

MAY 2022

Rail-Vision Signaling Scalable Remote Condition Monitoring Solution

CHG UK

Peter Clarke – Technical Director

AVEVA

About CHG



UK, Sheffield based Company

- Established in 2004 as an electrical contractor and panel builder CHG expanded to provide software systems, integration solutions, products and services for various customers
- CHG focuses its efforts into Rail, Water & Waste Water, Utility Frameworks and Multisite Industrial Manufacturers, offering Engineering and Software Solutions using AVEVA OSI Soft and other software solution providers as well as our own bespoke developed software solution products
- Since 2008 CHG has expanded through growth & acquisition into a group of companies
 - CHG Main Group Company
 - Link2 Software Development & Integration
 - DSL Laboratory Automation Systems
 - Arentis Rail focused CCTV Image Transmission Systems and Solutions



Railway Signaling Data Visualisation & Reporting



Challenge

- Provide data capture of Signaling and Device Data
- Visualisation & Reporting interlockings
- Translation of complex document input types
- Validated data Input/Output

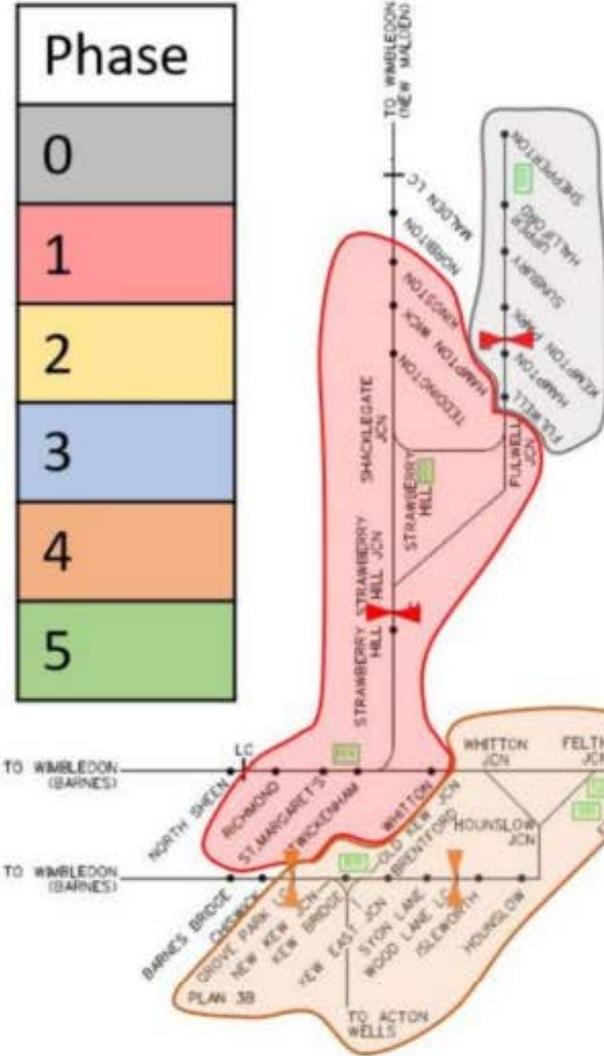
Solution

- Deployed the latest AVEVA PI System technology including PI AF and PI Vision
- Design Automated File Generation and Validation Tool
- Automated Testing & Validation

Benefits

- Increased granularity of information from disparate data sources
- Enhanced automated and real-time reporting
- Reduced maintenance requirements for fault diagnosis

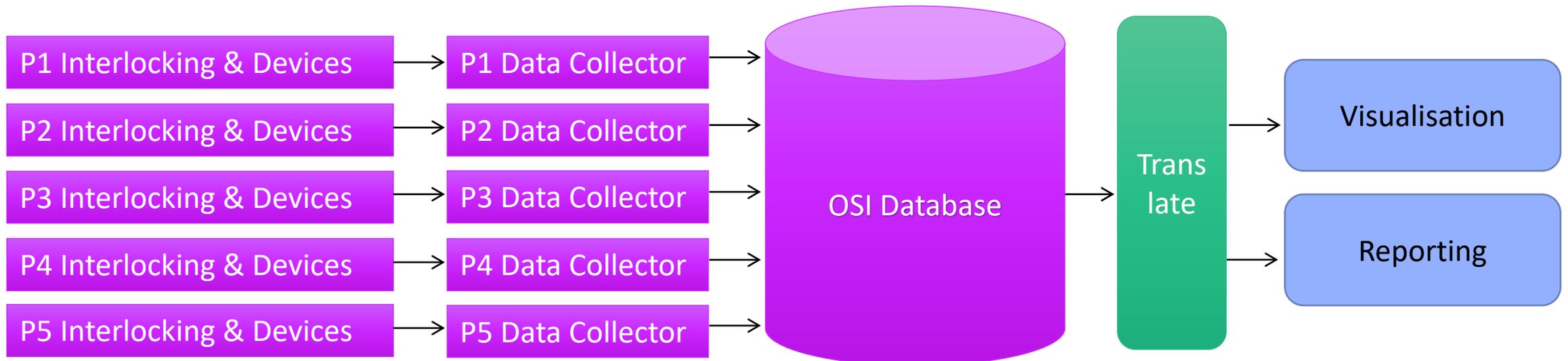
Project Overview



- Upgrade of Railway Signaling system
- 5 Phases over 5 years
- 40 Stations and over 80 platforms
- 21 Interlockings areas
- Over 70 miles of track up/down
- Scalable solution over FTN Fibre Network
- Cabinets: 250 for all phases
- Devices: 1500
- Level Crossings (15 for all phases)
- RTL's: (60 for all phases)
- Points: (80 for all phases)
- OSI Soft 80,000 tags (data points)

