

ICMIT 2017

三维光学测量技术如何 改变产品开发及质量

赵亮 | 2017.04.06 | 东莞



议程



1. 介绍
2. ATOS 如何改变产品开发与质量控制
3. ATOS 光学三维自动化智能技术
4. 愿景



GOM – 技术创新



集光学三维测量系统硬件和软件的设计、制造和销售



德国布伦瑞克

GOM

- 成立于1990年
- 私营公司
- 公司的研发、生产和行政管理部门都在总部德国布伦瑞克



GOM 网络分布

- 9个子公司
- 超过500名员工
- 36个销售和支持的合作伙伴 · 55个办事处
- 超过1000名的相关从业人员

GOM – 技术创新



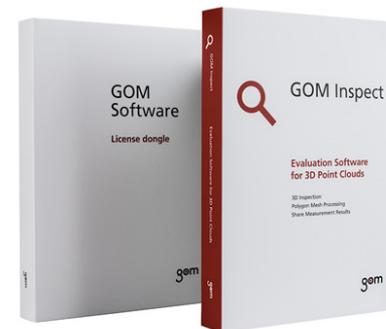
全球工业合作伙伴，拥有超过20年的光学硬件和软件的开发和生产经验

硬件和软件

硬件



软件



参数化软件

免费软件

GOM 测量系统在全球范围内广泛应用于工业、研究机构和大专院校



汽车行业



航空航天业



消费品行业



研究机构和院校

GOM – 客户 (摘要)



汽车制造商

Audi, Avtovaz, Bentley, BMW, Chrysler, Daihatsu Motor, Daimler, Fiat, Ford, GM, Honda, Hyundai, Isuzu, Jaguar, Kia, Land Rover, McLaren, Modenas, NAZA, Nissan, Opel, Porsche, PSA, Renault, Seat, Skoda, Subaru, Suzuki, Tata Motors, Toyota, VW, Volvo, Temsa, ...

汽车供应商

Automotive Lighting, Batz, Bertrandt, Bosch, Bombardier, Bridgestone, Carcoustics, DAAZ, Dräxlmaier, Faurecia, Georg Fischer, Gienanth, Goodyear, Hella, Johnson Controls, Kautex Textron, Michelin, Nothelfer, Pininfarina, Siemens, Thule, ThyssenKrupp, ZF Sachs, ...

航空航天

Airbus, Air Force Research Labs, Aselsan, Boeing, Cessna, Chrom Alloy, DLR, DNV, EADS, Eurocopter, FAA, FOI, Goodrich, Gorbynov Aviation, Hansen Transmissions, Hydro, IMPO, JAXA, Lockheed Martin, NASA, NLR, Northrop Grumman, ONERA, Vulcan Air, VZLÚ, ...

全球已安装超过10,000个系统

涡轮机制造商

ABB Turbo systems, Alstom, Aviadvigatel, BTL, Chromalloy, Elbar Sulzer, E.ON, Gorbynov Aviation, Honeywell, Howmet, IMA Dresden, MTU, Pratt & Whitney, Rolls Royce, Salut, Saturn, Siemens PG, Snecma, Solar Turbines, Triumph, Turbine Services, ...

消费品

adidas, Asics, ASUS, Blaupunkt, Bosch, Braun, Ching Luh Shoes, Ecco, Fisher-Price, Foxconn, Fuji, Gillette, Greenpoint, Hilti, Lego, LG Electronic, Mattel, Microsoft, Motorola, Nautor, Nike, Nokia, Philips, Reebok, Samsung, SANYO, Siemens, Sony, Stihl, Villeroy+Boch, Walt Disney, ...

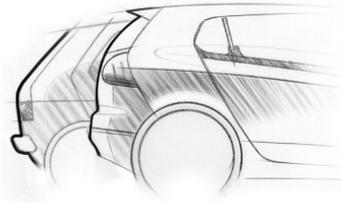
材料供应商

ACTech, Alfa Laval, Alcan (Alusuisse), Arcelor, , BASF, Bayer, Corning, DuPont, EXXON, Hydro (VAW), Pierburg Kolbenschmidt, Salzgitter, Shell, Tata Steel, Thyssen Krupp, Thyssen Nirosta, Tokai Rubber Industries, Voest Alpine Stahl, ...

ATOS 如何改变产品开发与质量控制



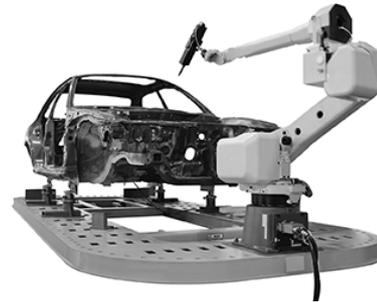
现代产品变化



复杂的设计



快速的更新换代



崭新的生产工艺



更高的质量要求

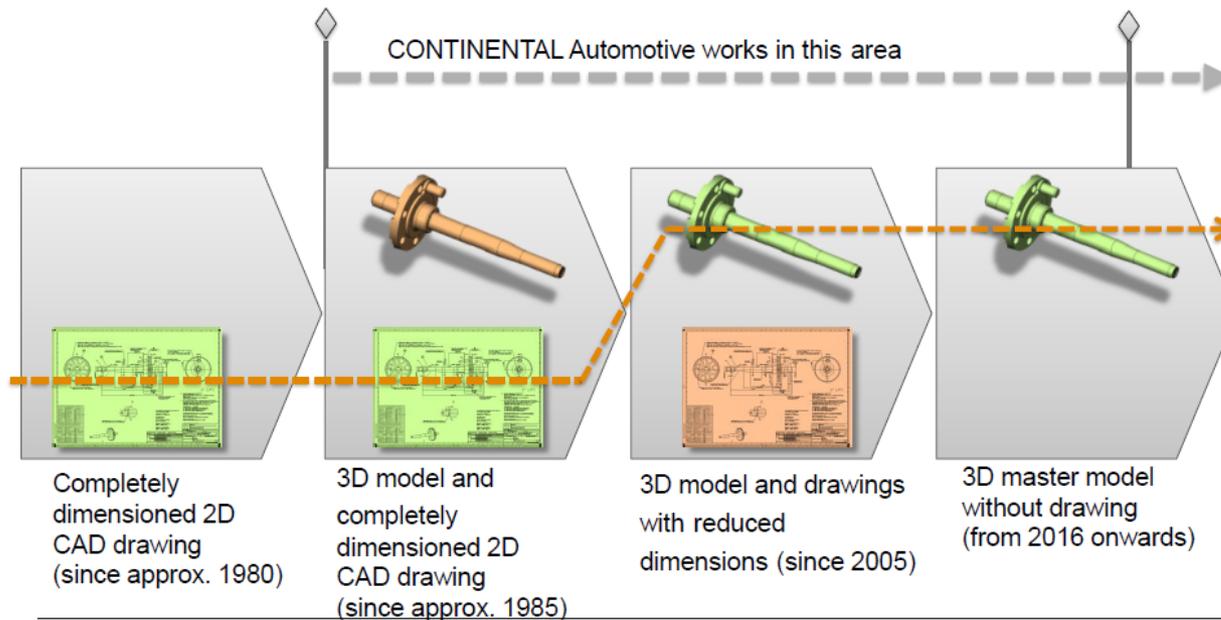
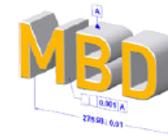
产品开发周期 (PDP)



