



Emerging GNSS Applications of Digital Constructions and Agriculture in China

GNSS 在中国农业及数字化施工的新兴应用

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Trimble's Market 天宝的行业市场



Agriculture
农业



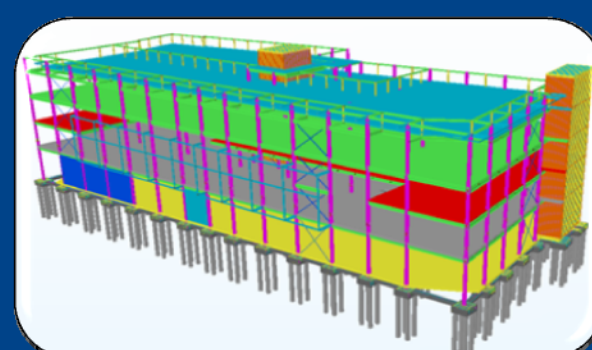
**Heavy & Civil
Construction**
大型土木工程



Geo Information
空间地理信息



MRM
交通运输与物流



Building Construction
用于建筑的BIM

Agriculture 精准农业



Planning & Management
农场规划, 测绘与管理

Machine Auto-pilot & Guidance
拖拉机与实施导航与控制

Productivity Management
产量测量

Cost Control
减少投入成本: 燃料, 肥料, 农药

Environment Impact
降低环境影响

Guidance and Steering	Correction Services	Farm Works Information Management	Planting, Pest/Nutrient Management	Harvest	Water Management
<ul style="list-style-type: none"> Displays Steering Implement Guidance Radios, Receivers, and Modems 	<ul style="list-style-type: none"> CenterPoint™ RTK, VRS, RTX OmniSTAR® HP, XP, VBS 	<ul style="list-style-type: none"> Office Solutions Connectivity Solutions Field Solutions Livestock Solutions 	<ul style="list-style-type: none"> Automatic Section Control Variable Rate Application Control 	<ul style="list-style-type: none"> Row Guidance Yield Monitoring 	<ul style="list-style-type: none"> 3D Levelling and Drainage Laser Transmitters 2D Levelling

Heavy & Civil Construction 大型土木工程

Productivity & Process Control

更快的项目完工、施工过程控制

Cost Control

减少投入成本: 燃料, 返工, 劳动力

Safety

增加安全性

Environment Impact

降低环境影响



Machine Control



Grade Control that is faster, more accurate and minimizes rework.

Paving Control



Increase paving accuracy and smoothness while minimizing asphalt usage.

Site Positioning



Measurement, stakeout, quality control and progress monitoring on the job site.

Software Solutions



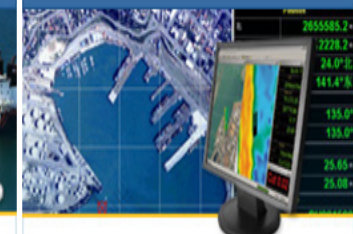
Manage fleets and assets, perform takeoff and data prep, collaborate and stay connected with software powered by Trimble.

