

Surface Texture, Limit & Fits – GD&T Part II

Introduction

Surface Texture

Surface texture is the local deviation of a surface from a perfectly flat plane. The measure of the surface texture is generally determined in terms of its roughness, waviness and form. In surface metrology, roughness is typically considered to be the high-frequency, short-wavelength component of a measured surface. However, in practice it is often necessary to know both the amplitude and frequency to ensure that a surface is fit for a purpose.

Textures are often used creatively, such as when they're employed to hide manufacturing defects like parting lines on plastic injection moulded enclosures. Others are used cosmetically to imitate wood, stone or leather. Finally, surface texture is very important when preparing for later painting or anodizing.

Limits & Fits

*In engineering, a **fit** refers to the clearance between two mating parts. The choice of an engineering fit determines whether the two parts can move relative to each other in case of a clearance fit, or act as a whole in case of a tight interference fit.*

Limits and Fits are used to define tolerances for mating parts. Limits are most commonly used for cylindrical holes and shafts, but they can be used for any parts that fit together regardless of the geometry.

A limit is the upper and lower tolerance for a shaft or hole.

A fit consists of a pair of limits. There are three categories: clearance, transitional, and interference.

While limits and fits apply to all sorts of mating parts, their main use is for regulating the sizes of mating shafts and holes for best performance.

Both ISO and ANSI have standardised fits in three classes – clearance, transition and interference. Each class has a variety of options available for choosing the correct one for a specific application.

Learning Outcomes

This module is taught on the basis of achieving intended learning outcomes. On successful completion of the module, the participant will be expected to be able to demonstrate the following:

<i>Knowledge & understanding</i>	▪ <i>Communicate clear descriptions of surface texture in reports and product documentation</i> ▪ <i>Recognize roughness and waviness impacts on components</i> ▪ <i>Recognize measurement errors and avoid misinterpretations of results</i>
<i>Intellectual, practical and transferable skills</i>	▪ <i>How to specify surface texture</i> ▪ <i>How surface texture relates to wear, sealing, and other functionality</i> ▪ <i>Surface metrology strategy</i> ▪ <i>Measuring roughness and waviness</i> ▪ <i>How Tolerance play a role in product design from cost and reliability perspective</i> ▪ <i>Interchangeability size of components</i> ▪ <i>Various types of Fit Fundamentals</i> ▪ <i>Deviation and Grade of Tolerance</i> ▪ <i>Study of Tolerances Chart</i>

Target Audience

This topic bridges all fields within the automotive industry and is designed for engineers and technicians involved in: the specification of mechanical systems and components; failure analysis and warranty; quality control and measurement functions, manufacturing and process development.

Prerequisites

Participants should have a basic knowledge of mechanical terms such as friction, sealing, wear, etc

Course Outline

The table below indicates how the module will be delivered. However, the schedule is indicative and may be subject to change.

Module 1	<i>Introduction</i> ▪ <i>Surface Texture</i> ▪ <i>Why is surface texture important?</i> ▪ <i>Limits & Fits</i>
Module 2	<i>Surface Texture</i> ▪ <i>Definition</i> ▪ <i>Filtering for Roughness, waviness and lay</i> ▪ <i>Symbols</i> ▪ <i>Surface finish units - R_a to R_z</i> ▪ <i>Factors affecting surface finish</i> ▪ <i>Surface finish and product function</i> ▪ <i>Measuring and Inspection of surface finish</i> ▪ <i>Surface roughness grades and process</i>

Module 3	<i>Limits & Fits</i> ▪ <i>Limits, Fits and Tolerance</i> ▪ <i>Fits</i> ▪ <i>Types of Fits</i> ▪ <i>Clearance Fits</i> ▪ <i>Interference Fits</i> ▪ <i>Transition Fits</i> ▪ <i>Terminology</i> ▪ <i>Hole and Shaft Basis System</i> ▪ <i>Tolerance Grade</i> ❖ <i>iT</i> ❖ <i>i</i> equation and calculation ❖ <i>Selection of Fits</i> ▪ <i>Inspection method and Gauges</i> ▪ <i>Dimensioning of Tolerances – Rules</i> ▪ <i>Machining Symbols</i>
Module 4	<i>Practical workshop</i> <i>Discussion</i> <i>Q&A</i>
Module 5	<i>Assessment</i> <i>Wrap-up</i>

Duration

2 days – 9.00am to 5.00pm

Trainer's Profile

Yong WK, (MBA,UK) – Please refer to standalone profile attached.