这个过程正在加快。



The Evolution in Mechanical Design Master Change to a 3D Model



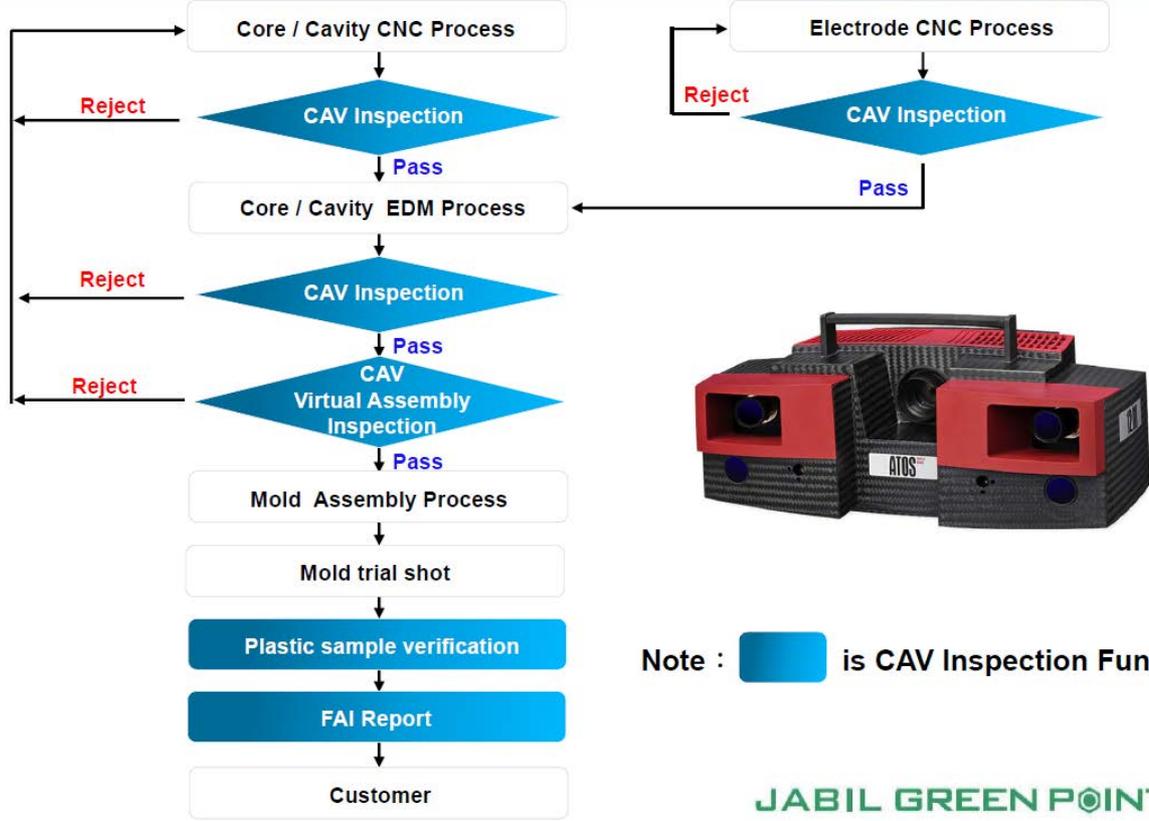
AIT EA ME
Public

6 July 2016
Angela Eisenhardt © Continental AG

10



Mold Develop Workflow



Note :  is CAV Inspection Function

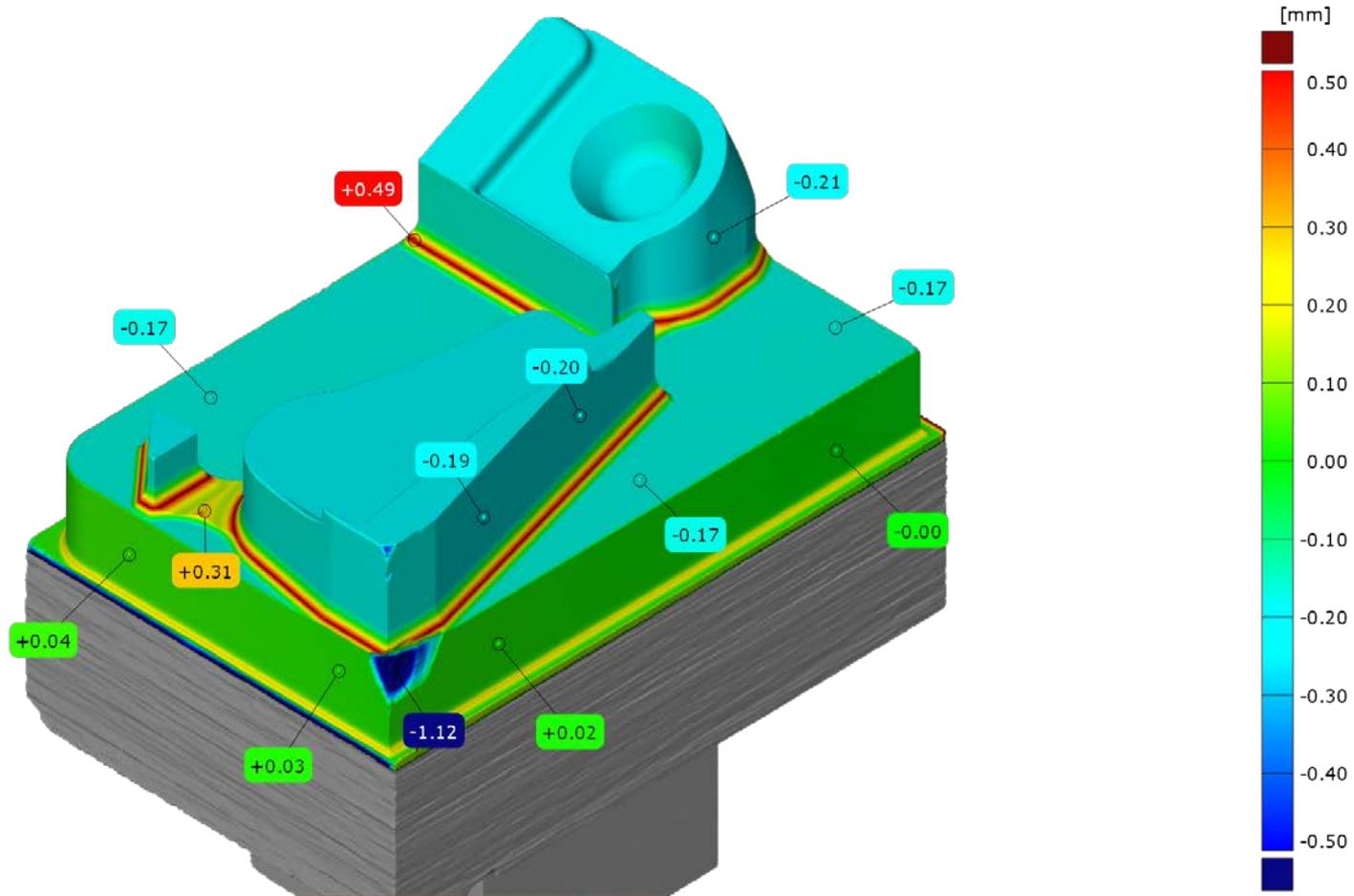
JABIL GREEN POINT^{10/23}

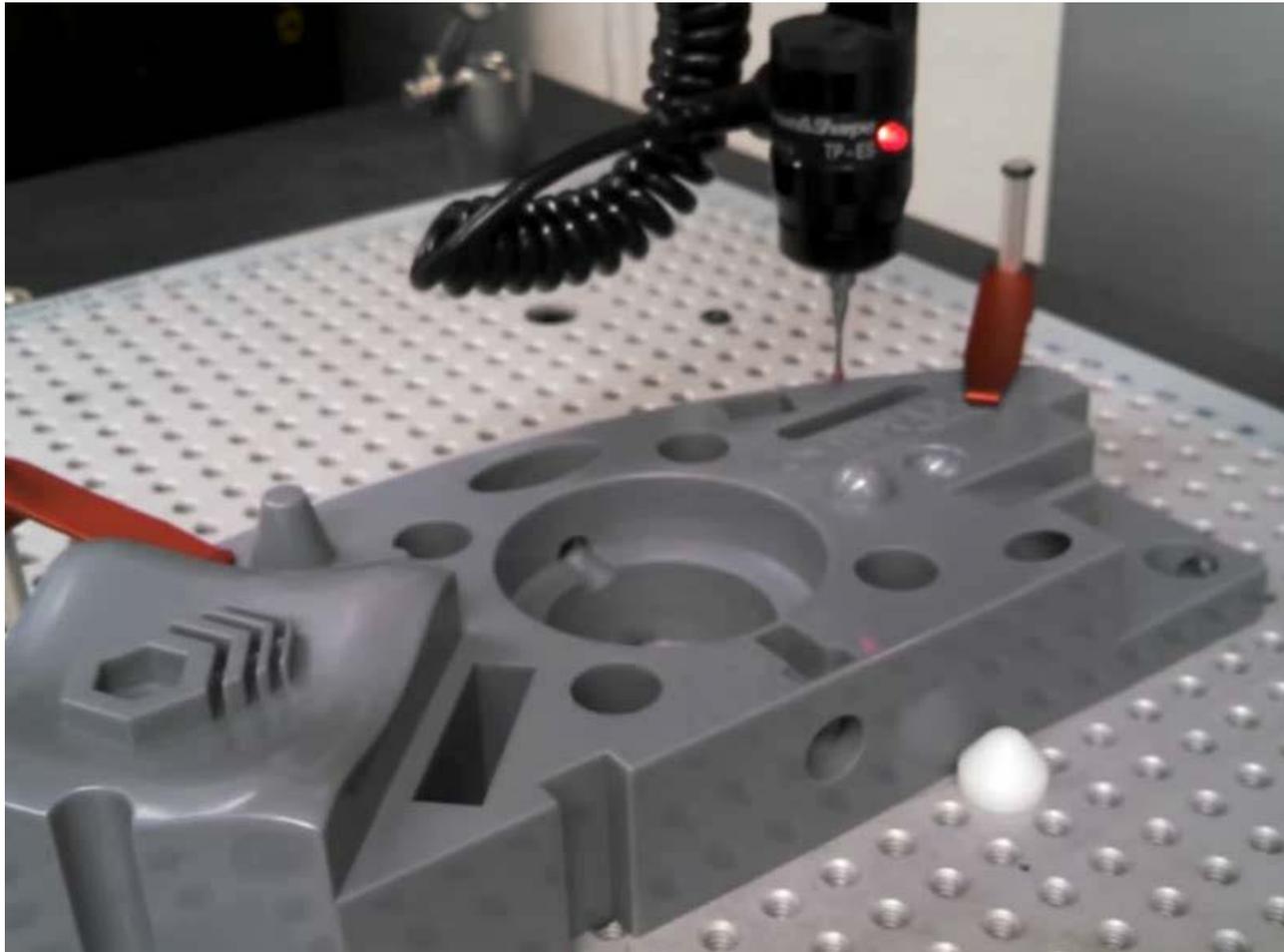
Mold inspection

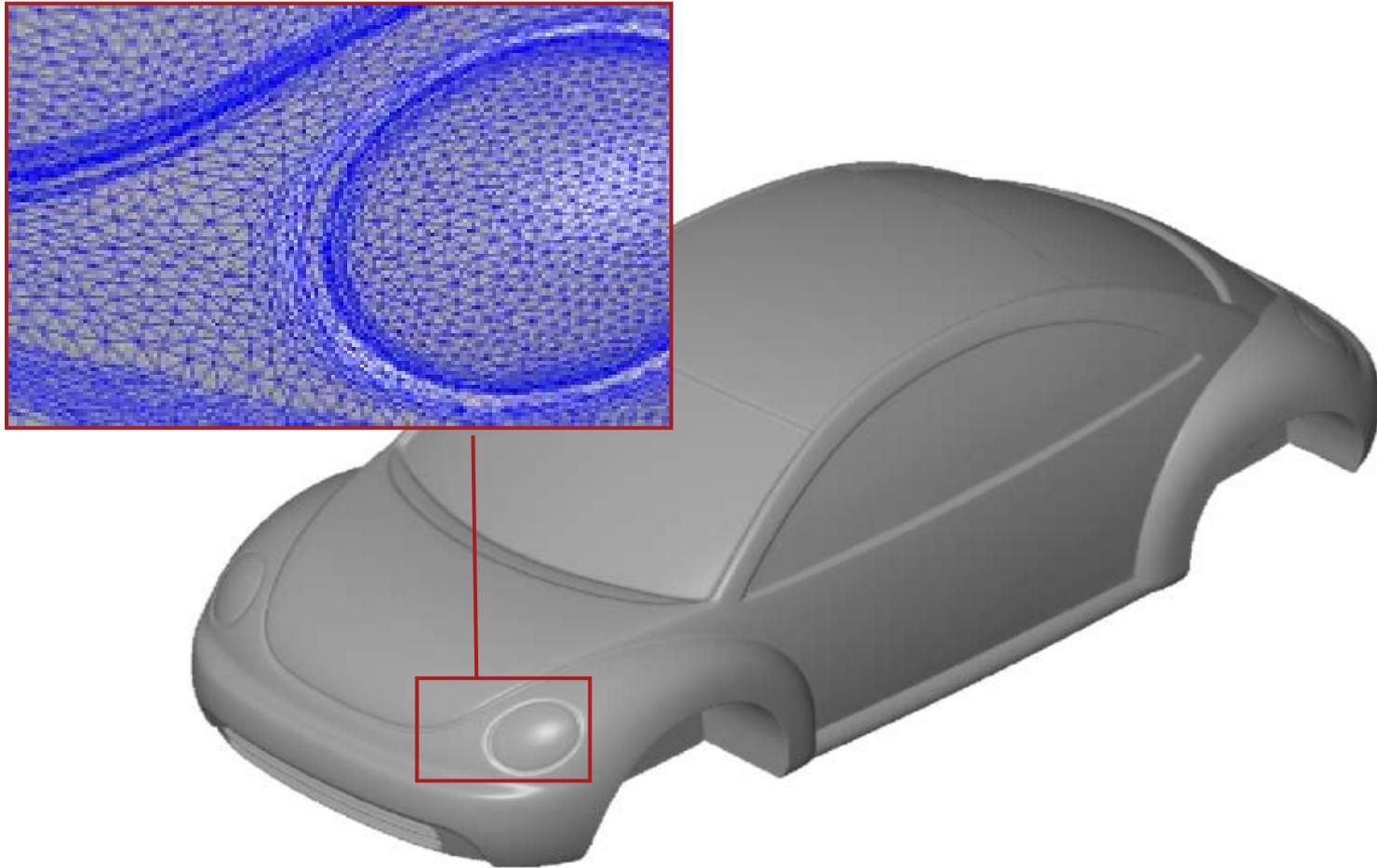
- 01 **Electrode Inspection**
- 02 **Core/ Cavity Inspection**
- 03 **Mold Virtual Assembly**

JABIL GREEN POINT^{14/23}

模具开发







质量管理



计量学是一门关于测量的科学：

- CAD (标称模型)
- 实际零件的尺寸

2种系统：

1. CMM

- 坐标测量机
- 典型速度：~1 每秒一个点
- 1950

2. 三维扫描

- GOM ATOS 系统
- 速度：每4秒拍照一次·获取高达16.000.000 个点
- 1990

ATOS 系统可以将实际零件数字化得到三维数据



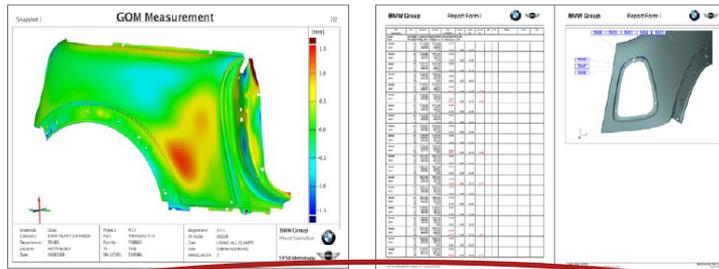
Mini
Dept:FO-301
Date: 13/09/10
Page 9

Mini Presentation Change in Measurement Process

