ADVM 0012 - GEOMETRIC DIMENSIONING AND TOLERANCING

Catalog Description

Formerly known as DES 12
Prerequisite: Completion of ADVM 2 or ADVM 11 or ADVM 66 or ENGR 151 with grade of "C" or better or equivalent as determined by instructor
Hours: 54 lecture
Description: Expands upon basic knowledge of dimensioning mechanical drawings by adding form and feature controls in order to clearly define parts. Review of basic dimensioning and tolerancing. Topics, as defined in ASME Standards, include geometric tolerancing symbols and terms, rules of geometric dimensioning and tolerancing, datums, material condition symbols, tolerances of form and profile, tolerances of orientation and runout, location tolerances and virtual condition. (CSU)

Course Student Learning Outcomes

- CSLO #1: Apply appropriate, current and relevant industry standards in preparing technical documentation for the appropriate discipline of their study.
- CSLO #2: Apply fits and allowances to mating parts and explain the advantages and disadvantages of chain and Datum Dimensioning.
- CSLO #3: Demonstrate computer aided drafting practices that conform to business and industry CAD standards.
- CSLO #4: Identify dimensioning and geometric characteristic symbols and evaluate the appropriate use of dimensioning and geometric characteristic symbols.

Effective Term

Fall 2022

Course Type

Credit - Degree-applicable

Contact Hours

54

Outside of Class Hours

108

Total Student Learning Hours

162

Course Objectives

Student will:
A. Dimensioning and Tolerancing
1. Apply basic dimensioning and tolerancing rules
2. Define tolerancing fundamentals
3. Define and apply material conditions to features on drawings
4. Apply fits and allowances to mating parts
5. Apply and explain the advantages and disadvantages of chain and datum dimensioning
6. Explain alternative dimensioning practices
B. Symbols & Terms
1. Identify dimensioning and geometric characteristic symbols
2. Define and evaluate the appropriate use of dimensioning and geometric characteristic symbols
3. Apply datum feature and target symbols to features on drawings
4. Demonstrate the appropriate use of material condition symbols on drawings
5. Demonstrate the appropriate use of feature control frames on drawings
C. Datums
1. Define what datums are and how they are selected on a part
2. Demonstrate the application of the datum feature symbol on drawings
3. Explain the datum reference frame concept and illustrate its use
4. Apply datum target symbols to features on a drawing
5. Apply the proper use of datum axis and datum center planes
D. Material Condition Symbols
1. Define the advantages and disadvantages of conventional tolerancing
2. Define and apply limits of size to features of a part
3. Demonstrate the appropriate use of material condition symbols
4. Describe and evaluate the use of datum precedence and material condition
E. Tolerance of Form & Profile
1. Define and apply straightness tolerance to parts on a drawing
2. Define and employ flatness tolerance to parts on a drawing
3. Define and apply circularity tolerance to parts on a drawing
4. Define and employ free state variation to parts on a drawing
5. Define and apply cylindricity tolerance to parts on a drawing
6. Define and employ profile tolerance to parts on a drawing
F. Tolerance of Orientation & Runout
1. Define and apply orientation tolerance to parts on a drawing
2. Define and employ runout tolerance to parts on a drawing
3. Describe and apply combinations of geometric tolerances
4. Apply the tangent plane symbol
G. Location Tolerances
1. Define and apply positional tolerance to parts on drawings
2. Define and employ positional tolerance to coaxial features on parts
3. Define and apply positional tolerance to nonparallel holes on parts
4. Define and employ positional tolerance to slotted holes on parts
5. Define and apply positional tolerance to spherical features on parts
6. Define and employ positional tolerance relative to fasteners on parts on drawings
7. Define and evaluate the use of a projected tolerance zone on parts
8. Describe the use of virtual condition to features on parts
9. Define and apply concentricity tolerance to parts on drawings
10. Define and employ positional tolerancing relative to coaxiality of parts on drawings
11. Define and apply symmetry relative to parts on drawings

General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

- CSU Transferable

Methods of Evaluation

- Objective Examinations
  - Example: Students take an objective exam on Datums. Example: Define Datums.
- Skill Demonstrations
  - Example: Students submit 2 dimensional detail drawing demonstrating their ability to apply Geometric tolerances to manufacturing documentation. A faculty member grades the student's performance of learned objectives and accuracy to the ASME standards. A point system is used and a letter grade assigned to the point totals.

Repeatable

No

Methods of Instruction

- Lecture/Discussion
- Distance Learning

Lecture:

1. Following an instructor lecture on technical documentation, students assimilate the assigned reading from their textbooks into their skill set in a way that student can apply the acquired information on the technical documents. The reading material is also utilized in group discussions led by the instructor during the lecture period.
2. Critical Thinking: Instructor guides students in the development of viable technical documentation of various product designs to ensure proper manufacturability. The instructor facilitates student learning through guided discussions, interactive lecture curriculum and the evaluation of weekly assignments and drawings. The weekly assignments and drawing are checked for completeness and accuracy according to the current industry standards and an appropriate grade assigned.

Distance Learning

1. Instructor will facillitate an online lecture on Defining and applying positional tolerance to parts on drawings. Students will then participate in a Discussion where they will read and share ideas on the importance of positional tolerancing applications.

Typical Out of Class Assignments Reading Assignments

1. Students must read chapter on positional tolerancing and complete the review questions and apply the knowledge to the print reading assignments. 2. Students required to read articles on tolerancing from professional journals relative to geometric dimensioning and tolerancing principles and practices and discuss industry applications of tolerancing.

Writing, Problem Solving or Performance

1. Students write papers comparing and contrasting various approaches to the application of geometric dimensioning and tolerancing to design problems. 2. Students construct drawings, based upon their written solution to design problems, demonstrating the objectives learned each week.

Other (Term projects, research papers, portfolios, etc.)

1. Students will compile samples of work accomplished into a portfolio that will demonstrate material examined in this course.

Required Materials

- Geometric Dimensioning and Tolerancing
  - Author: Madsen
  - Publisher: Goodheart-Wilcox
  - Publication Date: 2020
  - Text Edition:
  - Classic Textbook?:
  - OER Link:
  - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.