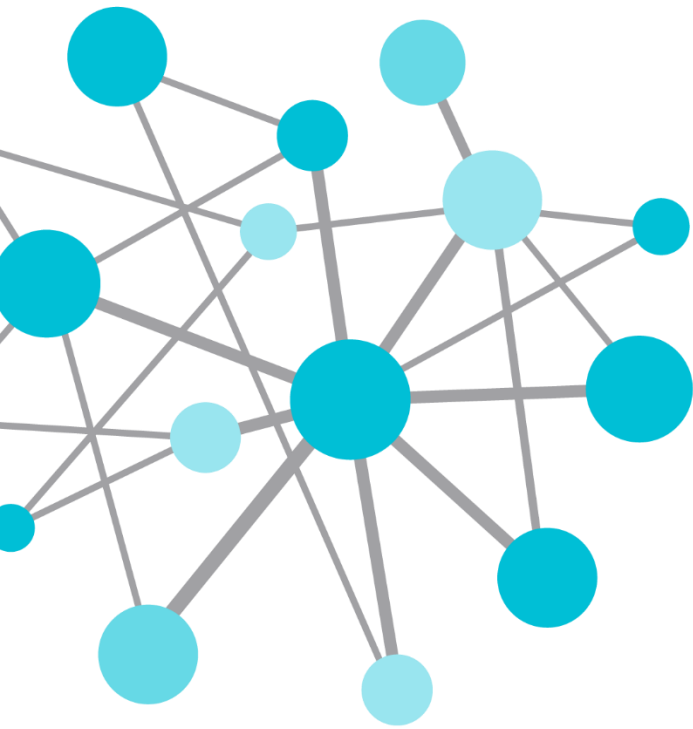


Achieving Stability and Operational Improvement at the Greenfield Ma'aden Aluminum Smelter

Presented by **Geff Wood**

Presentation Agenda

- Background on Ma'aden and the Ma'aden Aluminum Smelter
- History of OSIsoft PI Server Adoption at the Site
- Critical Process Dashboard and Notifications
- Potroom Performance Reporting
- Water Treatment Improvements in the Casthouse
- Monitoring of the PI Interfaces (Technology Team)
- Planned Next Steps
- Questions?



Background on Ma'aden and the Ma'aden Aluminum Smelter

معادن للألمنيوم MA'ADEN ALUMINIUM



Joint venture between Saudi Arabian Mining Company (Ma'aden) & Alcoa.
Once completed, US\$10.8b project will be largest / most efficient integrated aluminium complex in the world.

Facilities: bauxite mine at Al Ba'itha, connected by rail to alumina refinery, aluminium smelter & rolling mill at Ras Al Khair.



Where we are located



Ras Al Khair (RAK) location:
integrated aluminium facility

Arabian Gulf

Jena Island

Haul Rd

RAK-Abu Hadriyah Rd (27 km)

RAK-Jubail Hwy

نقاط 3

RAK-Jubail Hwy

نقاط 2

Abu Hadriyah Hwy

Al Jubayl

Jubail - Dammam Hwy

Al Ba'itha (ABM) location:
Bauxite mine



Our integrated operations

Mine



- Located at ABM, 600km from RAK
- 4 MMT annually
- 30+ years of reserves
- Railway to transport bauxite
- First bauxite 2014

Refinery



- Located at RAK
- First Alumina Refinery in GCC
- 1.8 MMT annually
- Designed for expansion
- First alumina 2014