One of the main question we had to ask , was has the measurement process changed when we moved from CMM to GOM.

The answer was **NO**

We had only improved the speed of measurement and added a colour map, we still ran Series measurement to the standard CMM process.



2 Pages

97 Pages

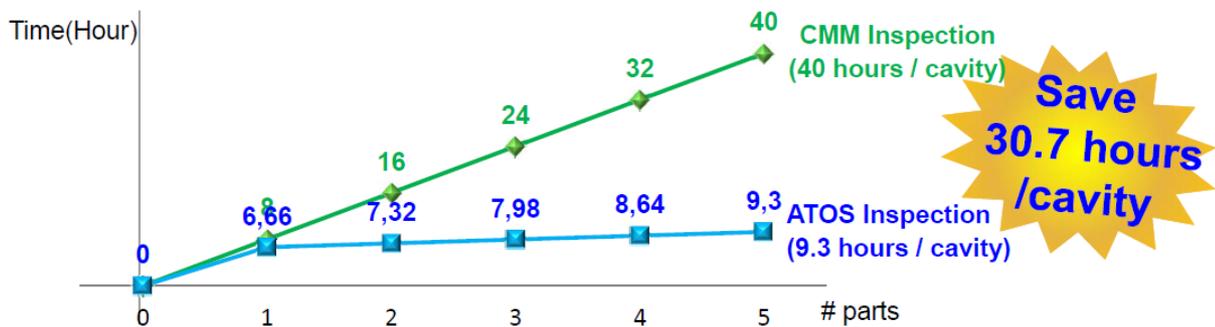
One of the main advantages of GOM was the speed of which parts could be analysed , but during series a CMM style report was still produced and reviewed.

- Every panel measured in GOM generated a colour map and also a CMM Series point report including Form, Trim and pierce
- The review of problems found highlighted that 97% of problems were form related
 - After Discussion with the Press shop they confirmed the that generally only the form process would vary due to material spec and press pressure changes and that change in form could be linked the trim and pierce changes due to the change in form location on the die.

