GD&T BASICS

ENGINEERING DRAWING BASICS

Prepare your Team to Work with Real Engineering Prints

Understanding drawings is one of the most critical skills for anyone who works with manufactured parts. The objective of this course is to make sure that you understand how to read, interpret and work with engineering drawings in a day to day setting. You will learn how to work with prints from a mix of documented engineering standards, shop floor knowledge, and real-world examples. Our material breaks down the complexity of engineering drawings into the key concepts that will apply to every print you will see.

Course Objectives:

After taking our course, you will be able to:

- Understand the most important information to look at when you first pick up an engineering drawing
- Recognize the pertinent manufacturing information such as units of measure (in vs mm), general tolerances, revision history, bill of material and other critical data right away.
- Visualize the different ways 3D parts are projected on 2D drawings and how to the different ways the full geometry of the part or assembly is presented.
- Determine how key information is organized in notes, symbols and title blocks
- Interpret the different view and line types used in drawings and what they mean for visualizing the part's geometry
- Understand dimensioning methods used on an engineering drawing and what dimensional tolerances really mean
- Identify the common symbols found on an engineering drawing and understand the meaning of each

Who's it For?: Engineering Drawing Basics Course

The Engineering Drawing Basics Course is designed to be very approachable for everyone - No prior Print or GD&T experience required!

- New Hires
- Engineers
- Machinists
- Quality/Inspection
- Managers
- Tooling Engineers
- Production Associates
- Drafters/Designers
- Sales/Purchasing
- ***Anyone who works with or make decisions with engineering prints!***

What's Included with the Online Training?

- 24/7 access to our full course from any device–even on mobile or tablet
- 180-Day Access to the Engineering Drawing Basics Course (1-Year if Bundled with a GD&T Course)
- Forum access and Direct Instructor Email Support for individual/private communication or questions
- Video question line answering real student questions
- Live & Recorded design, production, & inspection part walk-thrus
- Conceptual Charts, Handouts, and practice exercise worksheets with answer explanation video lessons.
- Quizzes that immediately follow the lessons, with answer explanations
- Individual login for each participant within your organization's group - available to access at work or home through any internet browser
- Certificate upon 100% course completion & LinkedIn Skills Badge

With the Engineering Drawing Basics Course, you will learn a simplified approach to your prints that will allow you to work more confidently, communicate clearly, & make a bigger impact in your career.

Once you take our training & understand our simple framework, you will drastically improve the way you work with your drawings. We don't want you to just understand theory – we want you to apply what you learn!

GD&T Basics – Pareto Learning, LLC
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Syllabus for the Engineering Drawing Basics Course

Section 1: Intro to Engineering Drawings

- Types of Drawings and How They're Uses
- Goal of an Engineering Drawing
- Most Important Parts of the Drawing

Section 2: Parts of a Drawing

- Field of View
- Title Block
- General Drawing Notes
- Revision Block
- Bill of Materials
  - Drawing Intro - Examples

Section 3: Understanding Engineering Graphics

- Part Geometry Lines
- Orthographic Views – Understanding a 2D Print for a 3D Part
  - Examples of Visualizing Orthographic Views
- Common Drawing Views
- Types of Section Views
- Descriptive/Dimension Lines
  - Understanding Drawing Views - Example

Section 4: Tolerances & Dimensions

- Intro to Part Tolerances
- Types of Dimensional Tolerances

ADDITIONAL LESSONS COMING SOON:

Est. Release Date: May 29, 2020

- *Holes and Threads*
- *Metric VS. Inch*
- *Dimensioning Methods*
  - *Dimensional Tolerances - Examples*
- *The Basics of GD&T*
  - *GD&T Full Tolerance - Example*

Est. Release Date: June 30, 2020

- *Roughness and Hardness Callouts*
- *Fundamental Welding Symbols*
- *General Drawing Symbols & Callouts*
  - *Drawing Requirements & Symbols - Example*

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GD&T BASICS
FUNDAMENTALS COURSE
Make Better GD&T Decisions with your Drawings

With the GD&T Basics Fundamentals Training Course, you will learn a simple framework that will allow you to understand how GD&T is used and why. We don't throw every concept at you – we make absolutely sure that what we teach is what you will actually need in the real world.