Smelter

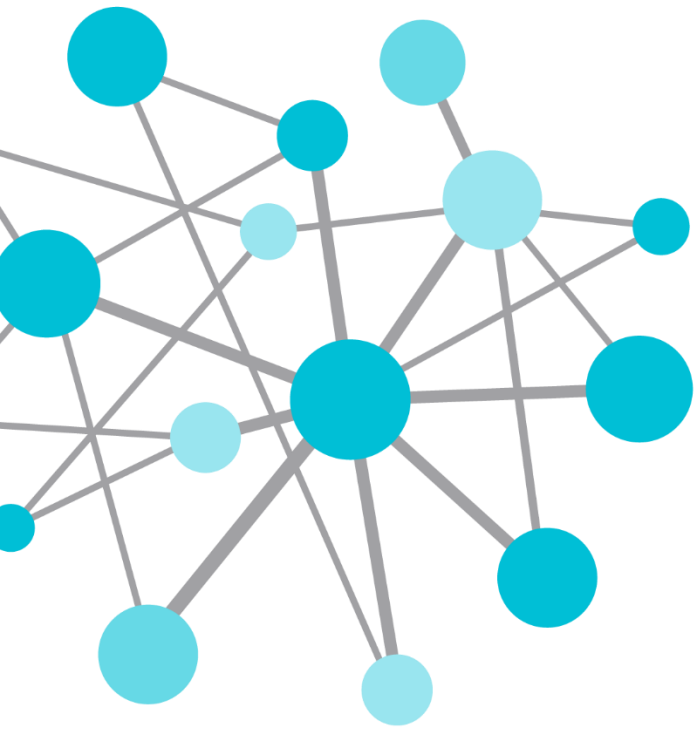


- Located at RAK
- 740 KMT annually, designed for expansion
- Ingots, billets, T-bar and slabs for Rolling Mill
- First hot metal 2012

Rolling Mill



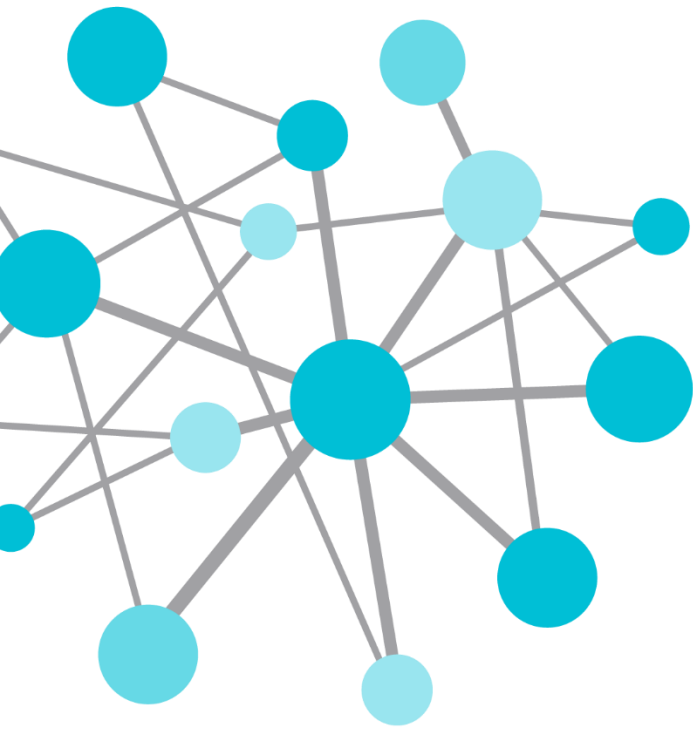
- Located at RAK
- 380 KMT annually, designed for expansion
- Body, end & tab stock for aluminum cans & Automotive and other aluminium coil
- Can Reclamation Unit
- First coil Dec 2013



History of OSIsoft PI Server Adoption at the Smelter

PI Systems were part of Original Design

- Alcoa was technology partner and was in process of establishing an Enterprise Agreement
- “Smart Infrastructure” was key element of Alcoa Architecture
- Ma’aden team had limited “PI System” experience so opted for infrastructure, but very small point count
- PI Data Archive up and running from day 1
- Multiple tag count increments