Development and Deployment Challenges

- System Deployment over 5 years
- Cannot adversely affect the running of the railway for previously deployed and operational areas
- Integration of system operation and functionality Automated processing and validation of data configuration
- Ability to add innovation and enhancements as project progresses
- Modular architecture allows multiple data collectors to be added



Auto Generation & Data Validation Tool

- The Auto Config Generator is a proprietary application developed within the Microsoft .Net environment.
- The Auto Config Generator transforms Excel based input files to a variety of output formats using pattern matching and regular expressions.
- Excel Input files are handled by the Microsoft Office Interoperability Layer and validated against known criteria such as Column information and Versioning Information.
- Data is then stored in Collections of Objects representing assets at specific locations.
- These Collections of Objects are then used to build configurations and tasks to build the system.
- Output formats include:
 - CSV Based Configuration Files
 - Command File / Powershell Scripts
 - JSON based Configuration Files
 - Microsoft Excel Documentation
 - Excel based Configuration Files
 - XML based Configuration Files
 - RESTful API Direct Configuration
 - RA FTView Databases (SQL)
- The majority of the outputs from the tool are static file-based configurations, but in two instances outputs are dynamic with scripts to determine the status of the network executed and direct dynamic configuration of Kepware Kepserver OPC Drivers via the product's own RESTful API.

Signaling Area Displays

The screenshot displays the 'Main Overview' for the 'Feltham & Wokingham' signaling area. The interface includes a navigation menu on the left with options like 'Basingstoke ROC', 'Whitton 281 Interlocking', and 'Ascot 290 Interlocking'. The main area contains a grid of interlocking areas, with several cells highlighted with red borders. Below the grid is an alarm log showing various system failures.

| Interlocking Area | Interlocking Area | Interlocking Area | Interlocking Area |
|----------------------------------|---------------------------------|-----------------------------|--------------------------------|
| Basingstoke ROC | Whitton 281 Interlocking | Ascot 290 Interlocking | Technician's Controls Overview |
| Shepperton 265 Interlocking | Feltham 282 Interlocking | Camberley 291 Interlocking | Frauscher FDS Overview |
| Richmond 266 Interlocking | Ashford 283 Interlocking | Bracknell 292 Interlocking | Export Reports Overview |
| Twickenham 267 Interlocking | Staines 284 Interlocking | Wokingham 293 Interlocking | PI Vision |
| Strawberry Hill 268 Interlocking | Windsor 285 Interlocking | Earley 294 Interlocking | User Accounts Administration |
| Kingston 269 Interlocking | Virginia Water 287 Interlocking | Blackwater 295 Interlocking | Shelve/Unshelve Points Alarms |
| Kew Bridge 278 Interlocking | Chertsey 288 Interlocking | | |
| Hounslow 280 Interlocking | Sunningdale 289 Interlocking | | |

Alarm Log:

| In Alarm Time | Alarm State | Message |
|---------------------|-------------------|--|
| 04/05/2022 13:51:08 | In Alarm, Unacked | [BASINGSTOKE ROC - INT4 - INT CUB 02] - Network Switch 1 - Communications Link Failure |
| 04/05/2022 13:51:08 | In Alarm, Unacked | [BASINGSTOKE ROC - INT4 - INT CUB 02] - Network Switch 2 - Communications Link Failure |
| 04/05/2022 13:51:08 | In Alarm, Unacked | [BASINGSTOKE ROC - TWICKNHAM(267) - INT4 - INT CUB 02] - Concentrator 1/COM-4 (Master/Slave) - Communications Link Failure |
| 04/05/2022 13:51:08 | In Alarm, Unacked | [BASINGSTOKE ROC - INT4 - INT CUB 02] - CON MON - Communications Link Failure |
| 04/05/2022 13:51:08 | In Alarm, Unacked | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Concentrator 1/COM-2 (Master/Slave) - Communications Link Failure |
| 04/05/2022 13:51:08 | In Alarm, Unacked | [BASINGSTOKE ROC - INT2 - INT CUB 01] - Interlocking System Gateway Port 2 - Communications Link Failure |
| 04/05/2022 13:51:08 | In Alarm, Unacked | [BASINGSTOKE ROC - INT4 - INT CUB 02] - FDS 2 - Communications Link Failure |

- Interlocking areas are shown in a standardized format for ease of navigation
- Cubicle and devices level displays indicate where issues are with Red Borders
- Detailed alarm and events displays show asset-based detail
- Tabular format to meet human factors requirements

Reporting from the PI OLDB Interface using SSRS

The screenshot shows the SSRS web portal for 'Feltham & Wokingham'. The top navigation bar includes 'ATKINS', the date '10/05/2022 12:13:47', 'System Administration', and 'Print Screen'. Below this is the 'Export Reports' section with a 'Back' button and a 'Home' button. The main area displays 'PAGINATED REPORTS (16)' with a grid of report thumbnails such as 'ActivityReport', 'AlarmAndEvents', 'AnalogueStatistics', and 'TechControlsStatus'.

- Reporting of system operation from OSISoft stored data
- Predefined reporting for incident investigation
- System performance monitoring
- Equipment operation and analytics

Analogue Statistics

Start Time : 01/04/2022 00:00:00 End Time : 01/05/2022 00:00:00 Source Filter :

Description Filter :

| Description | Minimum | Maximum | Mean | Source |
|--|---------|---------|------|--------------|
| [BASINGSTOKE ROC - ASCOT(290) - SIG2 - RDG1-028/1312A] - Network Switch - CPU Total 5 Minute Average | 0 | 0 | 0 | ACT RDG1 028 |
| [BASINGSTOKE ROC - ASCOT(290) - SIG2 - RDG1-028/1312A] - Network Switch - Internal Temperature | 0 | 0 | 0 | ACT RDG1 028 |