Course Objectives:

- Understand the simple GD&T framework that simplifies 95% of all GD&T.
- Breaks down the main requirements and terminology of the ASME Y14.5 Standard into simple English.
- Learn all 14 major symbols & how to use them, which ones are most useful & which ones to avoid.
- Understand GD&T Feature Control Frames and how they affect manufacturing and inspection.
- Discover how Max Material Condition creates bonus tolerance while maintaining a functional part.
- Understanding what datums do & how they are applied on drawings for design, manufacturing, & inspection.
- Study real drawings to understand how GD&T is applied on actual parts.
- Learn best practices that represent a realistic approach on getting started using GD&T on real drawings.
- Retain key concepts using our included resources so you will be able to apply what you learn after training.

Our #1 goal is that you retain the information you learn and make a noticeable impact at your company once you've completed training!

Who's it For?: GD&T Fundamentals Course

This course takes our EDB Course to the next step – by showing how GD&T is used, interpreted, and applied across a part's life cycle. If your company has GD&T on your prints and you want to learn the GD&T framework – this is the perfect course for your team. No prior GD&T knowledge is required though!

- Engineers
- Machinists
- Quality/Inspection
- Production Associates
- Drafters/Designers
- New Hires
- Tooling Engineers
- Managers
- Inspection Planners
  - ***Anyone who is working with prints that has GD&T on them***

What's Included with the Online Training?

- 24/7 access to our full course from any device–even on mobile or tablet
- 180-Day Access to the GDTF Course (1-Year if Bundled with a EDB or GDTA Course)
- Forum access and Direct Instructor Email Support for individual/private communication or questions
- Video question line answering real student questions
- Live & Recorded design, production, & inspection part walk-thrus
- Conceptual Charts and Review Handouts
- Quizzes that immediately follow the lessons, with answer explanations
- Individual login for each participant within your organization's group - available to access at work or home through any internet browser
- Certificate upon 100% course completion & LinkedIn Skills Badge

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Syllabus for the GD&T Fundamentals Course

Section 1: Introduction

- Course Introduction
- Simple Example - What is GD&T?

Section 2: The GD&T Framework

- Terminology & Basic Rules
- The Feature Control Frame
- S.L.O.F. & the 3 Simple Principles of GD&T

Section 3: S&F – Size and Form

- Intro to Features and Material Conditions
- Rule #1 of GD&T (Envelope Principle)
- Straightness (Surface)
- Straightness (Feature of Size)
- Flatness (Surface)
- Flatness (Feature of Size)
- Circularity
- Cylindricity

Section 4: Datums Control

- Intro to Datums
- Datum Reference Frame
- Primary Datum Controls
- Basics of Datum Selection

Section 5: L – Location (Position)

- Why Use Position Over Coordinate Dimensions
- True Position – Basics
- The Position Calculation

Section 6: 0 - Orientation Tolerances

- Parallelism (Surface)
- Parallelism (Axis)
- Perpendicularity (Surface)
- Perpendicularity (Axis)
- Angularity (Surface and Axis)

Section 7: Material Modifiers

- Maximum Material Condition
- Least Material Condition
- Regardless of Feature's Size & Rule #2

Section 8: Profile Tolerances

- Profile of a Surface – Basics
- Profile In-Depth (Modifiers)
- Profile of a Line

Section 9: Runout Tolerances

- Runout/Circular Runout
- Total Runout

Section 10 – Symbols to Avoid Using

- Concentricity
- Symmetry

Course Summary: Real -World Exercises

- SLOF Review for Drawings (Size, Location, Orientation & Form)
- Interpreting Weldment Print
- Axle Shaft Interpretation & Inspection
- Applying GD&T Yourself - Clevis Bracket Exercise

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GD&T Advanced

Make Better GD&T Decisions with your Drawings

The GD&T Standards are meant to cover every application, across every industry. While the GD&T Fundamentals course covers the core framework for understanding how GD&T is interpreted & applied – the GD&T Advanced course builds upon this framework showing how every GD&T Symbol and Callout are used.