Next Step :- Change the measurement process to Focus on Form and GOM

**Kevin Titcombe
BMW Group
Geometry Tech Manager**

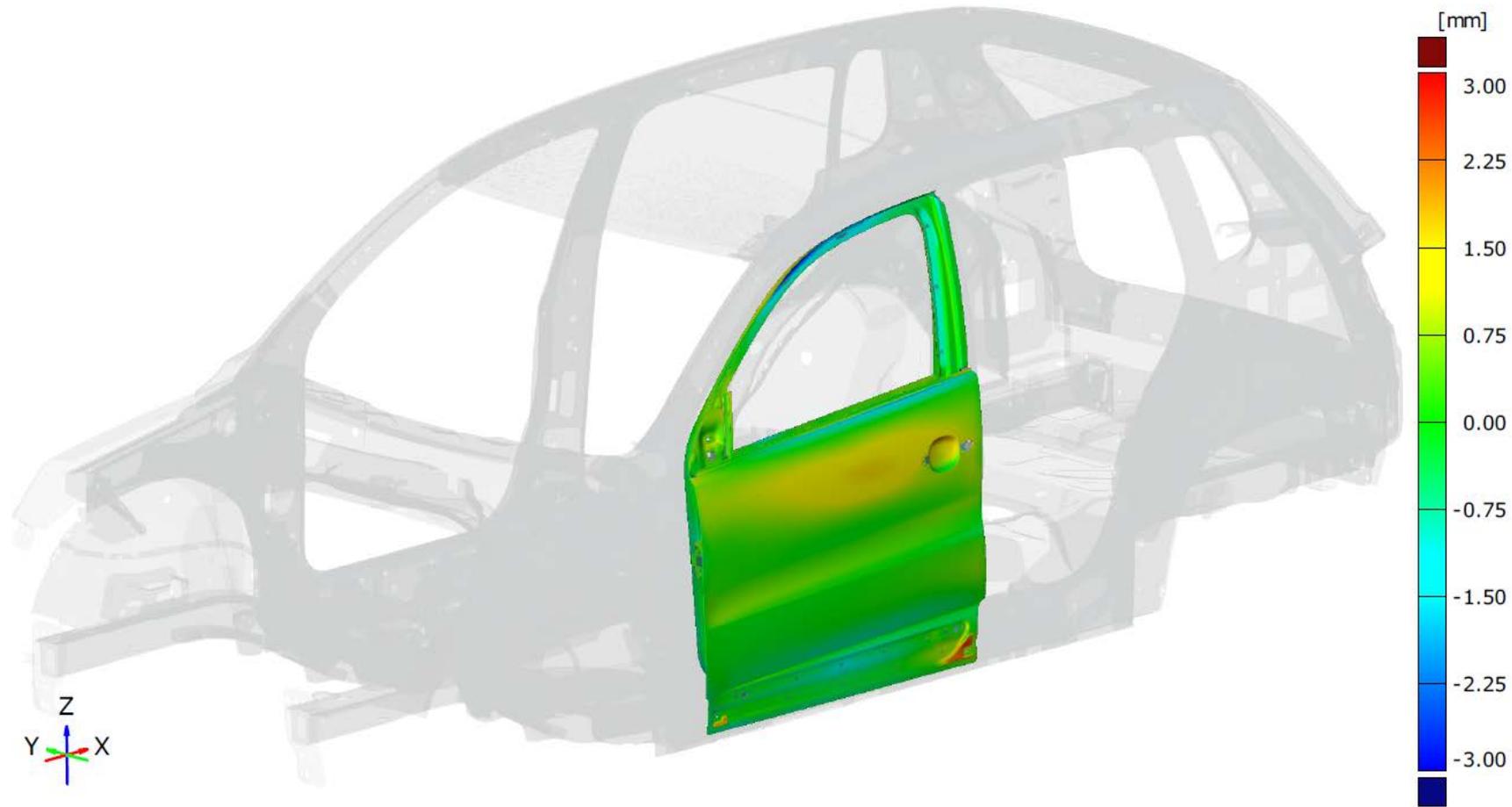
FAI Time Benefit : CMM+OMM vs ATOS



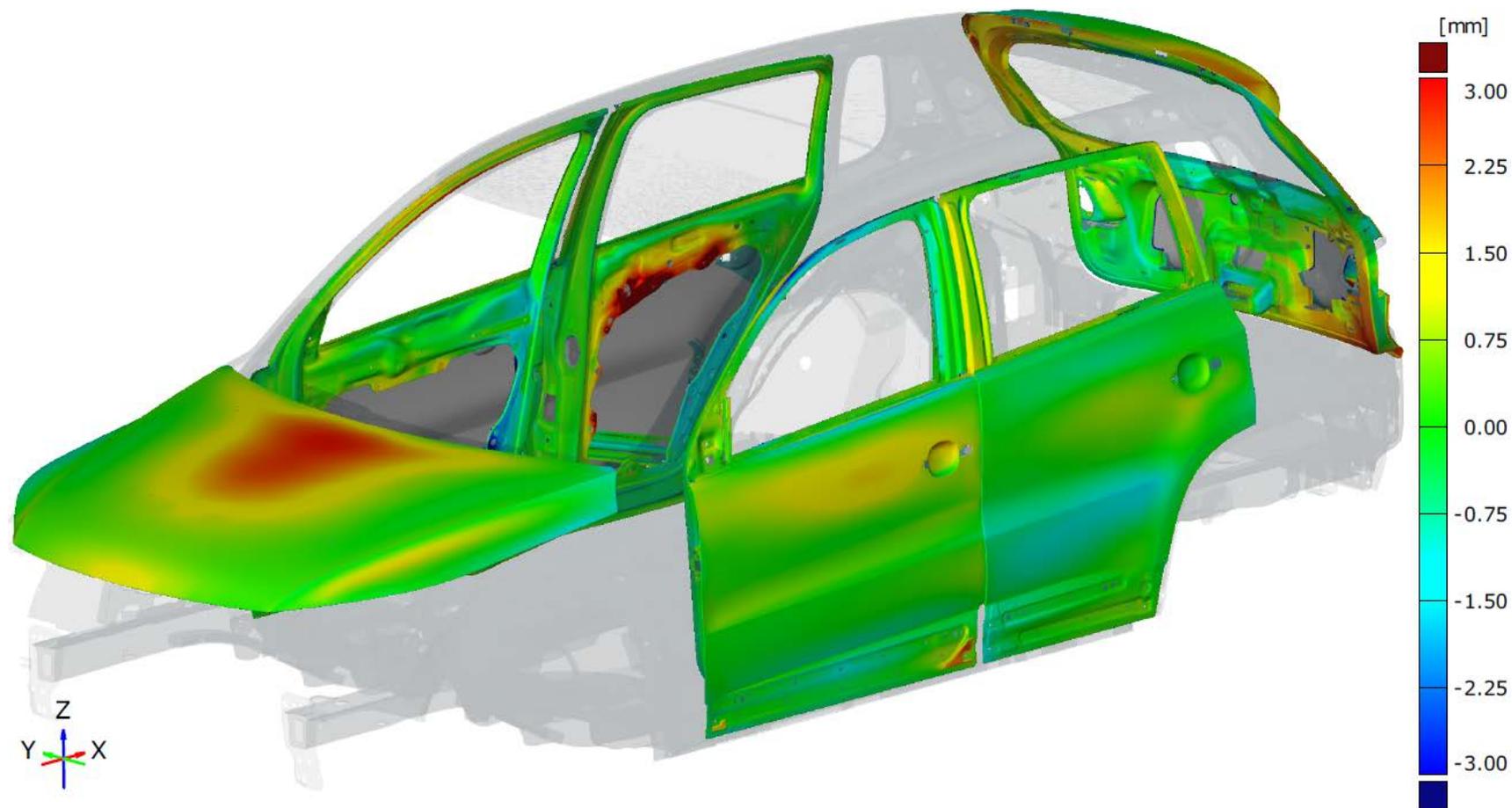
100 dimensions in FAI	CMM&OMM manual Inspection	ATOS manual Inspection
	5 FAI / cavity	5 FAI / cavity
1part	8 hours / FAI report	6.00 hours for template 0.25 hour for scanning 0.33 hour for polygonization 0.08 hour for update report
		0.66
5 parts	40 hours / cavity 8 hours × 5 FAI/Cavity	9.3 hours / cavity 6 hours + (0.66 hour × 5 FAI/Cavity)