The screenshot shows the 'AlarmAndEvents' report. It includes a navigation bar with 'Home' and 'AlarmAndEvents'. Below are search filters for 'Start Time' (01/04/2022) and 'End Time' (01/05/2022). The main content is a table of events:

| Time | Description | Status |
|---------------------|---|---------------|
| 11/04/2022 12:10:16 | [BASINGSTOKE ROC - INT4 - INT CUB 02] - Network Switch 2 - Internal Temperature Low | Alarm enabled |
| 11/04/2022 12:10:16 | [BASINGSTOKE ROC - INT4 - INT CUB 02] - Network Switch 2 - Internal Temperature Low | Alarm enabled |
| 11/04/2022 12:10:16 | [BASINGSTOKE ROC - INT4 - INT CUB 02] - Network Switch 2 - Network Switch Ports Status Failed | Alarm enabled |

Technician's Controls Status

| Item | Description | Set |
|--|--|-------|
| BAS INT CUB 01 ELIX SHP BEF2512BR BRG | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - BEF2512BR_BRG Banner (Green) Link Status Enabled | False |
| BAS INT CUB 01 ELIX SHP BEF2519BR BRG | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - BEF2519BR_BRG Banner (Green) Link Status Enabled | False |
| BAS INT CUB 01 ELIX SHP BEF2521BR BRG | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - BEF2521BR_BRG Banner (Green) Link Status Enabled | False |
| BAS INT CUB 01 ELIX SHP BEF2524BR BRG | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - BEF2524BR_BRG Banner (Green) Link Status Enabled | False |
| BAS INT CUB 01 ELIX SHP SBFE2510 AND | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBFE2510_AND Signal Memory - Aspect Not Disabled | True |
| BAS INT CUB 01 ELIX SHP SBFE2510 TACN | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBFE2510_TACN Signal Memory - Temporary Approach Control Not Applied | True |
| BAS INT CUB 01 ELIX SHP SBFE2512 AND | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBFE2512_AND Signal Memory - Aspect Not Disabled | True |
| BAS INT CUB 01 ELIX SHP SBFE2512 TACN | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBFE2512_TACN Signal Memory - Temporary Approach Control Not Applied | True |
| BAS INT CUB 01 ELIX SHP SBFE2512BR AND | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBFE2512BR_AND Signal Memory(Distant/Banner) - Aspect Not Disabled | True |
| BAS INT CUB 01 ELIX SHP SBFE2513 AND | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBFE2513_AND Signal Memory - Aspect Not Disabled | True |
| BAS INT CUB 01 ELIX SHP SBFE2513 TACN | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBFE2513_TACN Signal Memory - Temporary Approach Control Not Applied | True |
| BAS INT CUB 01 ELIX SHP SBFE2515 AND | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBFE2515_AND Signal Memory - Aspect Not Disabled | True |
| BAS INT CUB 01 ELIX SHP SBFE2515 TACN | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBFE2515_TACN Signal Memory - Temporary Approach Control Not Applied | True |
| BAS INT CUB 01 ELIX SHP SBFE2516 AND | [BASINGSTOKE ROC - SHEPRTON(265) - INT2 - INT CUB 01] - Genisys 2 - SBFE2516_AND Signal Memory - Aspect Not Disabled | True |

Pi Vision & Asset Framework
Level Crossings
Points Monitoring
Incident Investigation

PI Vision - Level Crossing

- Signaling interface operation
- Track section occupation
- Barrier Machine
- Road Traffic Lights
- Banner Repeater
- Time series operation

Hampton Level Crossing

Lamps

| Asset | Asset Name | Description | Tag |
|---------------------|--------------------|--|-------|
| S8_OF7_SFLOODLIGHTS | Road Traffic Light | CCTV Flood lights | False |
| S8_OP8_SX | Road Traffic Light | Y/Z audible warning devices | True |
| S7_OP2_FLRE(L) | Road Traffic Light | YN or ZN left red road light illuminated flashing | True |
| S7_OP2_LPRE(L)_LP | Road Traffic Light | YN or ZN left red road light lamp proving | True |
| S7_OP1_SHE | Road Traffic Light | YN or ZN yellow road light illuminated | False |
| S7_OP1_LPHE_LP | Road Traffic Light | YN or ZN yellow road light lamp proving | True |
| S8_OP2_FLRE(R) | Road Traffic Light | YO or ZO left red road light illuminated flashing | True |
| S8_OP2_LPRE(R)_LP | Road Traffic Light | YO or ZO left red road light lamp proving | True |
| S8_OP3_APRE(R) | Road Traffic Light | YO or ZO right red road light illuminated alternate flashing | True |
| S8_OP3_LPRE(R)_LP | Road Traffic Light | YO or ZO right red road light lamp proving | True |
| S8_OP1_SHE | Road Traffic Light | YO or ZO yellow road light illuminated | False |
| S8_OP1_LPHE_LP | Road Traffic Light | YO or ZO yellow road light lamp proving | True |
| S8_OP4_LPHE_LP | Road Traffic Light | YO or ZO yellow road light lamp proving | True |
| Correspondence | Road Traffic Light | ZN or YN left red road light driven flashing | False |
| S7_OP6_APRE(R) | Road Traffic Light | ZN or YN right red road light illuminated alternate flashing | True |
| S7_OP5_FLRE(L) | Road Traffic Light | ZN or YN left red road light illuminated flashing | True |
| S7_OP5_LPRE(L)_LP | Road Traffic Light | ZN or YN left red road light lamp proving | True |
| S7_OP3_APRE(R) | Road Traffic Light | ZN or YN right red road light illuminated alternate flashing | True |
| S7_OP3_LPRE(R)_LP | Road Traffic Light | ZN or YN right red road light lamp proving | True |
| S7_OP6_LPRE(R)_LP | Road Traffic Light | ZN or YN right red road light lamp proving | True |
| YO | Road Traffic Light | ZN or YN yellow road light driven steady | False |
| S7_OP4_SHE | Road Traffic Light | ZN or YN yellow road light illuminated | False |
| S7_OP4_LPHE_LP | Road Traffic Light | ZN or YN yellow road light lamp proving | True |
| S8_OP5_FLRE(L) | Road Traffic Light | ZO or YO left red road light illuminated flashing | True |
| S8_OP5_LPRE(L)_LP | Road Traffic Light | ZO or YO left red road light lamp proving | True |
| S8_OP6_APRE(R) | Road Traffic Light | ZO or YO right red road light illuminated alternate flashing | True |
| S8_OP6_LPRE(R)_LP | Road Traffic Light | ZO or YO right red road light lamp proving | True |
| S8_OP4_SHE | Road Traffic Light | ZO or YO yellow road light illuminated | False |

