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**High-Definition Metrology and Vision Application Note #09-06**

**Brake Disk Thickness Variation (DTV) Measurement**

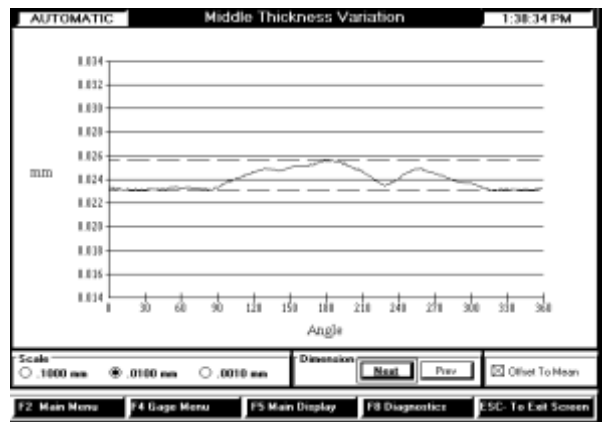
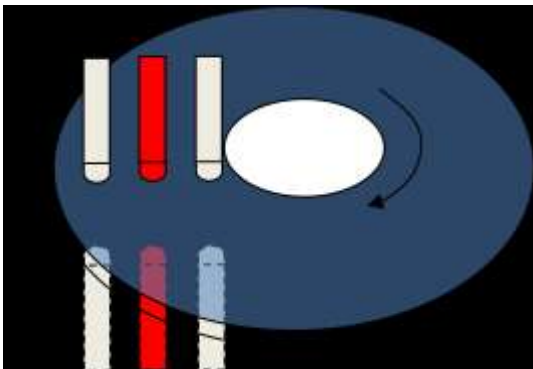
**The Manufacturing Challenge**



The geometric dimensions of brake disks, down to the micron level, have a major impact on the performance of the associated braking system and upon the noise, vibration and harshness (NVH) experienced by consumers as the vehicle “braking quality”. As vehicles have become more efficient and quieter, any brake chatter or other braking system noise and vibration effects in a vehicle become more readily apparent to its driver and passengers.

**The Metrology Need**

It is important to be able to ensure the parallelism and uniform thickness of brake disks to avoid brake chatter, noise and other vibration effects that would produce a harsh quality perceivable by the consumer. Poor braking quality results in customer dissatisfaction and excessive warranty repair costs. That ultimately feed back to the manufacturer in terms of reduced repeat customer sales and higher product lifetime costs. Traditional methods using LVDT sensors produce highly incomplete, and therefore inaccurate indications of brake surface parallelism and planarity, as only a few radii around the brake rotor centroid are ever measured.



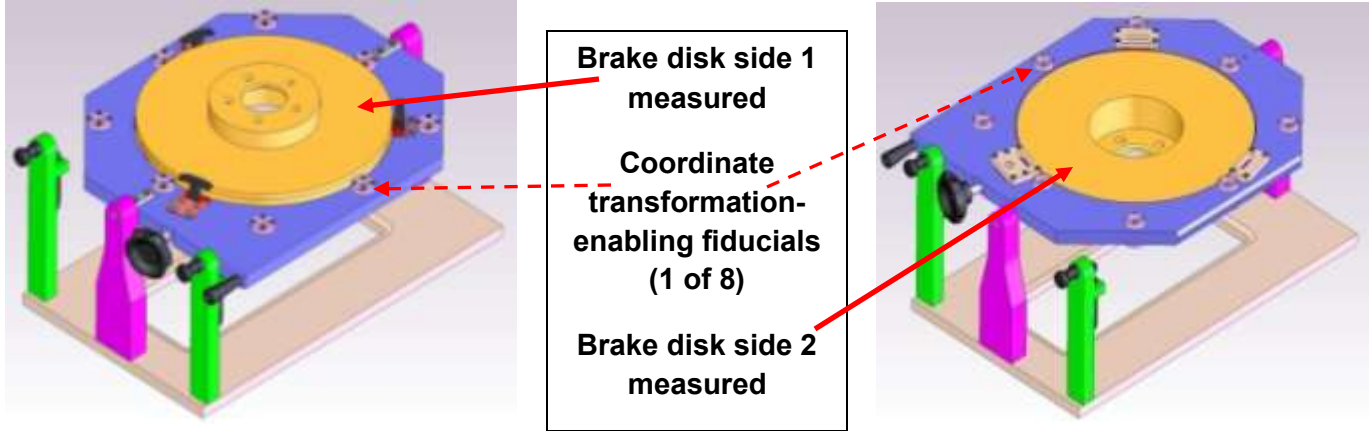
**Old Measurement Method – Incomplete and Unable to Detect Defective Surfaces**