JABIL GREEN POINT^{22/23}

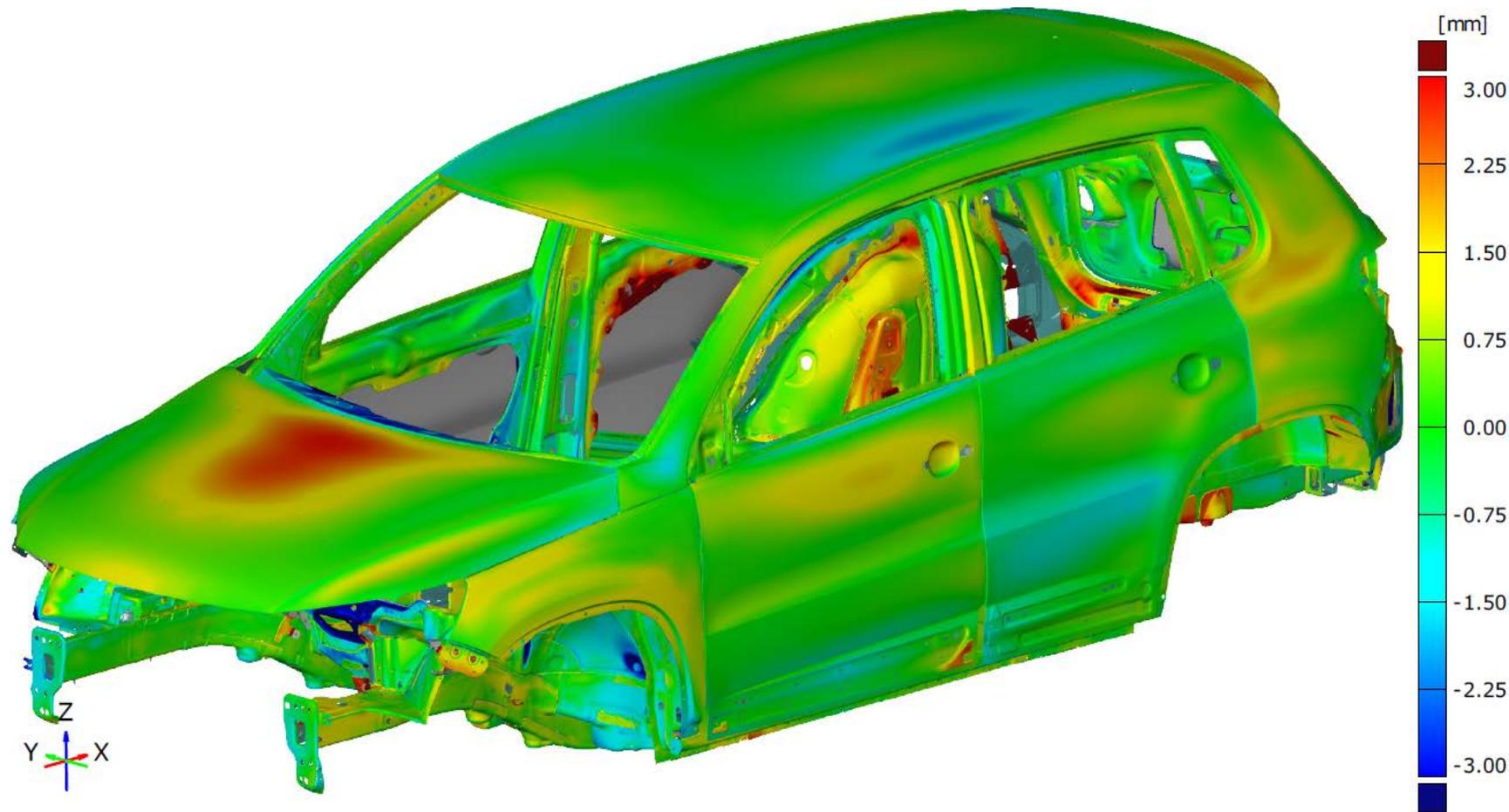
装配分析



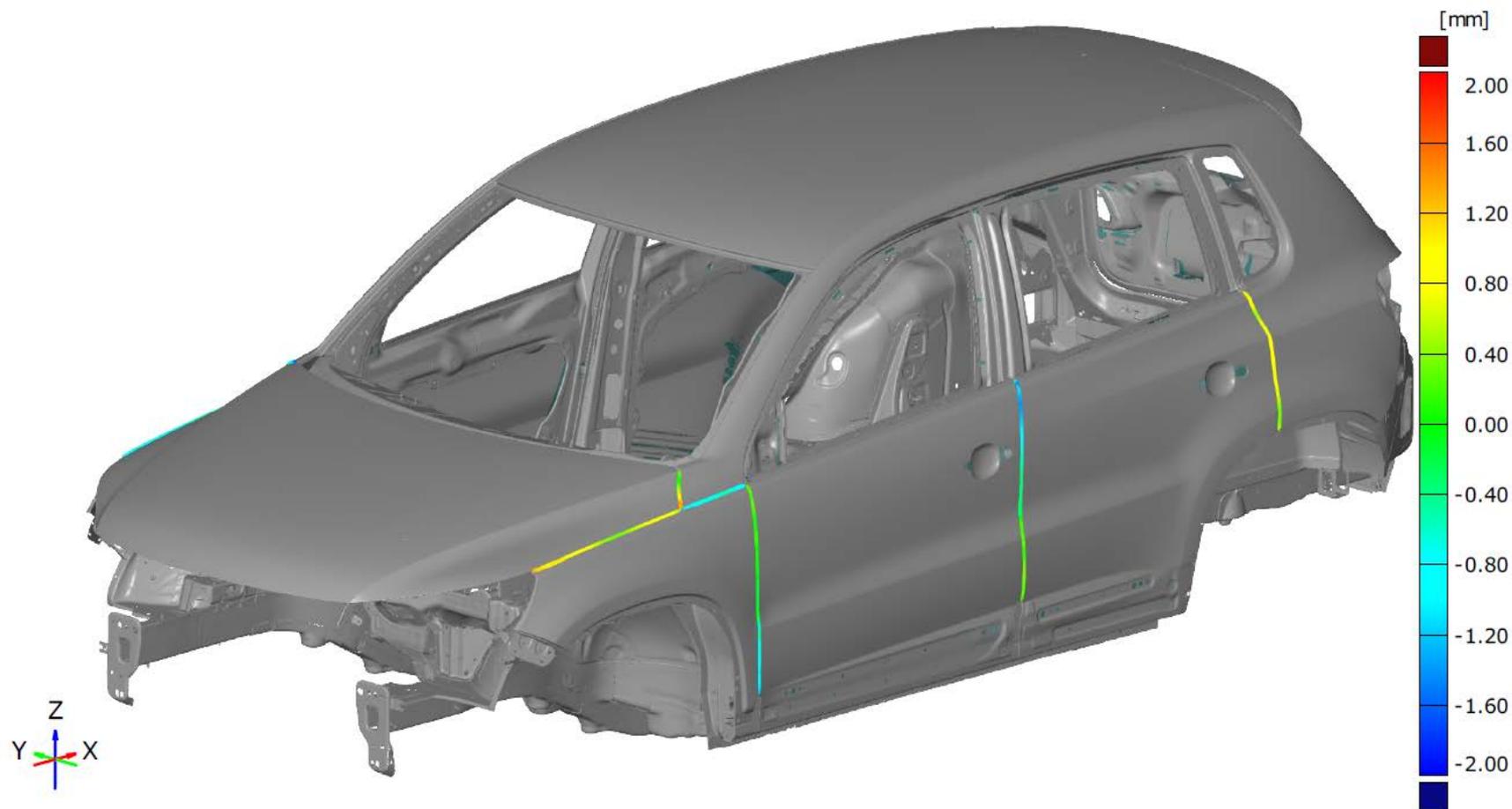
装配分析



装配分析



縫隙和齐平

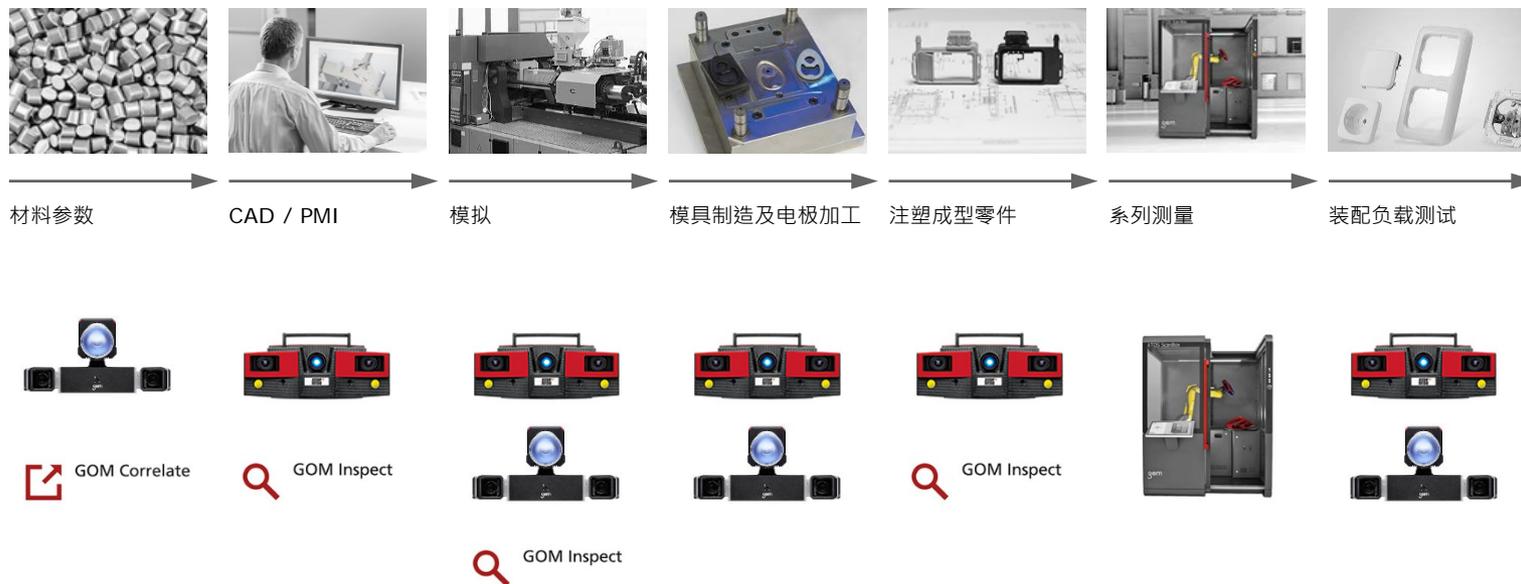


成型工艺过程



GOM的系统简化了产品开发和生产过程中复杂的测量任务

- 缩短开发时间
- 提高产品质量
- 提高整个产品生命周期的质量保证



ATOS 光学三维自动化智能技术



自动化三维检测



整个测量和检测过程自动化

光学三维测量自动化是满足工业要求所必需的：

- 更少操作员的影响
- 更高的产出
 - 可以测量更多零件
 - 可以收集更多信息
- 过程中的安全性更高



包括扫描条形码/标签/二维码



自动化三维检测



工业4.0需要三维光学自动化智能技术！



Mini
Dept:TO-301
Date: 13/09/10
Page 12

Mini Presentation

Change in Measurement Process – Time Line

- To be able to improve our overall measurement process we had to understand measurement time line, for this process we split the time line into 3 section **A) Set-up** **B) measurement** **C) reporting and analyse**