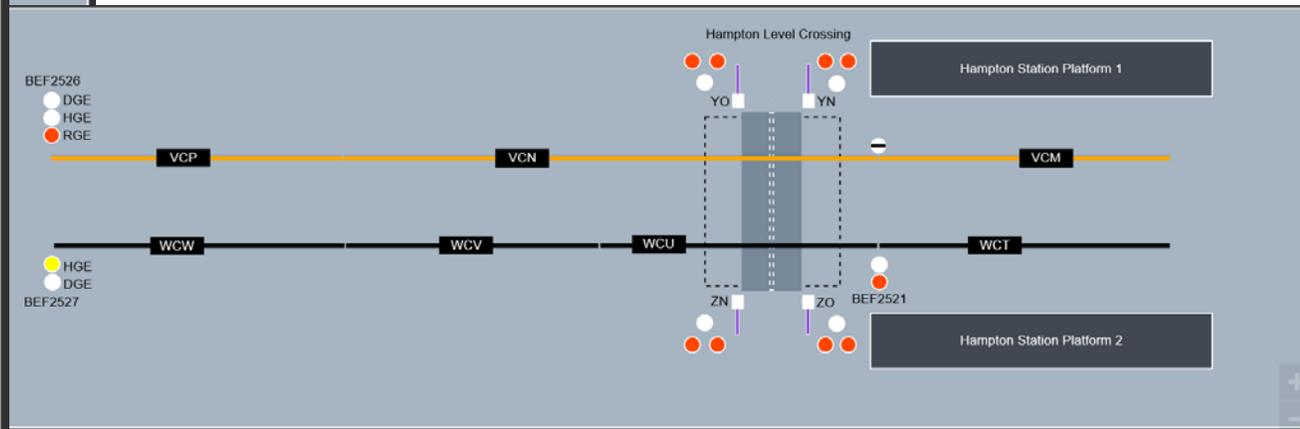
Barrier Machines

| Asset | Asset Name | Description | Tag |
|-----------------------|-----------------|---|-------|
| Control/System States | Barrier Machine | Nearside Lower Acknowledgement Failure | False |
| Internal | Barrier Machine | Nearside Raise Drive Time Out Failure | False |
| S1_IP1RE | Barrier Machine | YNZN Barriers detected between 42°-90° | True |
| S1_IP2RE | Barrier Machine | YOZO Barriers detected between 42°-90° | True |
| S1_IP3DN | Barrier Machine | Y/Z Barriers detected between 0°-4° | False |
| S1_IP4DNS | Barrier Machine | YNZN Down detection and safe torque off | False |
| S1_IP5UP | Barrier Machine | YNZN Barriers detected between 85°-90° | False |
| S1_IP6DNS | Barrier Machine | YOZO Down detection and safe torque off | False |
| S1_IP7UP | Barrier Machine | YOZO Barriers detected between 85°-90° | True |
| S1_OP1D1 | Barrier Machine | YNZN barriers drive | False |
| S1_OP2D2 | Barrier Machine | YNZN barriers drive | True |
| S1_OP4D1 | Barrier Machine | YOZO barriers drive | True |
| S1_OP5D2 | Barrier Machine | YOZO barriers drive | False |
| S2_IP7D1-R | Barrier Machine | (YNZN) D1 barrier drive diagnostic | False |
| S2_IP8D2-R | Barrier Machine | (YNZN) D2 barrier drive diagnostic | True |
| S3_IP3(DOOR)C | Barrier Machine | Y/Z barrier doors closed | True |
| S3_IP7D1-R | Barrier Machine | (YOZO) D1 barrier drive diagnostic | True |
| S3_IP8D2-R | Barrier Machine | (YOZO) D2 barrier drive diagnostic | False |
| S3_OP1(DOOR) | Barrier Machine | Hand mode not selected at LCU | True |

Banner Repeaters

BEF2524BR

| Asset | Asset Na... | Description | Tag |
|---------------|-------------|--|-------|
| SASC0 | BEF2524BR | Aspect Code 0 | True |
| SASC1 | BEF2524BR | Aspect Code 1 | False |
| SASC2 | BEF2524BR | Aspect Code 2 | False |
| SASCDN | BEF2524BR | Aspect Control | False |
| SAUTO | BEF2524BR | Auto | False |
| _BRG | BEF2524BR | Banner (green) Link Status enabled | True |
| SBPULL | BEF2524BR | Button pull | False |
| SFOAL | BEF2524BR | Free of approach locking | False |
| SLP | BEF2524BR | Lamp proving | True |
| S2_OP1FAIL... | BEF2524BR | Proving failure | False |
| S2_OP2FAIL... | BEF2524BR | Proving failure | False |
| S2_OP3FAIL... | BEF2524BR | Proving failure | False |
| S_NRR_V | BEF2524BR | Signal Memory(Distant/Banner) - (Signal module) not red retained (vital) | True |
| S_AND | BEF2524BR | Signal Memory(Distant/Banner) - Aspect not disabled | True |
| S2_OP1_LP | BEF2524BR | Slot 2 lamp proving status | True |
| S2_OP2_LP | BEF2524BR | Slot 2 lamp proving status | True |
| S2_OP3_LP | BEF2524BR | Slot 2 lamp proving status | True |
| S2_OP1_S | BEF2524BR | Slot 2 steady status | True |
| S2_OP2_S | BEF2524BR | Slot 2 steady status | False |
| S2_OP3_S | BEF2524BR | Slot 2 steady status | False |