Marine Positioning Solutions



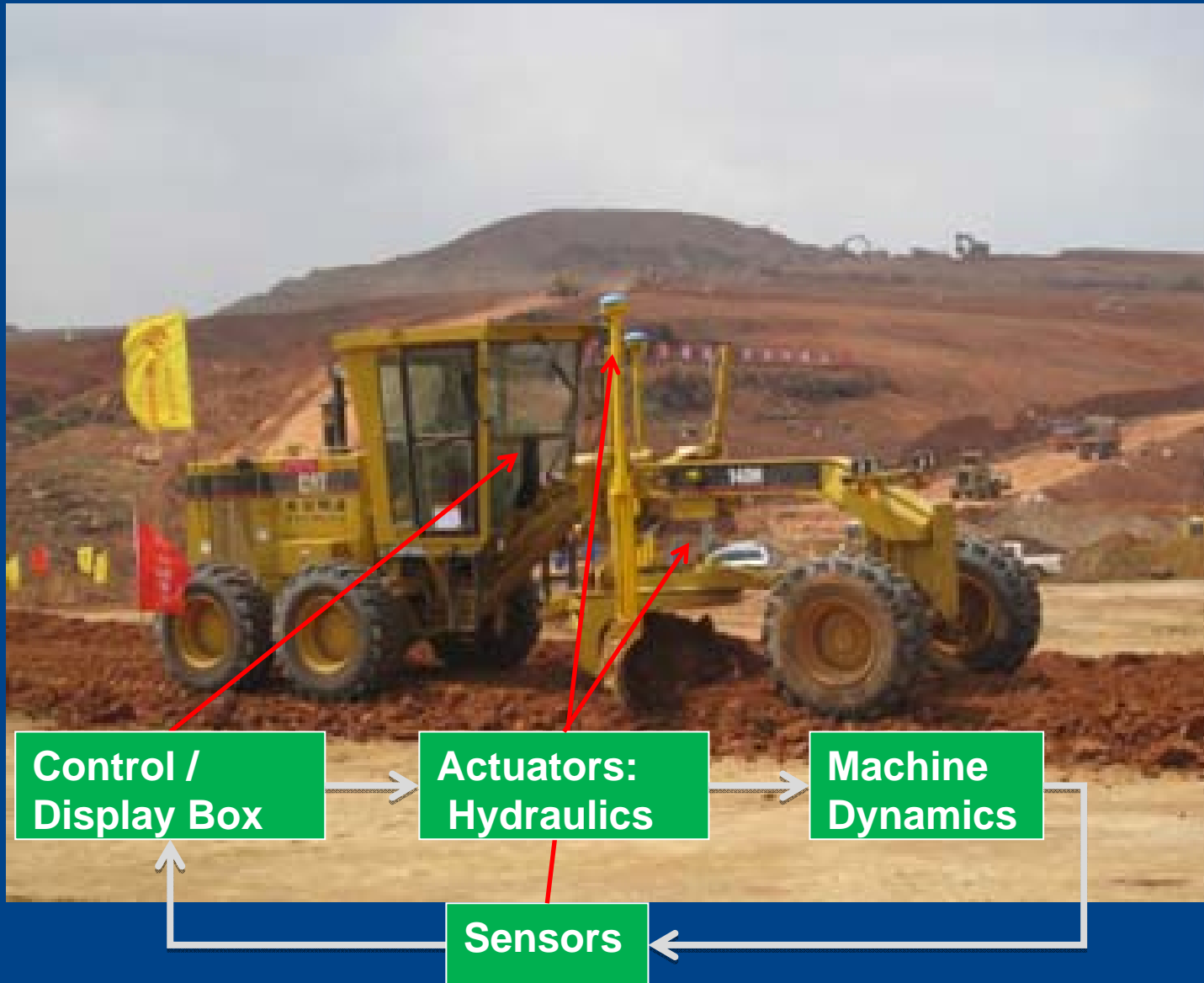
Trimble Marine GNSS receivers and antennas provide position accuracy to suit most marine construction applications - up to precise centimeter accuracy.