Critical Process Dashboard and Notifications

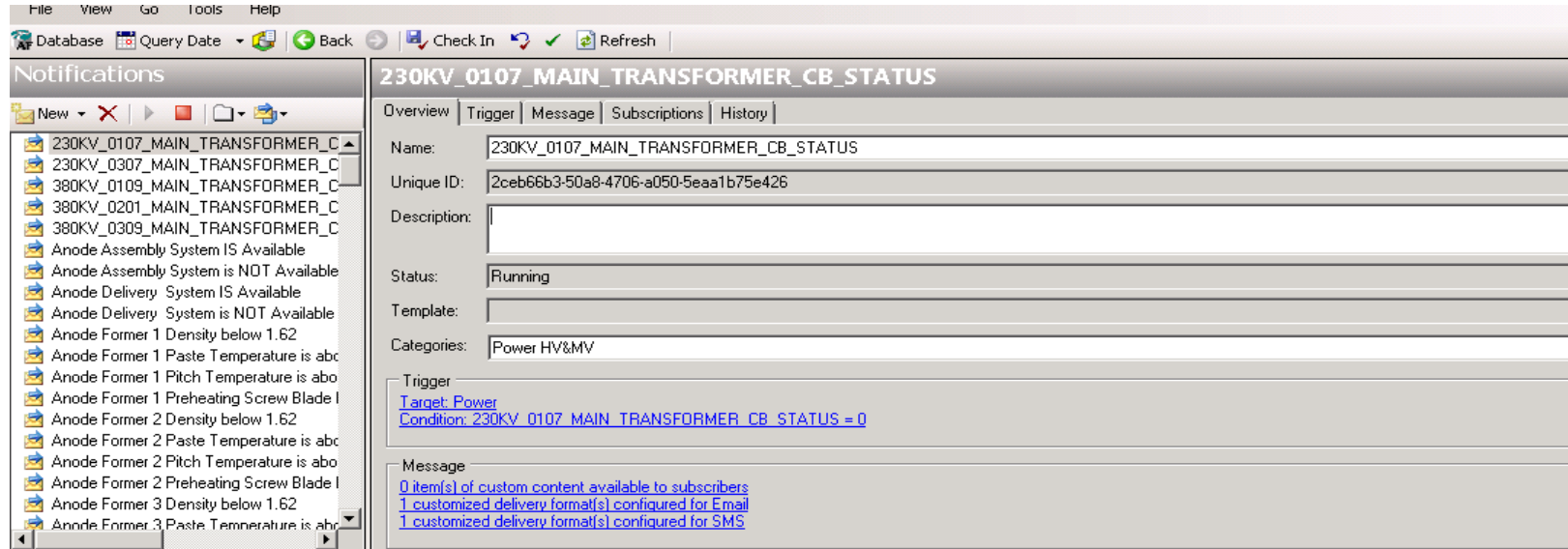
Dashboard - Key Process Indicators (KPIs)

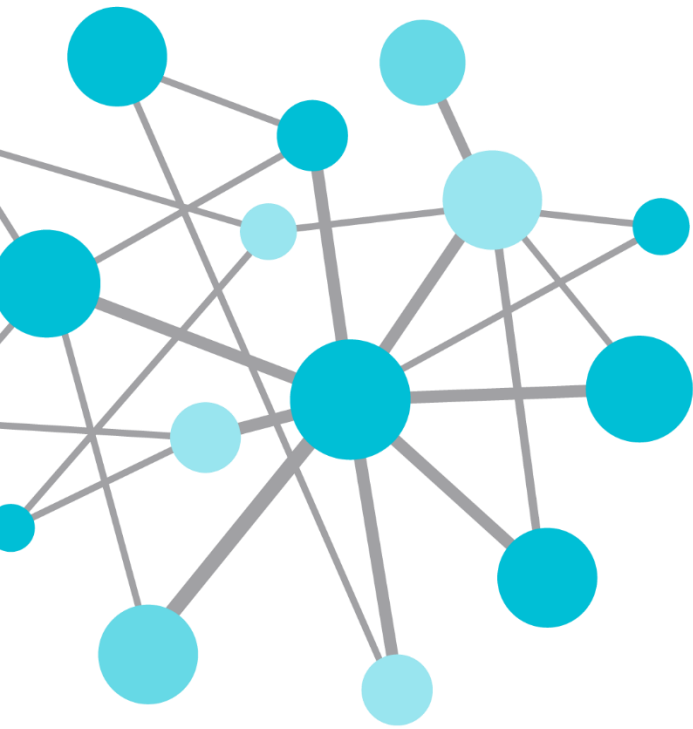
- KPIs to monitor the operation on a shift/daily basis
- The KPIs depend on area & level. Normally 10-15 per area



PI Notifications on real time (e-mail & SMS) to monitor critical process

- There are 202 PI Interfaces to monitor the critical Smelter process. Fast answer in case of issues
- The messages are sent instantly using SMS and e-mail format