PI Vision - Level Crossing

- Signaling interface operation
- Track section occupation
- Barrier Machine
- Road Traffic Lights
- Banner Repeater
- Time series operation

Hampton Level Crossing

Lamps

| Asset | Asset Name | Description | Tag |
|---------------------|--------------------|--|-------|
| S8_OF7_SFLOODLIGHTS | Road Traffic Light | CCTV Flood lights | False |
| S8_OP8_SX | Road Traffic Light | Y/Z audible warning devices | True |
| S7_OP2_FLRE(L) | Road Traffic Light | YN or ZN left red road light illuminated flashing | True |
| S7_OP2_LPRE(L)_LP | Road Traffic Light | YN or ZN left red road light lamp proving | True |
| S7_OP1_SHE | Road Traffic Light | YN or ZN yellow road light illuminated | False |
| S7_OP1_LPHE_LP | Road Traffic Light | YN or ZN yellow road light lamp proving | True |
| S8_OP2_FLRE(R) | Road Traffic Light | YO or ZO left red road light illuminated flashing | True |
| S8_OP2_LPRE(R)_LP | Road Traffic Light | YO or ZO left red road light lamp proving | True |
| S8_OP3_APRE(R) | Road Traffic Light | YO or ZO right red road light illuminated alternate flashing | True |
| S8_OP3_LPRE(R)_LP | Road Traffic Light | YO or ZO right red road light lamp proving | True |
| S8_OP1_SHE | Road Traffic Light | YO or ZO yellow road light illuminated | False |
| S8_OP1_LPHE_LP | Road Traffic Light | YO or ZO yellow road light lamp proving | True |
| S8_OP4_LPHE_LP | Road Traffic Light | YO or ZO yellow road light lamp proving | True |
| Correspondence | Road Traffic Light | ZN or YN left red road light driven flashing | False |
| S7_OP6_APRE(R) | Road Traffic Light | ZN or YN right red road light illuminated alternate flashing | True |
| S7_OP5_FLRE(L) | Road Traffic Light | ZN or YN left red road light illuminated flashing | True |
| S7_OP5_LPRE(L)_LP | Road Traffic Light | ZN or YN left red road light lamp proving | True |
| S7_OP3_APRE(R) | Road Traffic Light | ZN or YN right red road light illuminated alternate flashing | True |
| S7_OP3_LPRE(R)_LP | Road Traffic Light | ZN or YN right red road light lamp proving | True |
| S7_OP6_LPRE(R)_LP | Road Traffic Light | ZN or YN right red road light lamp proving | True |
| IC | Road Traffic Light | ZN or YN yellow road light driven steady | False |
| S7_OP4_SHE | Road Traffic Light | ZN or YN yellow road light illuminated | False |
| S7_OP4_LPHE_LP | Road Traffic Light | ZN or YN yellow road light lamp proving | True |
| S8_OP5_FLRE(L) | Road Traffic Light | ZO or YO left red road light illuminated flashing | True |
| S8_OP5_LPRE(L)_LP | Road Traffic Light | ZO or YO left red road light lamp proving | True |
| S8_OP6_APRE(R) | Road Traffic Light | ZO or YO right red road light illuminated alternate flashing | True |
| S8_OP6_LPRE(R)_LP | Road Traffic Light | ZO or YO right red road light lamp proving | True |
| S8_OP4_SHE | Road Traffic Light | ZO or YO yellow road light illuminated | False |

Barrier Machines

| Asset | Asset Name | Description | Tag |
|-----------------------|-----------------|---|-------|
| Control/System States | Barrier Machine | Nearside Lower Acknowledgement Failure | False |
| Internal | Barrier Machine | Nearside Raise Drive Time Out Failure | False |
| S1_IP1RE | Barrier Machine | YNZN Barriers detected between 42°-90° | True |
| S1_IP2RE | Barrier Machine | YOZO Barriers detected between 42°-90° | True |
| S1_IP3DN | Barrier Machine | Y/Z Barriers detected between 0°-4° | False |
| S1_IP4DNS | Barrier Machine | YNZN Down detection and safe torque off | False |
| S1_IP5UP | Barrier Machine | YNZN Barriers detected between 85°-90° | False |
| S1_IP6DNS | Barrier Machine | YOZO Down detection and safe torque off | False |
| S1_IP7UP | Barrier Machine | YOZO Barriers detected between 85°-90° | True |
| S1_OP1D1 | Barrier Machine | YNZN barriers drive | False |
| S1_OP2D2 | Barrier Machine | YNZN barriers drive | True |
| S1_OP4D1 | Barrier Machine | YOZO barriers drive | True |
| S1_OP5D2 | Barrier Machine | YOZO barriers drive | False |
| S2_IP7D1-R | Barrier Machine | (YNZN) D1 barrier drive diagnostic | False |
| S2_IP8D2-R | Barrier Machine | (YNZN) D2 barrier drive diagnostic | True |
| S3_IP3(DOOR)C | Barrier Machine | Y/Z barrier doors closed | True |
| S3_IP7D1-R | Barrier Machine | (YOZO) D1 barrier drive diagnostic | True |
| S3_IP8D2-R | Barrier Machine | (YOZO) D2 barrier drive diagnostic | False |
| S3_OP1(DOOR) | Barrier Machine | Hand mode not selected at LCU | True |

