

PD561**Geometric Tolerancing Applications and Tolerance Stacks****CEUs: 1.5****PDHs: 15****Number of Days: 2**

Learn how to take the guesswork out of the manufacturing process, to improve quality and avoid costly mistakes.

After taking the introductory GD&T course, you will grasp the fundamentals of GD&T, such as datums, position with Maximum Material Condition (MMC) and Regardless of Feature Size (RFS) modifiers, parallelism, profile, etc. However, you may still lack the intimate knowledge of how to apply geometric tolerancing expertly and perform tolerance stacks to define and optimize a product design.

This Applications and Tolerance Stacks course teaches you how to take GD&T skills to the next level. Apply and perform tolerance stacks using a series of case study problems including sheet metal, machinings, plastic parts, castings, etc. Being able to identify a tolerance on a part can influence the product's cost and performance. Learning these skills will help you balance functionality with manufacturing capabilities.

The case studies in this course require you to establish datum reference frames and apply geometric tolerancing based on defined functional requirements. Afterward, you must perform tolerance stacks to ensure design requirements are met. This process links the concept that the proper selection of the datums, as well as position and profile values on individual parts, have a great effect on the accumulation in the overall assembly. These exercises are interactive, creating an engaging classroom environment through small group discussions and classroom participation.

By participating in this course, you will learn how to successfully:

- Employ the proper application of geometric tolerancing on parts and assemblies.
- Perform linear and axial tolerance stacks.
- Reallocate tolerances to meet manufacturing capabilities.

Who Should Attend?

Engineers, designers and drafters, as well as quality, tooling and manufacturing personnel. As a prerequisite, it is recommended the students attend the Geometric Tolerancing Fundamentals class or have a strong understanding in geometric tolerancing fundamentals.

Course Materials (included in purchase of course):

- All participants receive a copy of *GeoTol Applications and Tolerance Stacks*
- *Downloadable job aid:* Tolerance Stack Spreadsheet

These items will serve as valuable resources long after the training is complete

Special Requirements:

Students should bring calculators to class. Participants may bring drawings to class for discussion.

Topics covered in this course include:

- Fixed and Floating Fastener Formulas: Calculating Position Tolerances
- Linear Stacks, Vector Method with Plus Minus Tolerances
- Linear Stacks, Vector Method with Profile Tolerances
- Practical Problem: Grommet Assembly
- Practical Problem: Powder Case Assembly
- Practical Problem: Step Bracket Assembly (sheet metal)
- Detail Axial Boundary Stacks
- Assembly Axial Boundary Stacks
- Practical Problem: Optic Connector with complex alignment requirements

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Geometric Tolerancing Applications and Tolerance Stacks

Day One

- **Fixed and Floating Fastener Formulas: Calculating Position Tolerances**
- **Linear Stacks, Vector Method with Plus Minus Tolerances**
- **Linear Stacks, Vector Method with Profile Tolerances**
 - Assemblies with a datum reference frame and profile tolerances
 - When to include flatness, perpendicularity in tolerance stacks
- **Practical Problem (2 parts): Grommet Assembly**
 - Selecting Datum Features, Calculating Position and Profile Tolerances
 - 3D Model Tolerancing Example
 - Linear Stack with Profile
- **Practical Problem (2 parts): Powder Case**
 - Selecting Datum Features, Calculating Position and Profile Tolerances
 - Intro to Axial Boundary Stacks
- **Practical Problem (3 parts, sheet metal): Step Bracket Assembly**
 - Selecting Datum features, Calculating Position and Profile Tolerances
 - Coaxial Holes as Datum Features
 - Complex Surfaces
 - 3D Model Tolerancing Example

Day Two

- **Detail Axial Boundary Stacks**
 - Maximum Material Boundary (MMB) and Least Material Boundary (LMB)
 - Wall Thickness Calculations
- **Assembly Axial Boundary Stacks**
 - 2-part Assemblies RFS (regardless of feature size) datum modifiers
 - 2-part Assemblies MMC (maximum material condition) datum modifiers
 - 4-part Assemblies
 - Stack Exercises utilizing Spreadsheet job-aid
- **Practical Problem (2 parts): Optic Connector**
 - Complex Alignment Requirements
 - Selecting Datum Features, Calculating Position and Profile Tolerances
 - Linear Stack
 - Axial Boundary Stack