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Choosing the Right Surface Imaging Technique

With so many surface imaging techniques available, it can be a challenge to select the best method for your project. Each technique provides surface data which can impact numerous functional characteristics of materials, parts, and devices. This guide will provide a quick reference of key considerations to help you make the best choice, faster.

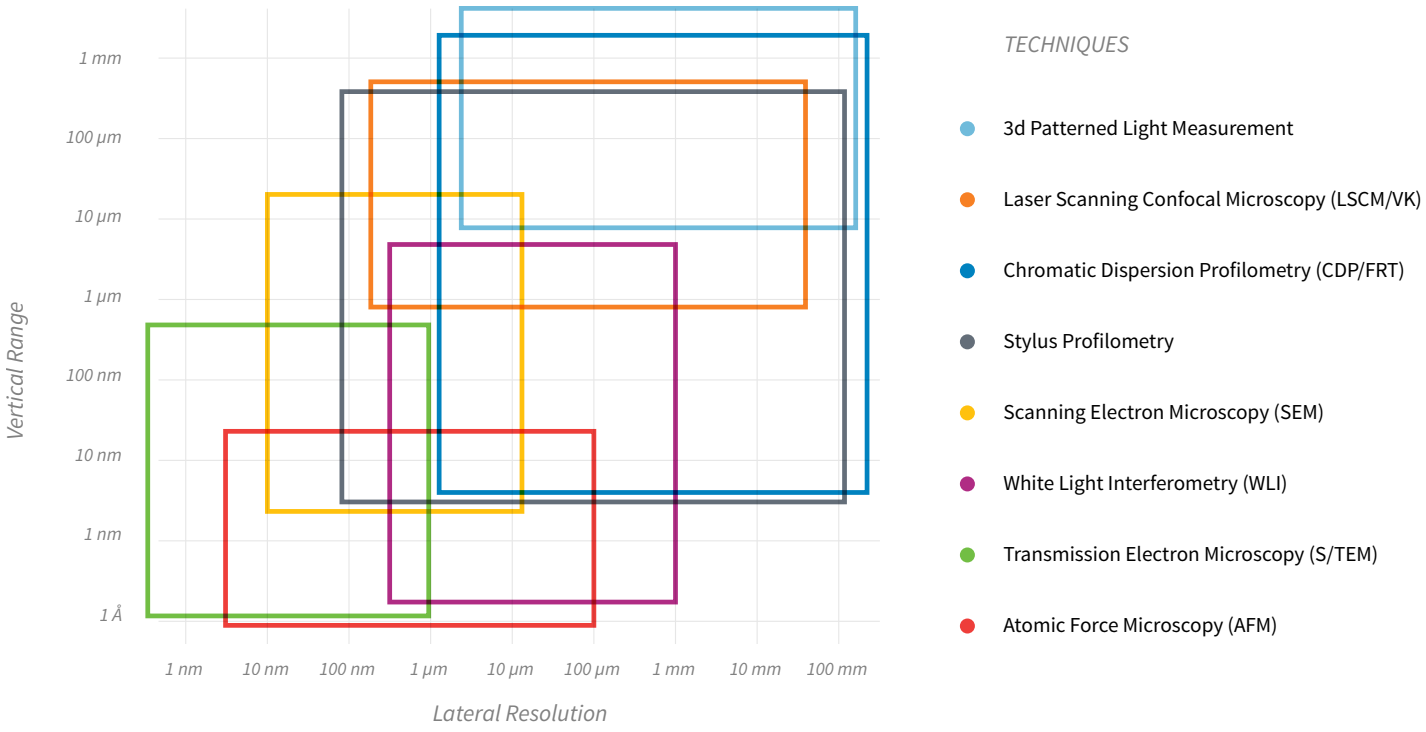
Considerations When Choosing a Surface Imaging Technique

Diverse techniques exist which can directly and indirectly measure surface finish, roughness and critical dimensions of surface features and structures. These vary in their scale of detail and scope, as well as in the types of output information they can provide. Here we break down 8 common surface imaging and profiling techniques through 2 considerations that can identify the best option for you.

Consideration 1: Lateral Resolution vs Vertical Scan Range

For surface roughness and topology analysis, it is important to consider both the scale of the features you want to measure, AND the size of the surface area you need to analyze.

To simplify narrowing your field of surface imaging options, use the guide below to select a technique with a scan range that will span the height / thickness variation in the target area, as well as a lateral resolution adequate to clearly resolve the required features. Then ensure that the technique you choose has a field of view that will cover the area over which you need measurement.



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Consideration 2: Technique Specifications & Applications

Consider what output information each technique can provide. Balance the cost required to secure the right data for your project.

	Contact / Stylus Methods		*Optical Profiling / Microscopy*				*Electron Microscopy*	
Technique	Atomic Force Microscopy (AFM)	Stylus Profilometry	Chromatic Dispersion Profilometry (CDP/FRT)	Laser Scanning Confocal Microscopy (LSCM/VK)	White Light Interferometry (WLI)	3D Patterned Light Measurement	Scanning Electron Microscopy (SEM)	Transmission Electron Microscopy (S/TEM)
Prices Start at	$225 / image	$225 / hour	$360 / hour	$300 / hour	$225 / hour	$275 / hour	$275 / hour	$850 / sample with prep
Field of View (min to max diameter)	200 nm to 70 µm	N/A	160 µm to 800 µm	100 µm to 1 mm *	5 µm to 200 mm *	4 mm to 24 mm *	1 µm to 2 mm	2 nm to 10 µm
Vertical Precision	Å	nm	nm	nm	Å	3-5 µm	nm	Å
Strengths	Very High Resolution (Angstroms)	Large Scan Area	Large Scan Area, High Vertical Res.	Balanced Vertical / Lateral Res.	High Vertical Resolution	Macroscopic Dimensional Measurement	High-Res in situ Nano-manipulator	Best Resolution (Atomic Scale)
Max Sample Diameter	300 mm if centered	200 mm in-house	200 mm in-house	Flexible	Flexible	Flexible	200 mm	Appx 100 µm (Requires Sample Prep)
Works Best on	Smooth, Hard Surfaces	Smooth, Hard Surfaces	Opaque Material, No Steep Slopes	No Steep Slopes	Opaque Material	Opaque Material, No Steep Slopes	Conductive Samples	Nano-scale Features / Defects
	Applications							
Non-Destructive			●	●	●	●		
Cross Sectional Imaging	●		●	●		●	●	●
Flexible-Angle Imaging			◐	●		◐	●	
1D Height Line-Scan	●	●	●	●	●	●		
2D Height Map	●		●	●	●	●		
3D Profile	●		●	●	●	●		
3D CAD Model (.stp, .stl)						●		
Quantitative Dimensions	●	◐		●			●	●
Integrated Element Analysis							●	●
Nanomechanical Properties	●							

* *Technique uses single field of view, but images can be stitched together to cover a larger area*

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Covalent Metrology's team of experts use cutting-edge instrumentation to deliver affordable, impactful imaging and profilometry analysis with fast turn-around times.

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