255min

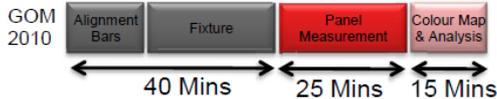


- The CMM process was with a PH10 and standard eMMA geometrical reporting on 220 Form points + Trim +Holes
- Total Time = 255 mins



- The GOM process was using version 6 and alignment bars (dots) and exporting a Form colour map and a eMMA Series report for Form points + Trim +Holes
- Total Time = 170 mins

80min



- The new GOM process measures and reports only form + alignment holes using GOM Software
- This allow for a faster measurement time due to decreased amount of photo's and decreased alignment bars due to form only measurement and faster analysis due to no eMMA process
- Total Time = 80 mins (less than half of the current measurement process time)



ATOS Capsule Plus 29M in ScanBox 5108

3D Scanning

自动化三维检测

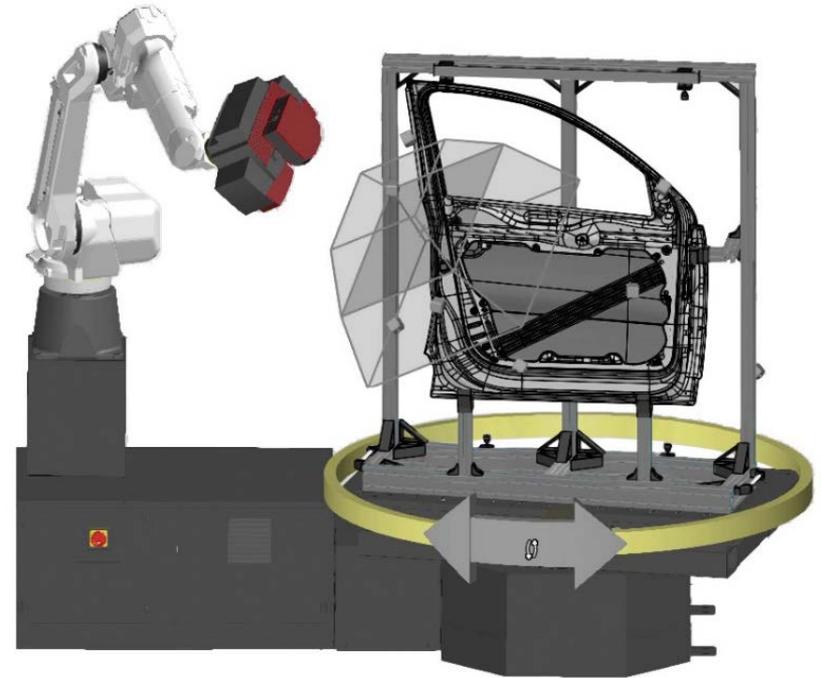


虚拟计量室 (VMR)

- 实际系统的场景及其功能性仿真
- 中央控制和测量规划软件

完全集成的自动化方案

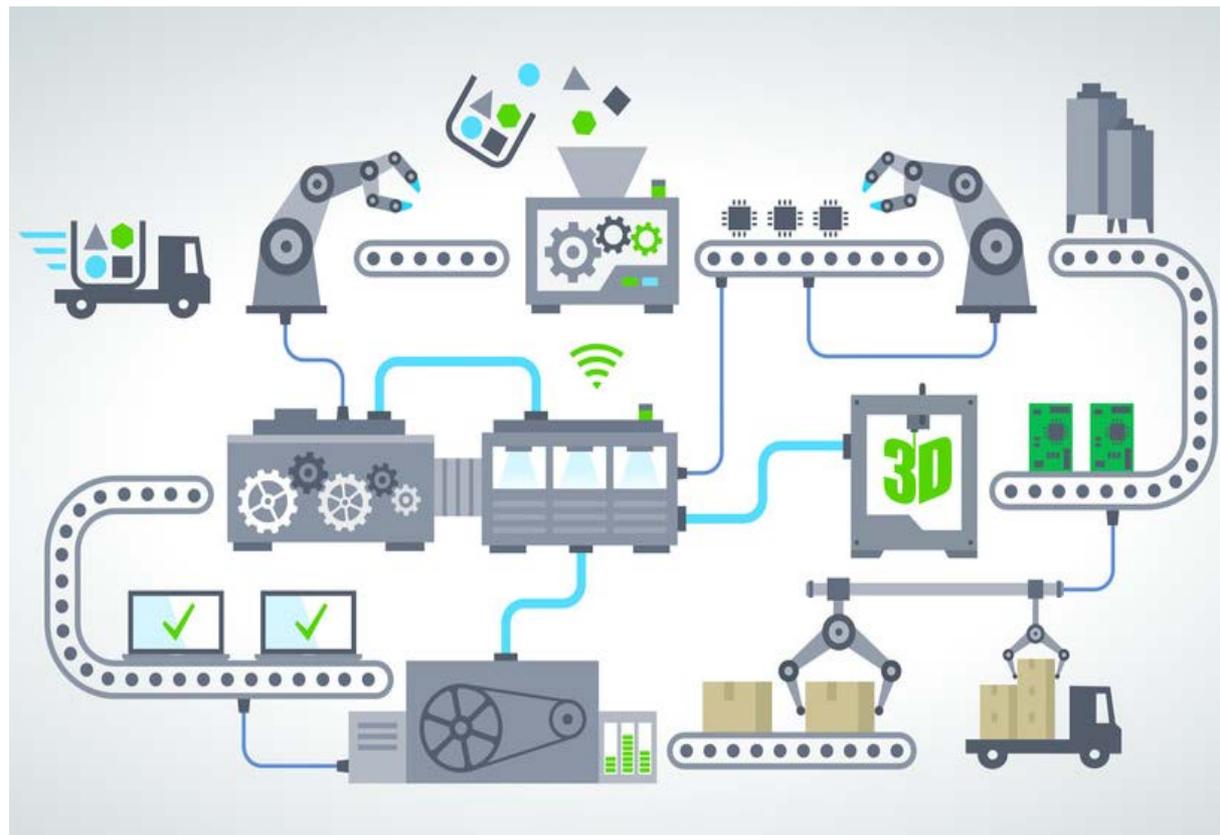
- 自动智能编程技术
- 自动优化机器人路径
- 智能碰撞侦测
- 曝光时间自动侦测
- 反光区域智能侦测
- 测量头状态自我智能监控
- 自动处理数据
- 自动输出报告