Marine Construction Software

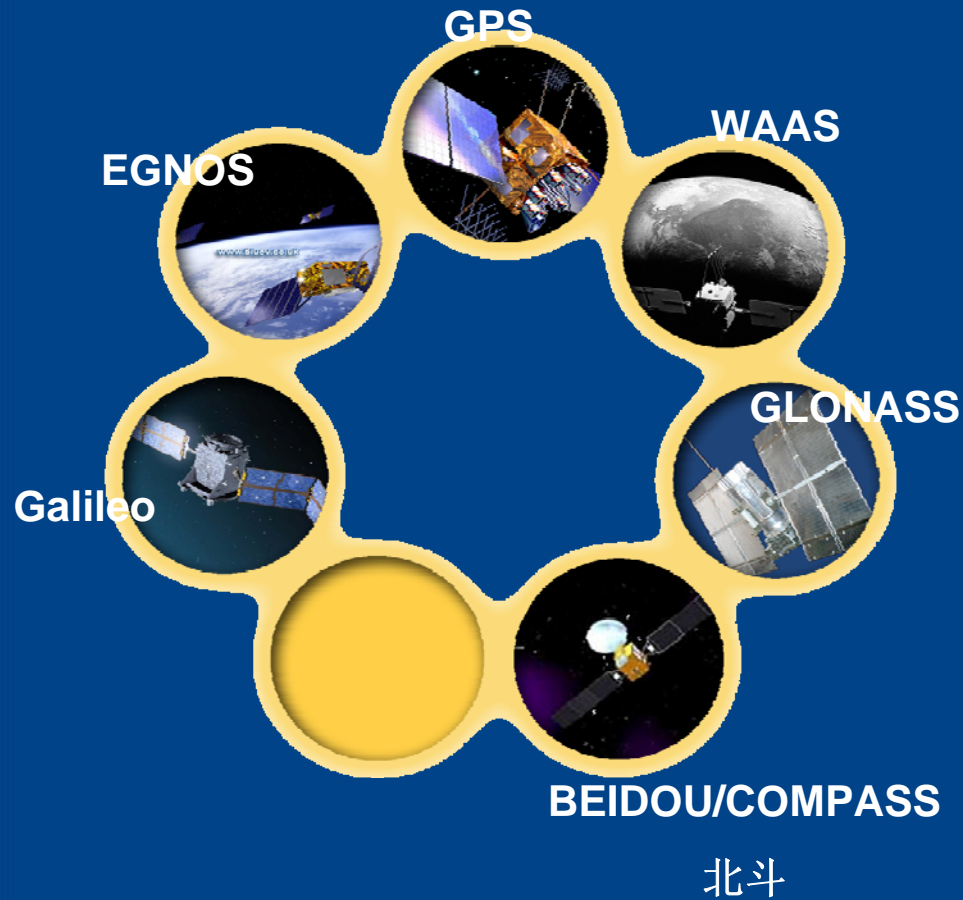


Trimble HYDROpro™ and SCS900 Site Controller Software offer workflows for all phases of on-shore and off-shore marine construction.

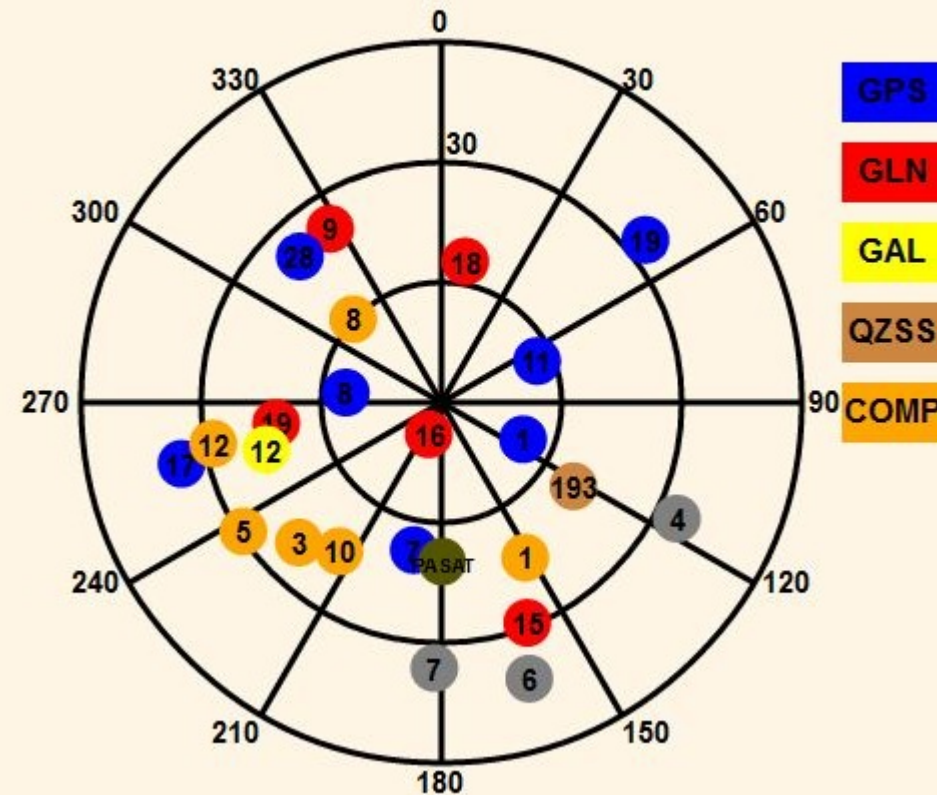
Machine Control System 机械控制系统



GNSS 全球卫星定位系统



Satellites - Skyplot



GNSS in Construction 施工中的GNSS应用

- cm level real-time precision 厘米级实时定位
- All connected: design to finish 联合作业-设计到完工