**The Measurement Requirements**

To ensure that all disk thickness variations (non-parallelism and/or non-planarity) are reliably detected to micron-level accuracy it is necessary to measure and analyze the entire surface of both sides of the brake disk, and specifically their relationship in a single coordinate system.

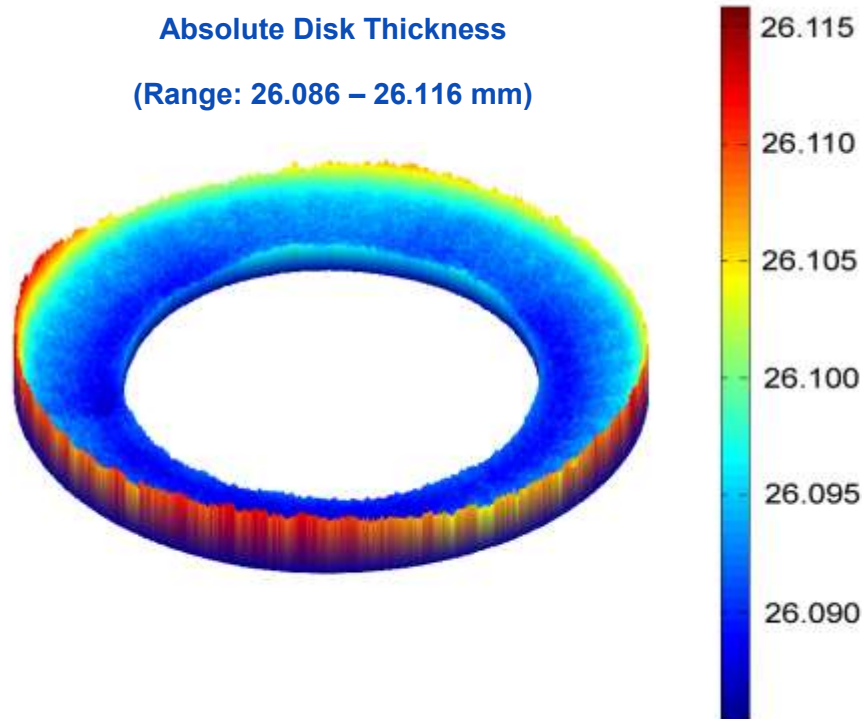
## The Coherix Solution

The **Coherix ShaPix Surface Detective™** produces a height map with a resolution of 44 surface samples per square millimeter throughout both surfaces (sides) of the brake disk. To accomplish this unique result, **ShaPix** employs a combination of fiducial-equipped fixtures and 3D measurement and analysis algorithms to accurately determine the entire geometric relationship of the two disk sides and produces a high-definition complete disk thickness map for the rotor.



## The ShaPix Results

The **ShaPix Surface Detective™** shows, in an immediately obvious visual form, the thickness shape and the relationships of the part surfaces across the entire disk surface.



## The Manufacturing Value Delivered

**ShaPix** provides a quality assurance of the dimensional characteristics of complete brake rotor surfaces not achievable by any other means at the rate of a few minutes per rotor, thus reducing warranty costs and increasing the delivered a vehicle's customer- perceived and actual quality.