Banner Repeaters

BEF2524BR

| Asset | Asset Na... | Description | Tag |
|---------------|-------------|--|-------|
| SASC0 | BEF2524BR | Aspect Code 0 | True |
| SASC1 | BEF2524BR | Aspect Code 1 | False |
| SASC2 | BEF2524BR | Aspect Code 2 | False |
| SASCDN | BEF2524BR | Aspect Control | False |
| SAUTO | BEF2524BR | Auto | False |
| _BRG | BEF2524BR | Banner (green) Link Status enabled | True |
| SBPULL | BEF2524BR | Button pull | False |
| SFOAL | BEF2524BR | Free of approach locking | False |
| SLP | BEF2524BR | Lamp proving | True |
| S2_OP1FAIL... | BEF2524BR | Proving failure | False |
| S2_OP2FAIL... | BEF2524BR | Proving failure | False |
| S2_OP3FAIL... | BEF2524BR | Proving failure | False |
| S_NRR_V | BEF2524BR | Signal Memory(Distant/Banner) - (Signal module) not red retained (vital) | True |
| S_AND | BEF2524BR | Signal Memory(Distant/Banner) - Aspect not disabled | True |
| S2_OP1_LP | BEF2524BR | Slot 2 lamp proving status | True |
| S2_OP2_LP | BEF2524BR | Slot 2 lamp proving status | True |
| S2_OP3_LP | BEF2524BR | Slot 2 lamp proving status | True |
| S2_OP1_S | BEF2524BR | Slot 2 steady status | True |
| S2_OP2_S | BEF2524BR | Slot 2 steady status | False |
| S2_OP3_S | BEF2524BR | Slot 2 steady status | False |

The diagram illustrates the Hampton Level Crossing layout. It shows two main track sections: VCP (Vehicular Crossing Point) and VCN (Vehicular Crossing Not). The VCP section includes VCM (Vehicular Crossing Machine) and WCV (Workshop Crossing Vehicle). The VCN section includes WCV (Workshop Crossing Vehicle) and WCU (Workshop Crossing Unit). The WCU section includes WCT (Workshop Crossing Terminal). The crossing is flanked by Hampton Station Platform 1 and Hampton Station Platform 2. Barrier machines are shown at the crossing, with YO (Yellow Open) and YN (Yellow Not) on the left, and ZN (Zebra Not) and ZO (Zebra Open) on the right. Signal aspects are indicated by colored circles: DGE (Distant Green), HGE (Home Green), and RGE (Red Green). The diagram also shows the location of signal aspects BEF2526 and BEF2527.

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AVEVA

PI Vision - Points

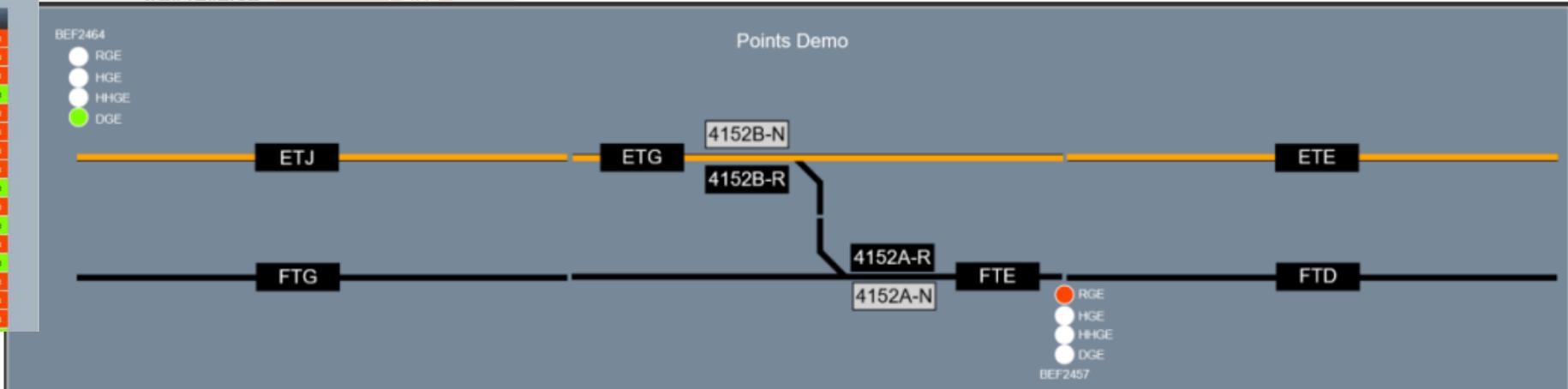
Points Set 4152

| Asset | Asset Name | Description ▲ | Tag |
|-------|------------|--|-------|
| PDN | 4152 | (Controlled and) detected normal | True |
| PDR | 4152 | (Controlled and) detected reverse | False |
| LUKFL | 4152 | Auto normalisation flashing indication | False |
| PCN | 4152 | Controls normal | True |
| PCR | 4152 | Controls reverse | False |
| | | Key normal | False |
| | | Key reverse | False |

- Signaling interface operation
- Track section occupation
- Points Swing Time, Aspects
- Application of Tech Controls
- Time series operation

Aspect BEF2464

| Asset | Asset Name | Description | Tag |
|-----------|------------|---|-------|
| LRDE | BEF2464 | Reminder Device Latches - ELECTRIC- Entrance Signals | False |
| LRD | BEF2464 | Reminder Device Latches - ALL TRAFFIC - Entrance Signals | False |
| LRDA | BEF2464 | Reminder Device Latches - Auto Working | False |
| B_AND | BEF2464 | Signal Memory - Aspect not disabled | True |
| S_RIP | BEF2464 | Signal Memory - Route/Junction indicator proved | False |
| LS(RR)S | BEF2464 | Restricted route status latch | False |
| LS(RR)I | BEF2464 | Restricted route indication latch | False |
| S_SSC | BEF2464 | Signal Memory - Signal stick control set | False |
| S_NRR_V | BEF2464 | Signal Memory - (Signal module) not red retained (vital) | True |
| S_TISP-00 | BEF2464 | Signal Memory - TISP bit 0 | False |
| S_TACN | BEF2464 | Signal Memory - Temporary approach control not applied | True |
| S2_OP6_S | BEF2464 | Slot 2 steady status | False |
| S3_OP1_S | BEF2464 | Slot 3 steady status | True |
| S2_OP5_S | BEF2464 | Slot 2 steady status | False |
| S_TDRR | BEF2464 | Signal Memory - TORR test passed | False |
| S_TISP-01 | BEF2464 | Signal Memory - TISP bit 1 | False |



PI Vision – Points (Video)

The screenshot displays the PI Vision interface for a 'Points Set Demo'. The top navigation bar includes 'New Display' and 'RPT01Administrator'. The main area is divided into several data tables and a central diagram.