Applications in China 在中国的应用案例



Railway 铁路: 智能压实



Ag: 农业: 自动驾驶



Bridge 杭州湾大桥



Dam 水利: 毛尔盖大坝



Canal 水利: 南水北调



Agriculture: Auto-Pilot 农业机械的自动驾驶

Helongjiang Farm: 黑龙江农场

- Longer work hours
- 增长作业时间
- 24 hours operations
- 24 小时作业
- Reduce fatigue
- 减少劳动强度



Hangzhou Bay Bridge 杭州湾大桥



- VRS Stations
- 建立了VRS站
- RTK from Construction to Maintenance
- 从建设到维护
- Monitoring
- 监测



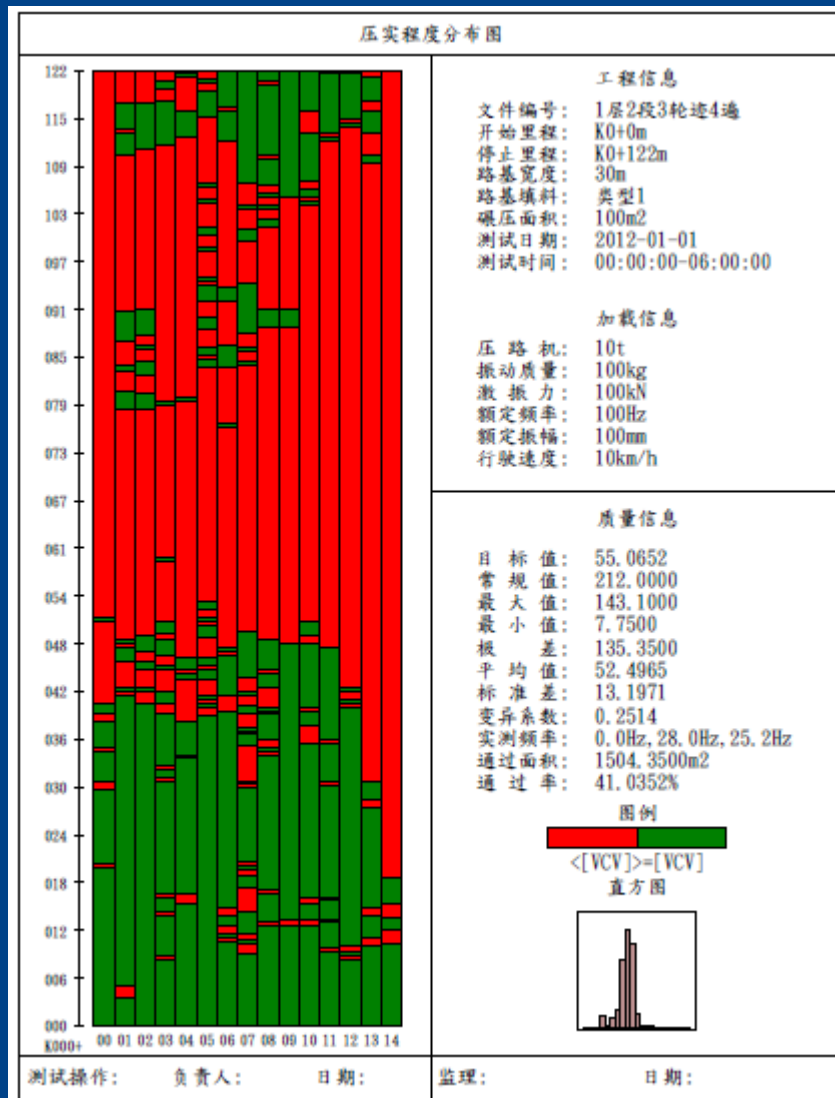
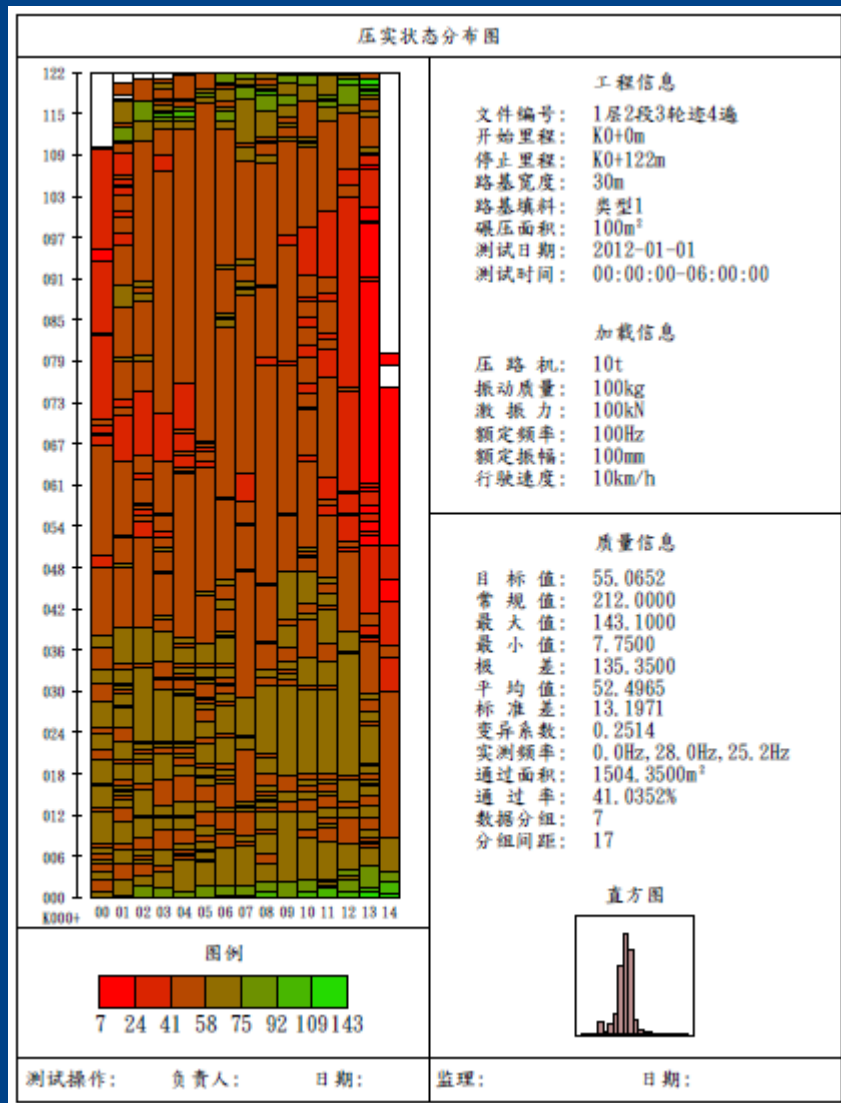
Subgrade Compaction 路基压实