Potroom Performance Reporting

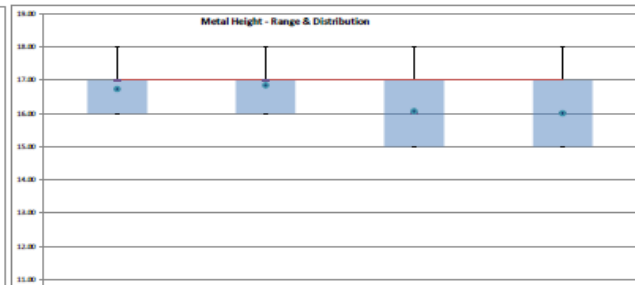
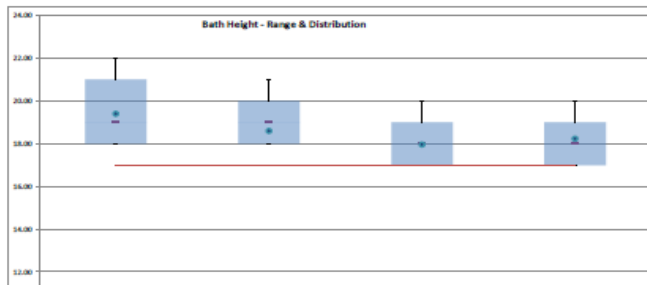
Automatic Daily Report to the manager e-mail using PI DataLink (no code)

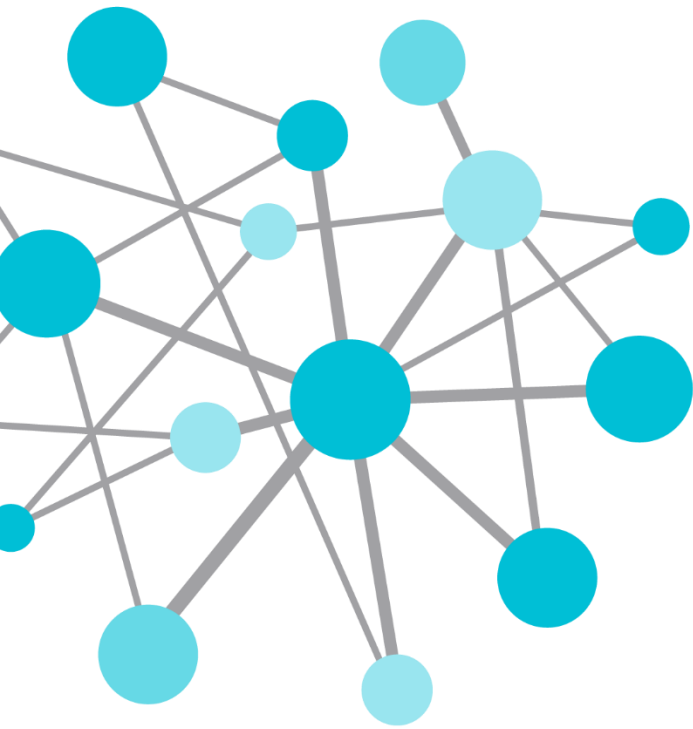
Last update:
5/7/2014

Description	UOM	Line 1		Line 2		ISSUES
		PLAN	ACTUAL	PLAN	ACTUAL	
OPERATING POTS	#	322		359		
LINE LOAD	KA	571.9625		372.7321		
METAL TAPPED	mt	686.465		759.58		
METAL TAPPED (MTD)	mt	11309.04				
ALF3 ON HAND	mt					
# POTS PREPARED	#					
# POTS ENERGIZED	#					
# POTS STARTED	#	0		0		
Quality	Room	A	B	C	D	
HIGH Fe POTS > 2,000	ppm	3	0	1	0	
HIGH SI POTS > 2,000	ppm	1	3	0	0	
CURRENT EFFICIENCY TODAY	%	No Data		No Data		
CURRENT EFFICIENCY (MTD)	%	No Data		No Data		
RWO MATERIAL	#	QTC 1	QTC 2	QTC 3	QTC 4	
FRESH ALUMINA	%	81.46	72.96806	67.55	74.53633	
FLUORINATED ALUMINA	%	80.06	79.92407	80.53	78.45436	
CRUSHED BATH	%	61.39	51.54327	60.62	51.98594	

Description	UOM	Line 1		Line 2		ISSUES
		PLAN	ACTUAL	PLAN	ACTUAL	
LINE VOLTS	V		5423.803		1571.203	
ANODE EFFECT RATE	AE/pot	< 0.2	0.0967	0.2	0.0919	
BATH TEMP	C°	964 +/- 3	967.0433	964 +/- 3	966.7682	
BATH HEIGHT	cm	17 +/- 1	19.0226	17 +/- 1	18.0919	
METAL HEIGHT	cm	17 +/- 1	16.7179	17 +/- 1	16.0362	
Fe CONTENT	ppm	< 1000	630.3855	< 1000	592.9106	
SI CONTENT	ppm	< 1000	463.4008	< 1000	482.4385	
INSTABILITY	nu	< 100	47.2305	< 100	45.1355	
POWER INTERRUPTION	sec	0	No Data	0	No Data	
LATE WORK	A	B	Total	C	D	Total
SETTING ANODE						
ANODE COVERING						
METAL TAP						
ALF3						
Beam Raising						
BATH TAP						
CONCERNS						

