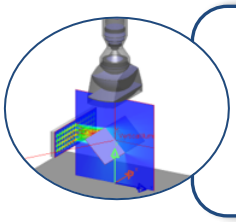
动态相位偏折法三维量检技术
Dynamic Deflectometry for Defect Inspection

ASTRI 香港应用科技研究院

基于动态相位偏折技术的3D缺陷检测系统

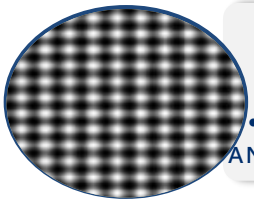
3D defect inspection system based on dynamic phase deflection technology

（适用于高速、高精度运动产线反光表面）



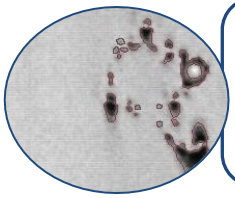
共轴远心线扫感知系统
Coaxial telecentric line scanning

- 动态相位偏折术的感测头
  Dynamic phase measuring Deflectometry



多频空间载波偏折术
Hybrid-frequency Spatial-carrier Deflectometry

- 动态线扫相位偏折术恢复表面形貌
  A Newly Proposed Method for Specular Surface 3D Sensing



频率引导梯度场缺陷检测
Frequency Guided Defect Inspection

- 多频融合梯度场快速3D缺陷检测
  Fast 3D Defect Inspection method

真空磁控溅射镀膜技术面临的问题：

Problems faced by vacuum magnetron sputtering coating technology

- 产线的高缺陷率

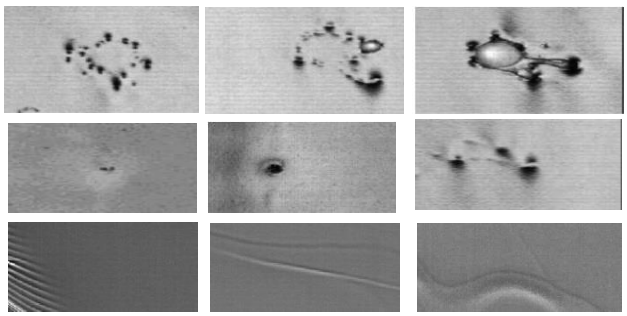
High defect rate on the production line

- 生产效率(~50米/分钟)要求高速检测技术配合

Production efficiency (~50 meters/minute) requires the high-speed detection technology

- 被检金属膜幅面大(~1.6m宽)，缺陷尺寸小(~微米)、缺陷形态复杂

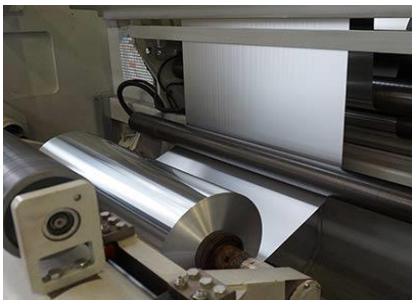
Large wide(~1.6m), Small defect size (~microns), Complex defect shapes.



应用场景 Application Scenarios

碳化硅缺陷检测
Silicon carbide defect inspection

金属箔片3D缺陷检测
3D defect detection of metal foil



检测难点包括 Technical challenges：

- 反光表面的成像难度大
  Reflective surfaces are difficult to image
- 难以针对大视场场景做到高速、高分辨率成像
  Difficult to achieve high-speed and high-resolution imaging for large FOV
- 难以做到实时缺陷检测
  Real-time defect detection is difficult to achieve

应科院检测系统规格 System Specification

缺陷尺寸 Defect size	30μm(高) 30μm(Height)
分辨率 Resolution	X: 20μm; Y: 20μm; Z: 10μm
视场FOV	240mm
检测速度 Inspection speed	80K线/s 80K lines/s
缺陷种类 Defect type	飞溅点、凹凸点、褶皱... Splatter, bulge and dent , wrinkling

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