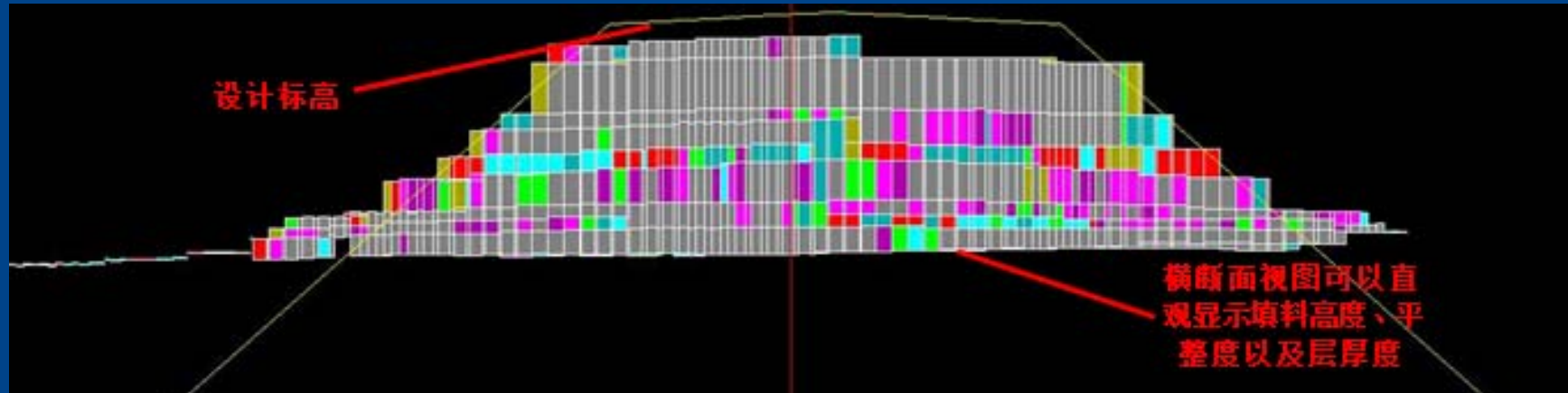
Smart Compaction System 智能压路机系统



Compaction Report 压实报告



Process Control 过程控制



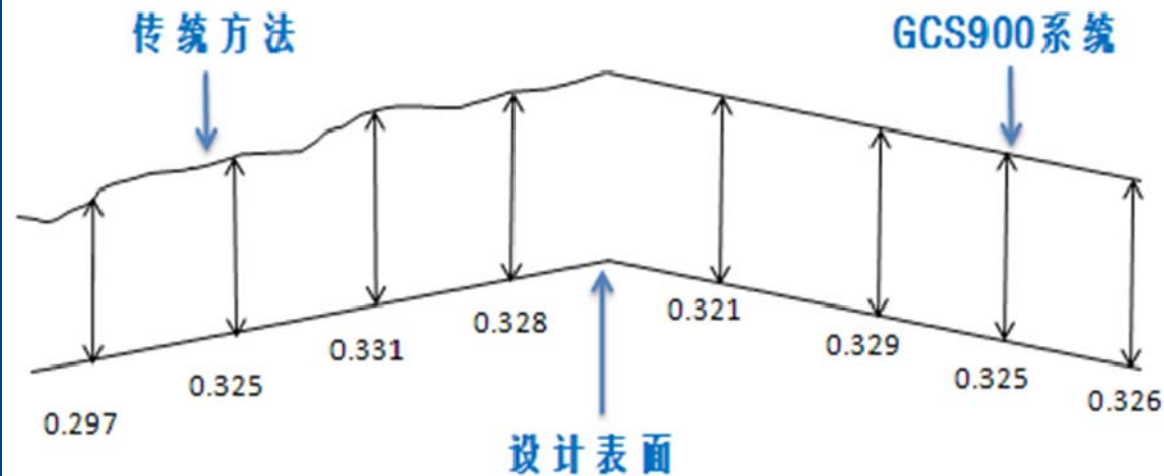
Testimonial 1 用户评价 1

- **During the night time, the operator can rely on the control box to guide the operation in straight lines so to avoid any compacting quality issues**
- “智能压实系统能够辅助机手夜间施工。有了智能压实系统，机手可以依据驾驶室内的控制箱中显示的轨迹行驶，很容易沿直线工作，这样就避免了碾压过程中漏压、少压，提高了工作效率。”

Testimonial 2 用户评价 2

- **With the compaction system, each bureau can monitor the project progress, workload, and quality. The compaction data and report can avoid any over or missing compaction issues.**
- “通过应用这套系统，可以很好的把握各个局自己的施工进度和工作量，控制下面分包队伍的施工质量。通过碾压变数的统计，能很好的防止过压和漏压。”

Subgrade Leveling 路基智能平整



Canal Construction 水利沟渠施工

- Finish the job once for all 一次成型, 减少返工
- Speed up with better process control 缩短工期、过程质量控制



In a water canal project: Trimble's excavator control system allows 100% precision while 20% reduction of project duration

南水北调焦作段：该项目部采用了Trimble提供的挖掘机控制系统，精度完全满足工程验收标准，替代修坡机，施工速度比预期快20%。

Summary 总结

- **Precision GNSS enables automation**
精密GNSS成就自动化
- **Automation: process control, quality, productivity, cost and environment protection**
自动化：过程控制、质量、产能、成本、环保
- **This is just the beginning!**
这仅仅是一个开端！



Thanks!
谢谢!