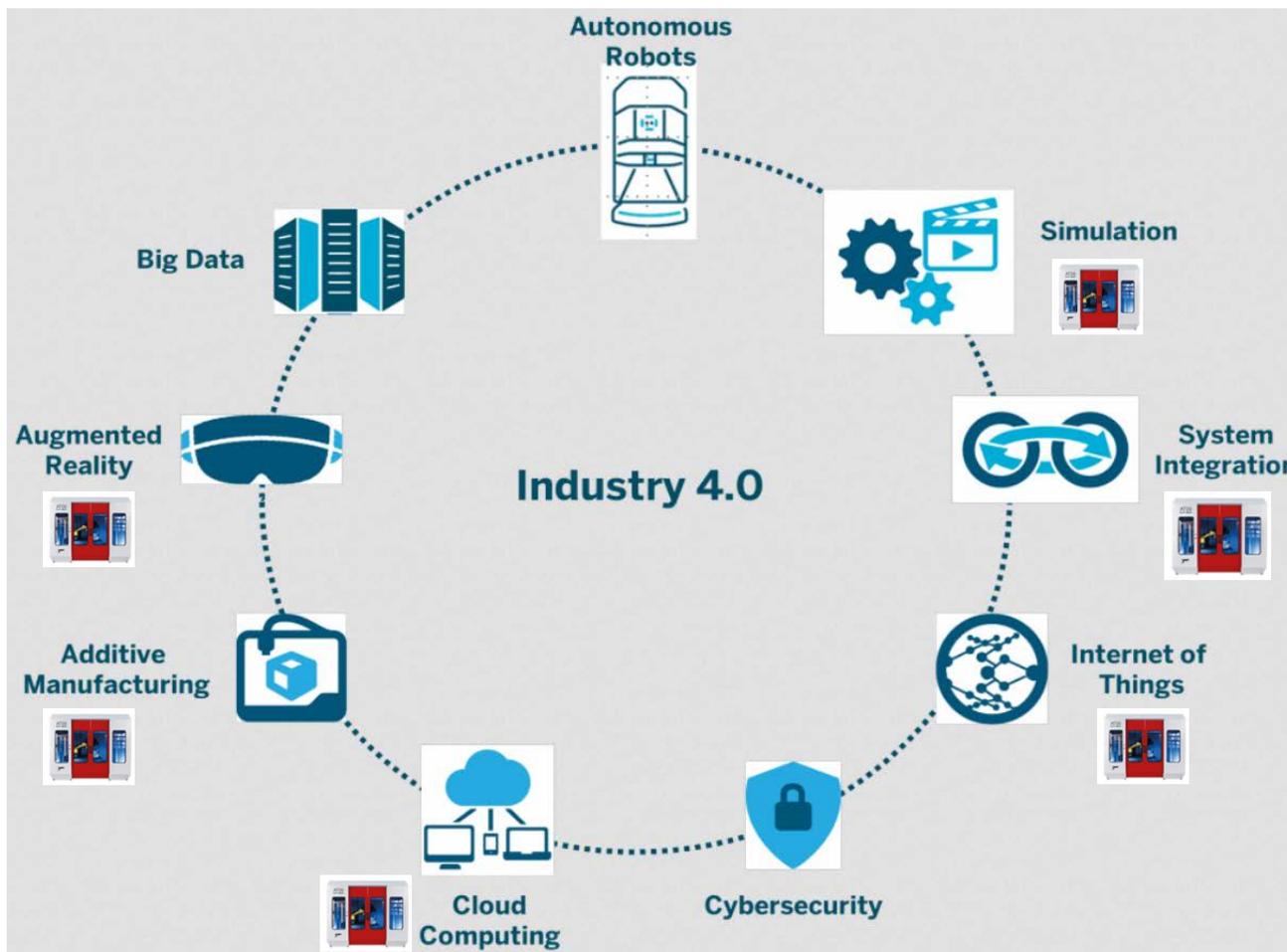


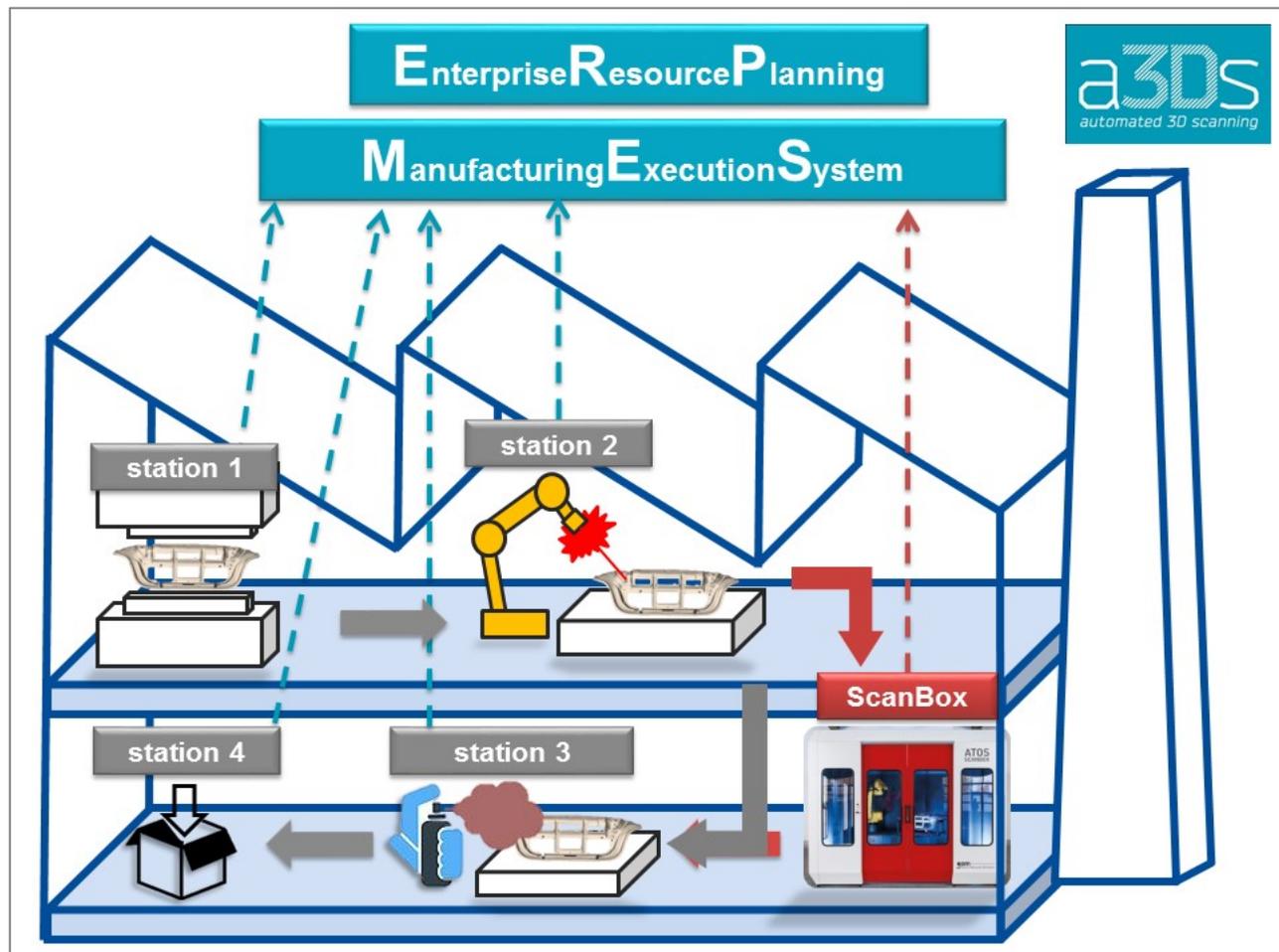
ATOS ScanBox 4105

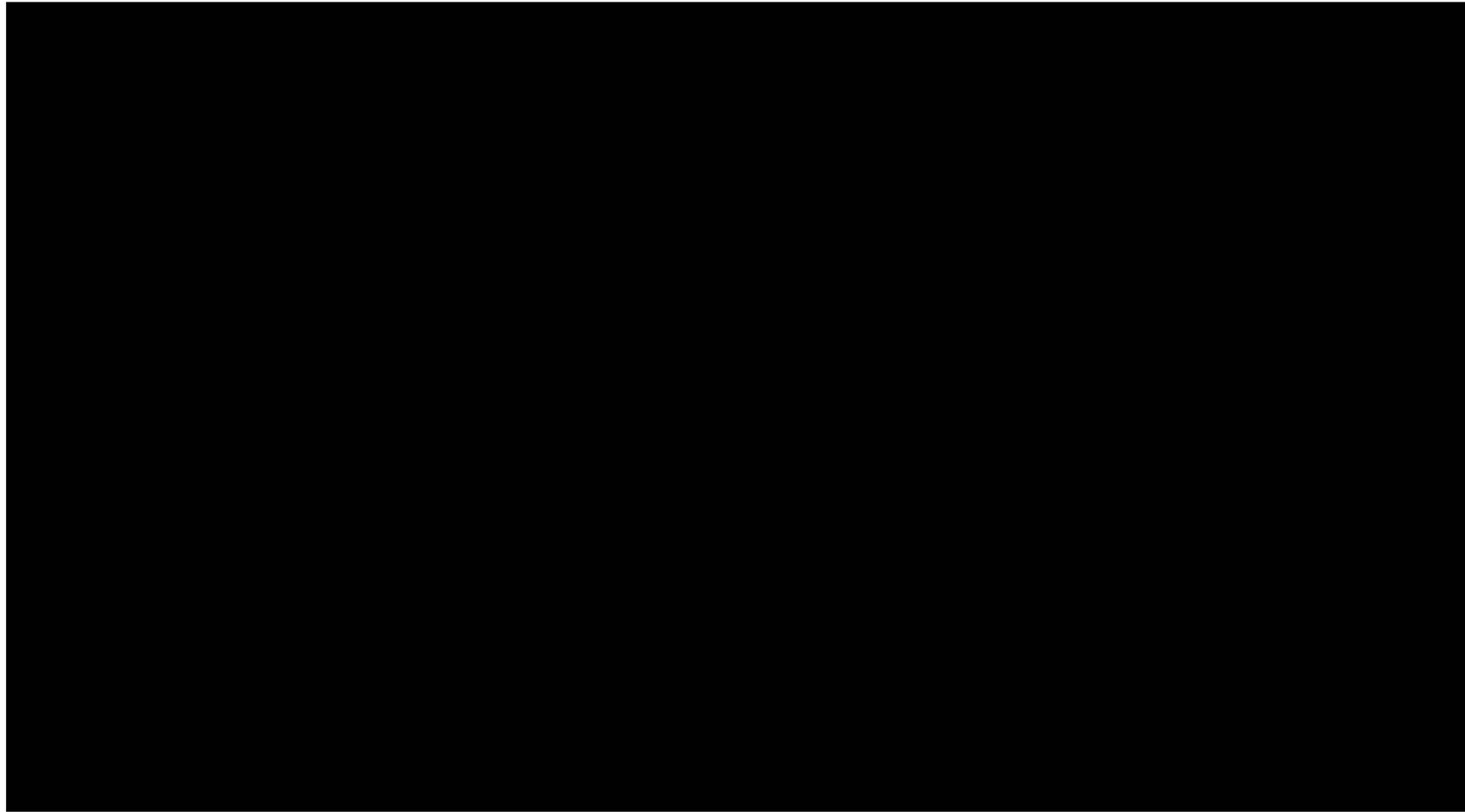
Auto Teaching and Path Optimization

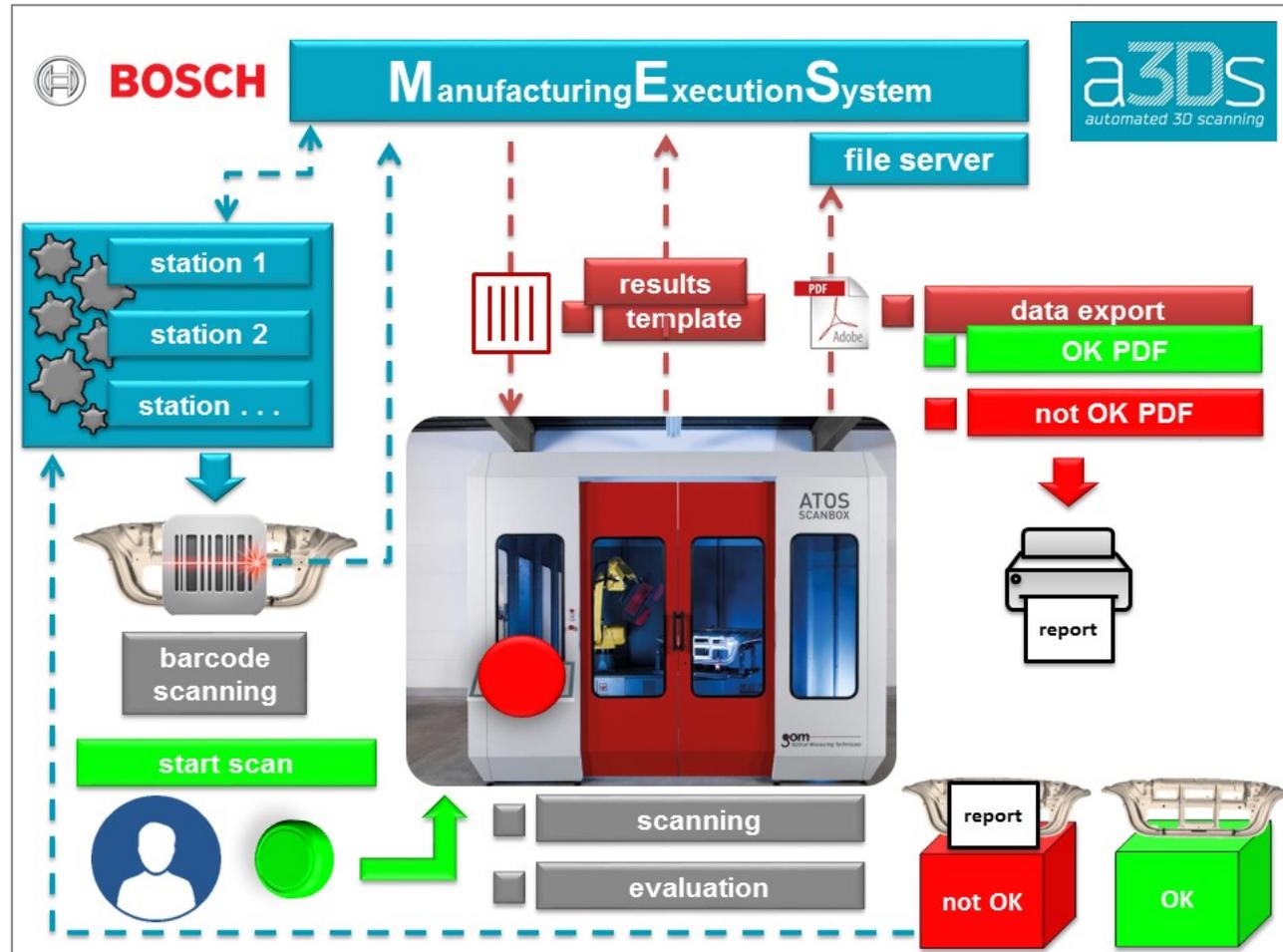
愿景

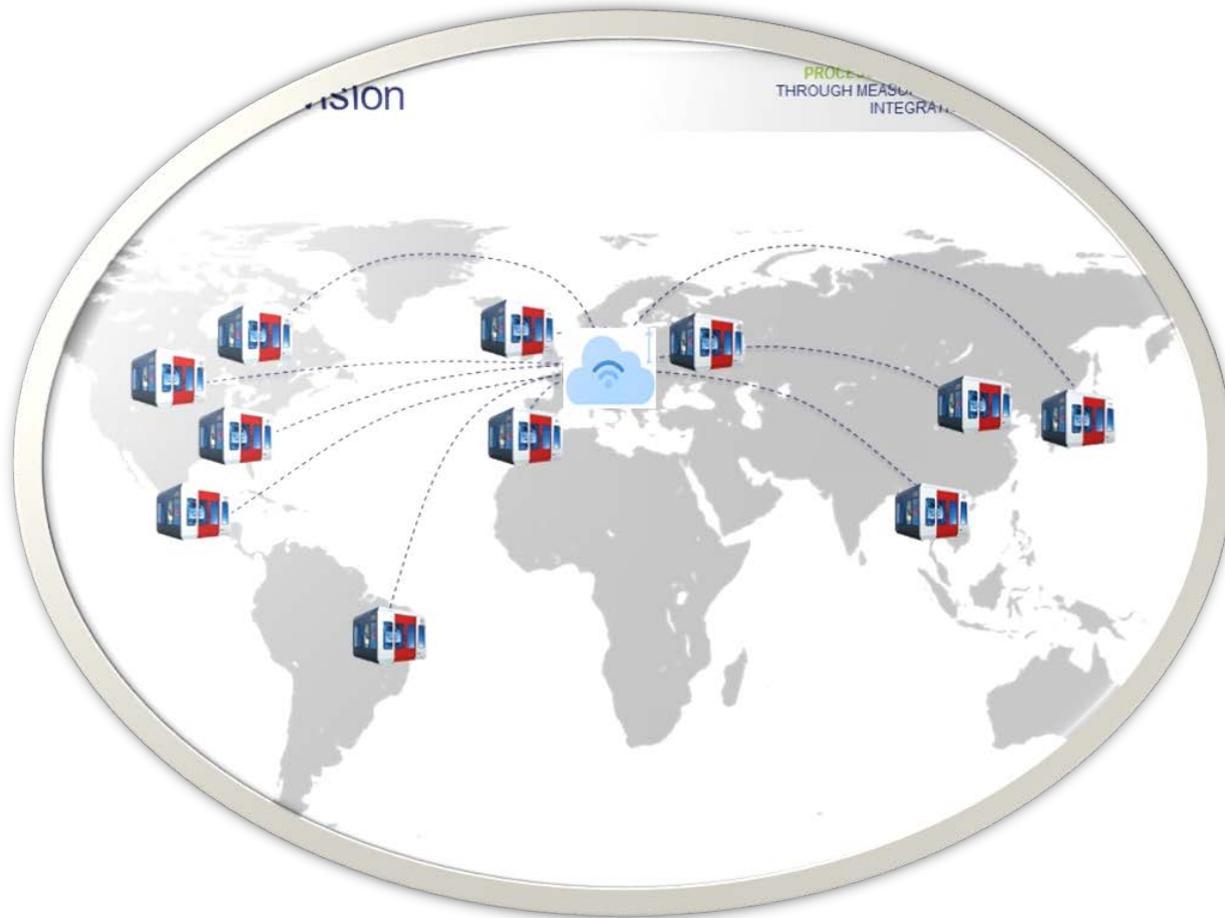












PROCESS THROUGH MEASUREMENT THROUGH INTEGRATION

Cooling fixture adjustment view

Color plot

Complete

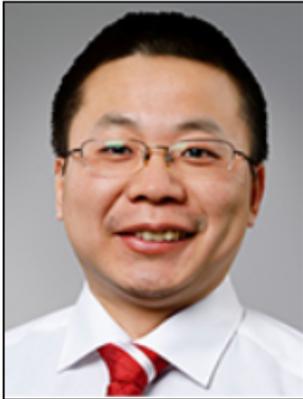
Full statistics of all measurement

Name	Nominal	Stats	Trend
A1 pt.2	Nominal value: 899.80	N: 7 μ: -0.5 σ: 0.2 Lower tolerance: min: -0.3 max: -0.3 Upper tolerance: 0.2	16.26
A2 pt.2	Nominal value: 899.80	N: 7 μ: 0.3 σ: 0.2 Lower tolerance: min: -0.3 max: 0.4 Upper tolerance: 0.2	15.91
A3 pt.2	Nominal value: 899.44	N: 7 μ: -0.4 σ: 0.0 Lower tolerance: min: -0.4 max: -0.3 Upper tolerance: 0.2	150.40

AR 技术



关于讲师



赵亮

GOM Asia , 亚洲区商务拓展经理

经历：

毕业于德国斯图加特大学 信息测绘工程系

支持多个大型光学测量自动化项目

创立GOM 亚洲区分部

亚洲区商务拓展经理



GOM – Precise Industrial 3D Metrology

Thank you for your attention.

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