the engineer's sketches and verbal instructions, the contractor's sketches, and/or sales personnel sketches
2. Who must approve structural drawings once they are complete?
   The originator of the job (i.e., architect, engineer, or contractor)
3. Explain how a correction and a revision differ.
   A correction results from an error by the drafter or engineer. A revision results when the architect, engineer, or contractor changes his or her mind about some aspect of the job.
4. What step immediately follows the preparation of the original drawings?
   a. checking