Data Tables:

- Points Set Demo:** A large table with columns for ID, Name, Type, and Status. It lists various point types such as 'Automatic Point', 'Manual Point', 'Track Control', and 'Track Control Applied'.
- Points Set Demo (Detailed):** A table with columns for Asset, Identifier, Type, Cancelled, Confirmed, and Status Tag. It provides more granular details for specific point assets.
- Points Set Demo (Summary):** A table with columns for Asset, Identifier, Type, Cancelled, Confirmed, and Status Tag, showing a summary of point statuses.

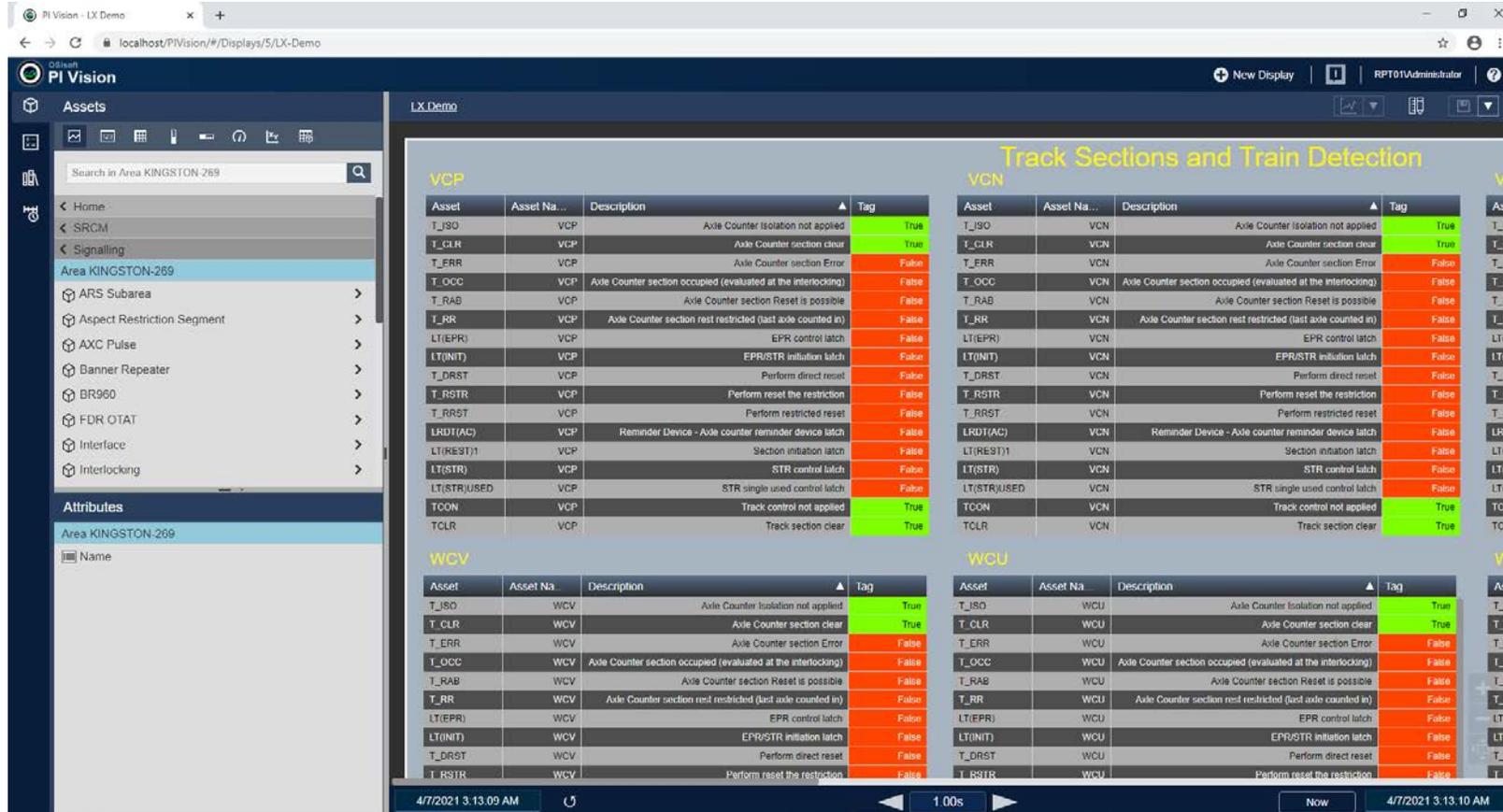
Diagram:

The central diagram, titled 'Points Demo', shows a track layout between stations BEF2464 and BEF2457. The tracks are labeled with point identifiers: ETJ, ETG, ETE, FTG, FTE, and FTD. A double-track section is labeled with 4152B-N and 4152B-R, and another section with 4152A-R and 4152A-N. A legend on the left and right of the diagram identifies point types: RGE (orange circle), HGE (white circle), HHGE (white circle), and DGE (white circle).

Footer:

The bottom of the interface shows a timestamp '07/04/2021 02:47:30', a refresh icon, a '10.00s' timer, a 'Now' button, and another timestamp '07/04/2021 0'.