Course Objectives:

- Build off the topics learned in the GD&T Fundamentals Course to understand everything contained within the GD&T Standards.
- Learn how advanced datum controls are to be interpreted and applied in measurement.
- Understand functional gauging and how to design the gage for quick inspection of your part.
- Interpret composite controls for position and profile tolerances and understand why they are beneficial.
- Calculate fixed & floating fastener applications and guarantee the fits of bolted connections.
- Learn cost saving techniques that benefit manufacturing processes and inspection.
- Perform boundary tolerance calculations on parts to detect minimum and maximum limits.
- Gain a full understanding for industry specific topics in the ASME Y14.5 that you may come across on your prints.

Who's it For?: GD&T Advanced Course

Our GD&T Advanced course is great for individuals and companies seeking advanced techniques to save costs, open up tolerances and understand GD&T best practices for design, production and inspection.

Our Advanced course is Part 2 of our GD&T Professional Program, following Part 1: GD&T Fundamentals. **To enroll in the GD&T Advanced course, you can register for the GD&T Professional Bundle, which includes both our GD&T Fundamentals and Advanced courses in one program.

- Design Engineers
- Lead Inspectors
- Lead Machinists
- Drafters/Designers
- Tool/Gage Engineers
- Engineering Managers
- Inspection Planners
- Manufacturing Engineers

What's Included with the GD&T Advanced Bundle?

- 24/7 access to our full course from any device–even on mobile or tablet
- 1-Year Access to the GD&T Professional Bundle, which includes both the GD&T Fundamentals and GD&T Advanced Courses
- ASME GDTP Exam Study Guide
- Forum access and Direct Instructor Email Support for individual/private communication or questions
- Video question line answering real student questions
- Live & Recorded design, production, & inspection part walk-thrus
- Conceptual Charts and Review Handouts
- Quizzes that immediately follow the lessons, with answer explanations
- Individual login for each participant within your organization's group - available to access at work or home through any internet browser
- Two Completion Certificates upon 100% course completion & LinkedIn Skills Badge – One Per Course

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Syllabus for the GD&T Basics Advanced Course

Section 1: Introduction

- Intro: Review Key Rules from Fundamentals Course and SLOF Principles
- Discuss Specific Use Cases of Advanced Concepts

Section 2: Advanced Datums

- Datum vs Datum - Feature vs Datum - Feature Simulators
- Patterns as Datums
- Datum Targets
- Datum Translation & Movable Targets
- Irregular & Inclined Datums

Section 3: Functional Gauging & Datum Modifiers

- Maximum Material Boundary (MMB)
- Simultaneous Requirements
- Gauge Building Exercise with Position
- Functional Gauge Design Considerations

Section 4: Composite Tolerances

- Composite Tolerances – Single Datum
- Composite Tolerances – Multiple Datums
- Multiple Single Segment Tolerances
- Composite Profile Tolerances
- Clevis Bracket – Composite Design Case Study

Section 5: Fastener Tolerances & Design

- Projected Tolerances
- Fixed Fasteners
- Floating Fasteners
- Zero Tolerance at MMC
- Hole Processes (Counterbore etc.)

Section 6: Geometric Tolerance Calculations

- RFS Wall Thickness Boundary Calculations
- Practice Tolerance Calculation–RFS Example
- MMC & LMC Positional Stack-Up Method
- Practice Tolerance Calculation–MMC Example
- Tolerance Impact of Datum Surfaces (Orientation & Form)
- Practice Application–Datum Surface Tolerance Calculation

Section 7: Additional Features, Rules and Symbols

- Tangent Line, Free State & Statistical Tolerance
- Individually Callout & Continuous Features
- Parts in Restrained Condition for Measurement
- Screw Thread & Gear Spline Rules
- Knurling and Keyseats
- Conical & Flat Tapers, Slope, & Full Ø Depth
- Review of User Designs/ Use Cases & Closing

Once you take our training & understand our simple framework, you will drastically improve the way you work with your drawings. We don't want you to just understand theory – we want you to apply what you learn!