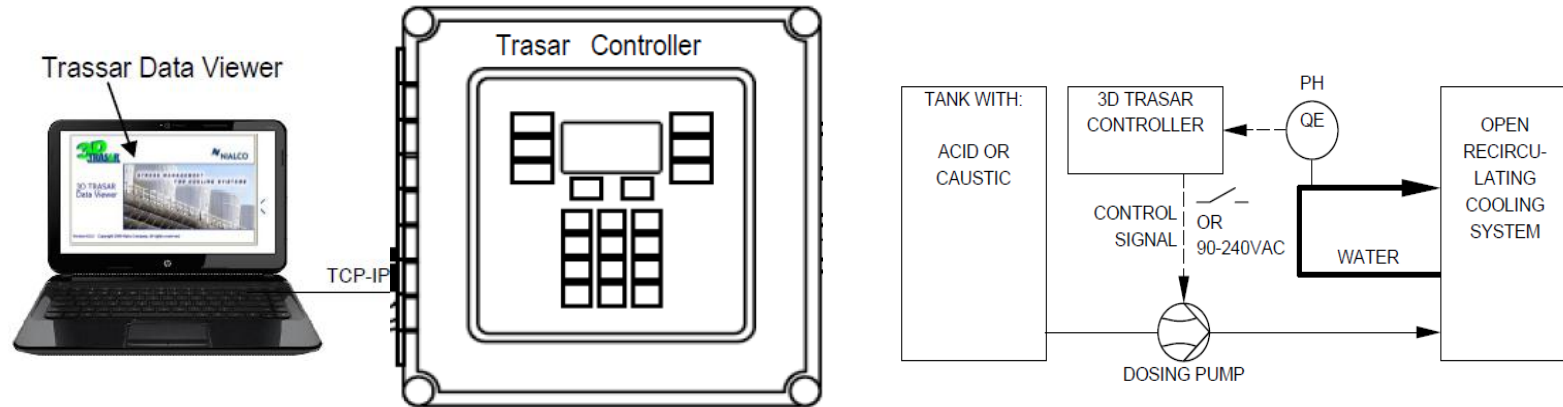
Description	Line 1		Line 2		ISSUES
	PLAN	ACTUAL	PLAN	ACTUAL	
PTA Room-A/C					
PTA Room-B/D					
TAPPING BEAM					
ABRF					
BTW					
WEDGE EXTRACTOR					
ALF3 HOPPER					
AFTV					
FORKLIFT					
CRUCIBLES (M)					
CRUCIBLES (B)					
THTV					
BATH LIFTING BEAM					
SCHEDULED PM					
MISSD PM					
MAINTENANCE					





Water Treatment Improvements in the Casthouse

Case Study: Bring Water Treatment Controller information into PI Data Archive



Target: 3DTrasar Controller

Location: 3 nos. Field Mounted. 200meters from nearest substation

Function: Control Cooling Water PH, Corrosion, Bacterial Growth etc.

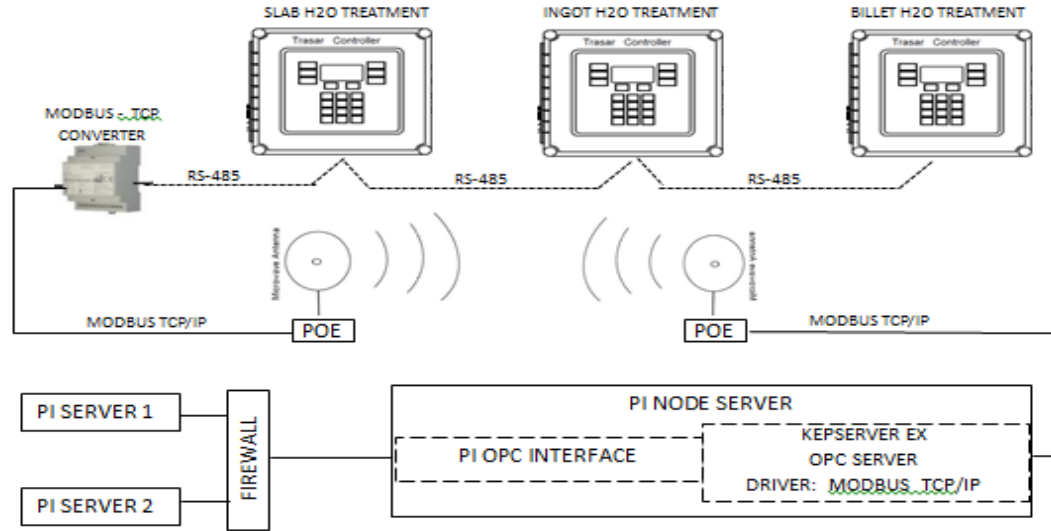
Inputs: Sensors for PH, Conductivity, Fluorometer, Tagged Polymer etc.