PI Vision – Incident Investigation



The screenshot displays the PI Vision interface for incident investigation. The main area shows three data tables: VCP, VCN, and WCV. Each table lists assets with their names, descriptions, and status tags (True/False).

| Asset | Asset Na... | Description | Tag |
|-------------|-------------|---|-------|
| T_ISO | VCP | Axle Counter Isolation not applied | True |
| T_CLR | VCP | Axle Counter section clear | True |
| T_ERR | VCP | Axle Counter section Error | False |
| T_OCC | VCP | Axle Counter section occupied (evaluated at the interlocking) | False |
| T_RAB | VCP | Axle Counter section Reset is possible | False |
| T_RR | VCP | Axle Counter section rest restricted (last axle counted in) | False |
| LT(EPR) | VCP | EPR control latch | False |
| LT(INIT) | VCP | EPR/STR initiation latch | False |
| T_DRST | VCP | Perform direct reset | False |
| T_RSTR | VCP | Perform reset the restriction | False |
| T_RRST | VCP | Perform restricted reset | False |
| LRD1(AC) | VCP | Reminder Device - Axle counter reminder device latch | False |
| LT(RES1) | VCP | Section initiation latch | False |
| LT(STR) | VCP | STR control latch | False |
| LT(STR)USED | VCP | STR single used control latch | False |
| TCON | VCP | Track control not applied | True |
| TCLR | VCP | Track section clear | True |

| Asset | Asset Na... | Description | Tag |
|-------------|-------------|---|-------|
| T_ISO | VCN | Axle Counter Isolation not applied | True |
| T_CLR | VCN | Axle Counter section clear | True |
| T_ERR | VCN | Axle Counter section Error | False |
| T_OCC | VCN | Axle Counter section occupied (evaluated at the interlocking) | False |
| T_RAB | VCN | Axle Counter section Reset is possible | False |
| T_RR | VCN | Axle Counter section rest restricted (last axle counted in) | False |
| LT(EPR) | VCN | EPR control latch | False |
| LT(INIT) | VCN | EPR/STR initiation latch | False |
| T_DRST | VCN | Perform direct reset | False |
| T_RSTR | VCN | Perform reset the restriction | False |
| T_RRST | VCN | Perform restricted reset | False |
| LRD1(AC) | VCN | Reminder Device - Axle counter reminder device latch | False |
| LT(RES1) | VCN | Section initiation latch | False |
| LT(STR) | VCN | STR control latch | False |
| LT(STR)USED | VCN | STR single used control latch | False |
| TCON | VCN | Track control not applied | True |
| TCLR | VCN | Track section clear | True |

| Asset | Asset Na... | Description | Tag |
|----------|-------------|---|-------|
| T_ISO | WCV | Axle Counter Isolation not applied | True |
| T_CLR | WCV | Axle Counter section clear | True |
| T_ERR | WCV | Axle Counter section Error | False |
| T_OCC | WCV | Axle Counter section occupied (evaluated at the interlocking) | False |
| T_RAB | WCV | Axle Counter section Reset is possible | False |
| T_RR | WCV | Axle Counter section rest restricted (last axle counted in) | False |
| LT(EPR) | WCV | EPR control latch | False |
| LT(INIT) | WCV | EPR/STR initiation latch | False |
| T_DRST | WCV | Perform direct reset | False |
| T_RSTR | WCV | Perform reset the restriction | False |

- Drag and Drop asset data and specific signals onto one screen
- Control Centre Technician configurable
- Re play data to identify issues and coloration between data sets
- Time series operation
- Track section occupation
- SPAD detection

Railway Signaling Data Visualisation & Reporting



Challenge

- Provide data capture of Signaling and Device Data
- Visualisation & Reporting interlockings
- Translation of complex document input types
- Validated data Input/Output

Solution

- Deployed the latest AVEVA PI System technology including PI AF and PI Vision
- Design Automated File Generation and Validation Tool
- Automated Testing & Validation

Benefits

- Improved visibility of data
- Reduced response time
- Making quicker informed decisions
- Automated compliance reporting
- Improved planned maintenance
- Get trains running quicker



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- Nathaniel.Colman@atkinsglobal.com

ATKINS

Member of the SNC-Lavalin Group

Questions?

Please wait for the microphone

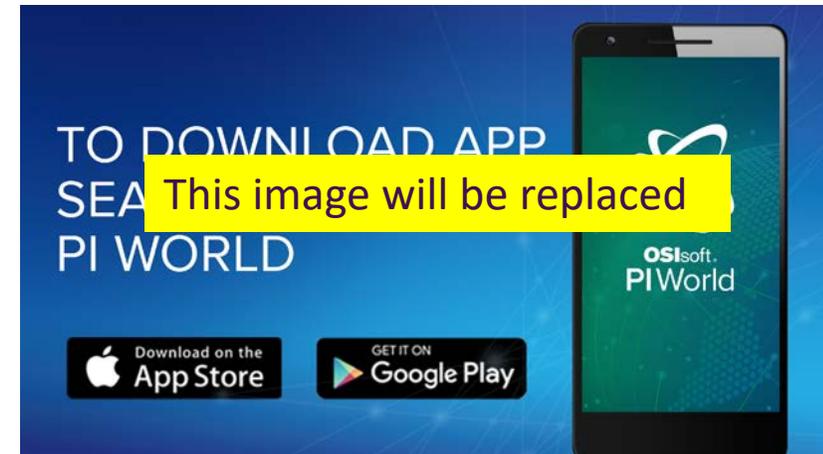
- State your name and company



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GRACIES

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DANKON

TANK

TAPADH LEAT

SALAMAT

SPASIBO

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ありがとうございました

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ĎAKUJEM

HATUR NUHUN

PAXMAT CAĠA

SIPAS JI WERE

TERIMA KASIH

CẢM ƠN BẠN

UA TSAUG RAU KOJ

TI БЛАГОДАРАМ

СИПОС

WAZVIITA

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