Outputs: Relays for 6 Dose Pumps

Program Access: Local LCD Display, Data viewer on Laptop

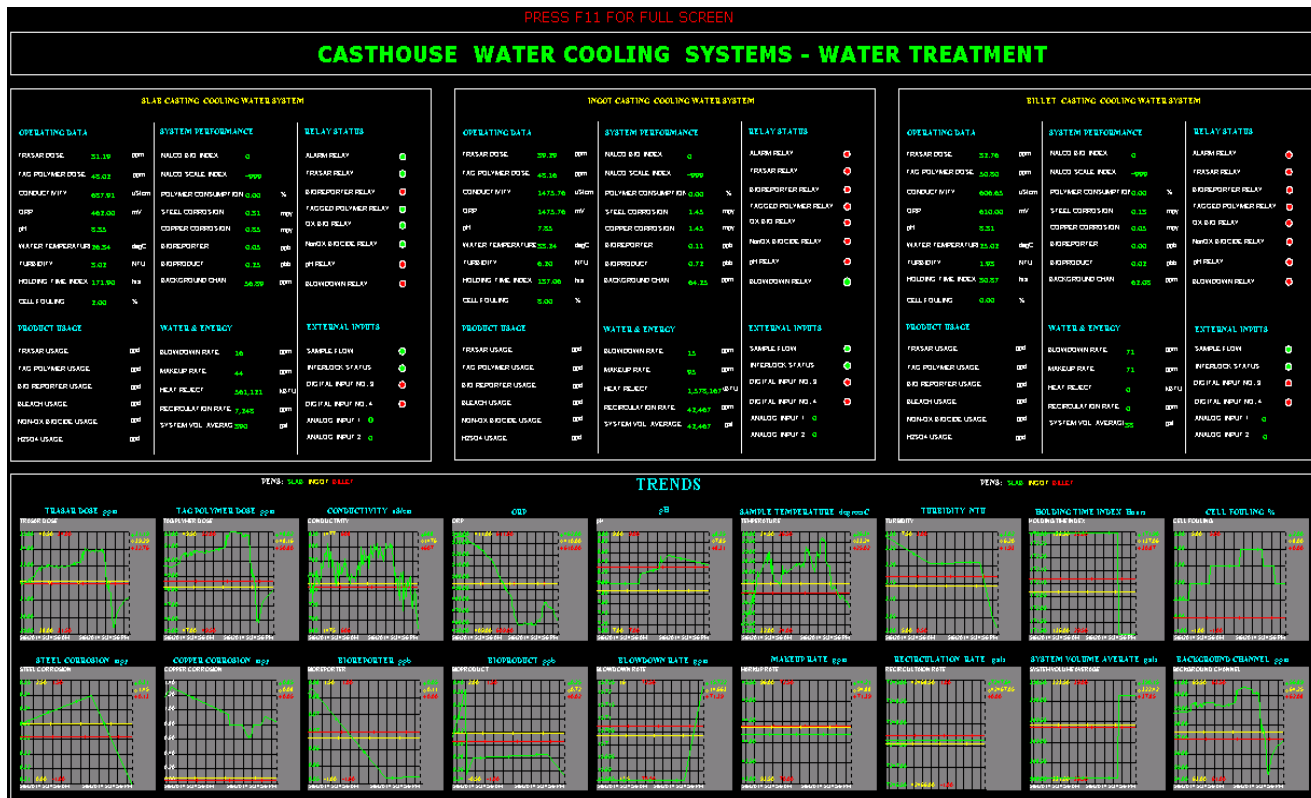
Communication: RS485 Serial Port

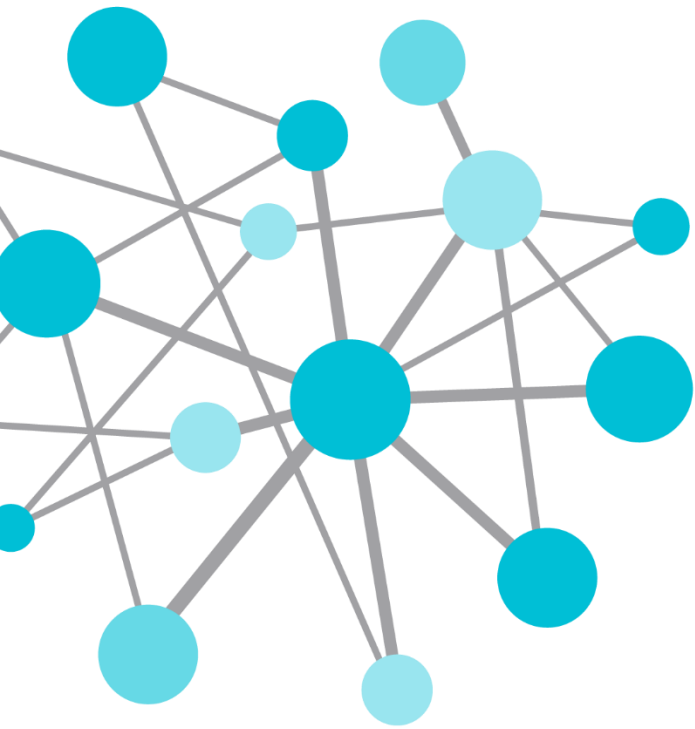
OSI interface using KepServer (OPC protocol)



- OPC Server – KepServer EX with Modbus TCP/IP driver
- 114 PI Tags created for 114 3DTrasar water treatment parameters (38/Controller).
- Tags used to create PI ProcessBook Display showing all 3 Trasar controllers with Trends of critical parameters.

Dashboard for the Water Treatment

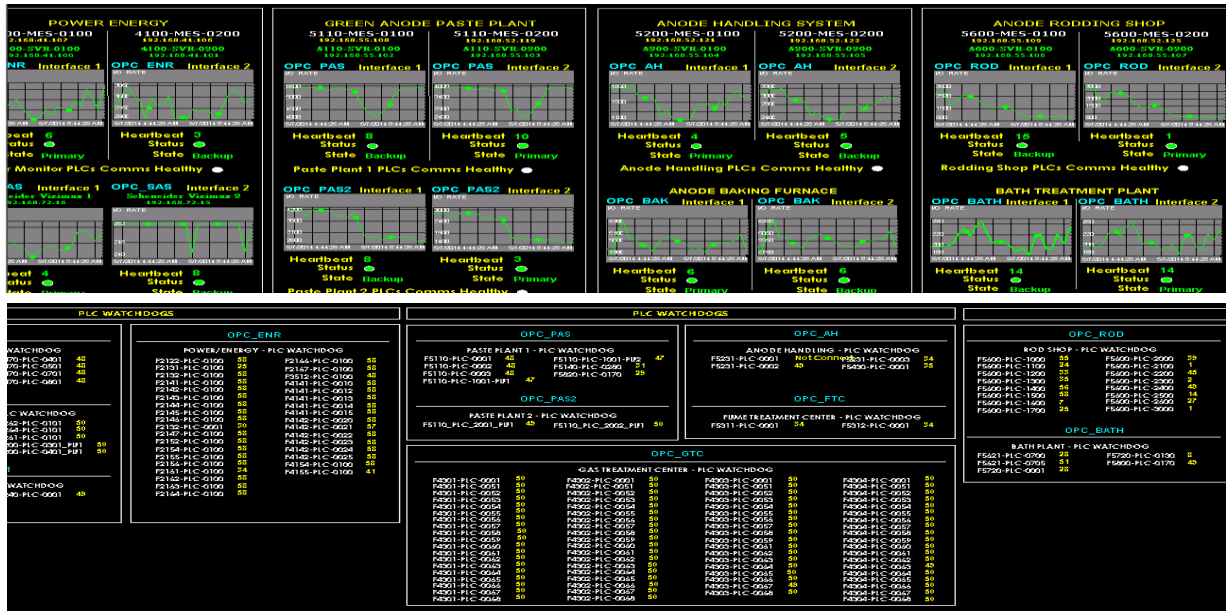


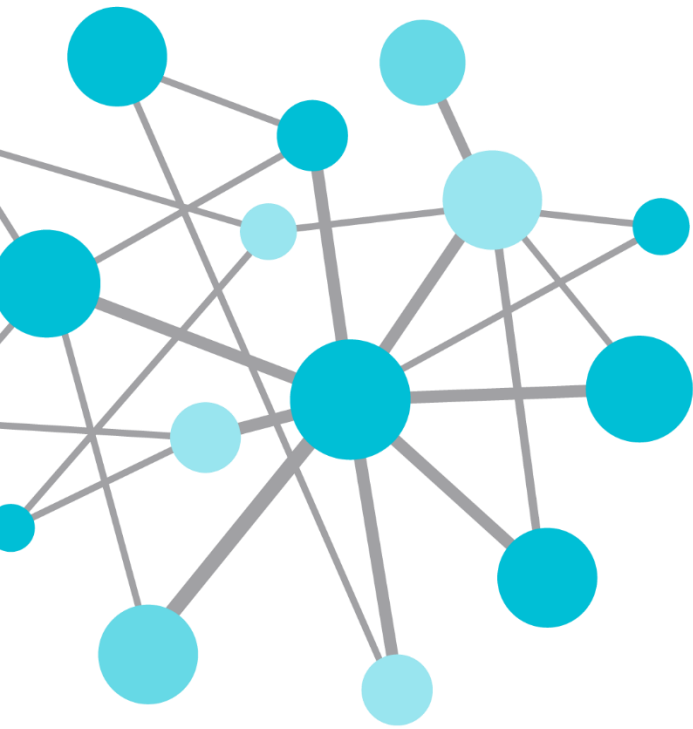


Monitoring of the PI Interfaces (Technology Team)

Dashboard to Monitor the PI Interface Node

- There are 22 PI OPC Interfaces
- There are 8 PI RDBMS Interfaces that fetch data from Oracle and MSSQL
- PLC Watchdog to monitor the critical PLCs.





Planned Next Steps

Develop Business Case for Value Add

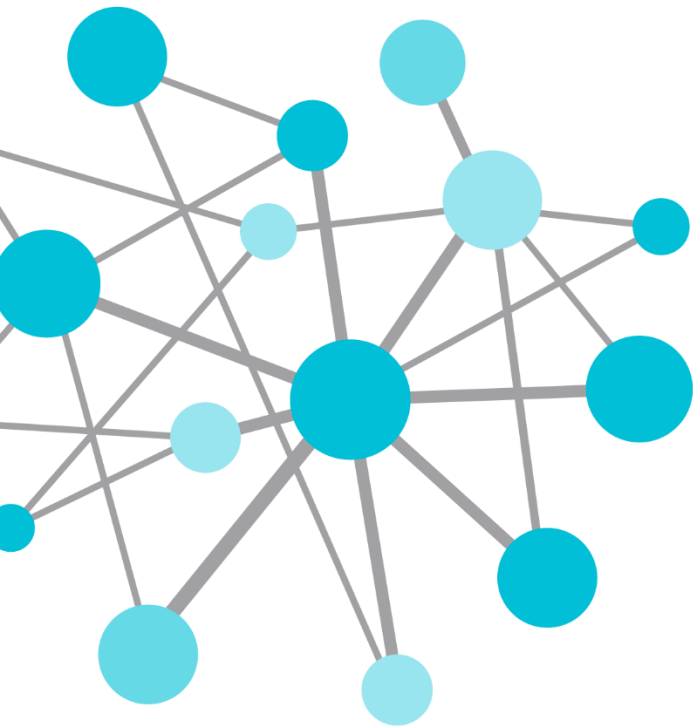
- With Smelter entering Stabilization phase there is great pull from Operations for multitude of Value Add Opportunities
 - OEE
 - Metal Flow Visibility
 - Operations at a Glance
 - Bottleneck Highlights
 - ...
-
- Evaluate Enterprise Agreement with Value Add \$\$ in Equation

Marshall Mahala IPS Manager / CH MES SME Ma'aden Aluminium

- Marshall.Mahala@Alcoa.com
- mahalam@ma.maden.com.sa

Geff Wood - Alcoa

- Geff.Wood@Alcoa.com



Questions

Please wait for
the **microphone**
before asking
your questions



State your
**name &
company**



THANK
YOU

Brought to you by  **OSI**soft.

Please don't forget to...

Complete the online survey for
this session

eventmobi.com/emeauc14



Share with your friends

#UC2014

