

OSIsoft®

USERS²⁰¹¹ CONFERENCE



Turning **insight** into **action**.



The Journey Toward Enterprise Value Creation in MOL Group Refining

Presented by **Tibor Komróczki**
MOL Group

“Coming together is a beginning.
Keeping together is progress.
Working together is success.”

Henry Ford



Agenda

- History of Refinery Operational System in MOL
- OSIsoft portfolio
- Unified operational control
- PI System based solutions in MOL Group
- Future plans

About MOL

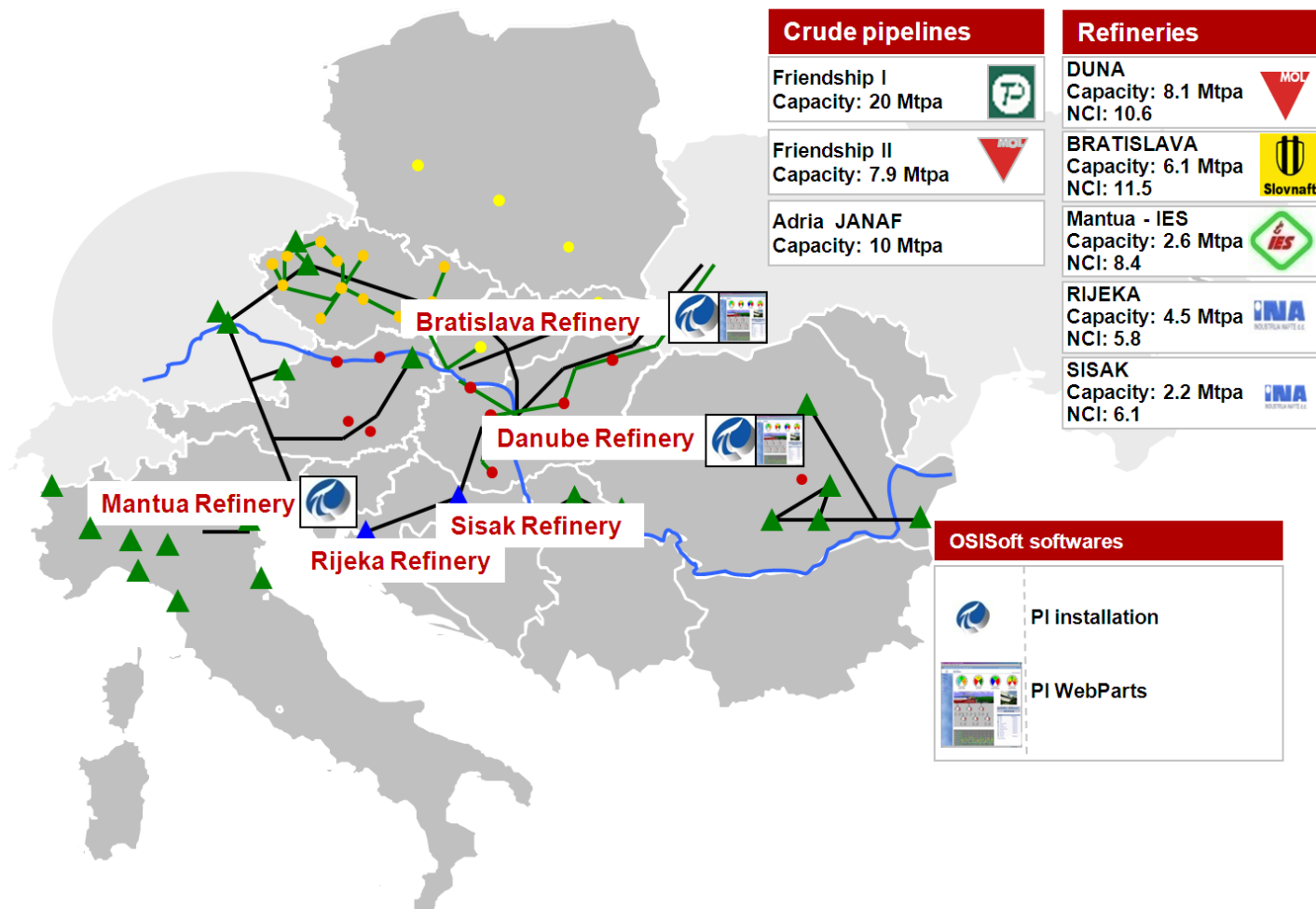
- Founded in 1991
- One of the largest multinational corporations in Central Europe
- 2009 Net sales revenue: ~ 15,94 mn. USD
- 2009 Market capitalization: ~ 9,4 Bn. USD
- Approximately 34,000 employees

Exploration & Production

- Activities in 9 countries (excluding INA blocks)
- 11 international exploration assets

Refining & Marketing

- 7 refineries in 4 countries (Hungary, Slovakia, Italy, Croatia)
- Extensive crude and product pipeline system
- 1686 filling stations in 10 countries



PI System implementation



- MOL (Hungary) PI System -1998;
- SLOVNAFT (Slovakia) PI System - 2006;
- IES (Italy) PI System – 2008;
- INA (Croatia) PI System – 2012;



OSIsoft portfolio in MOL Group

- PI System
- PI DataLink – Energy monitoring, small applications
- PI ProcessBook , PI WebParts – SPS based website
- PI SDK – for application development
- Complex solution – Operational KPI system

Pillars of operational control



Business challenge

Solution

Result / Benefits

Business Challenge

- Closing the gap between process control and business governance
- Providing real-time information for tighter control of operations
- Establishing a unified data model of Refining for all refineries in the group
- Overall monitoring of operations to fulfill strategic objectives

Solution

- Implemented PI System to collect process data from the field regardless supplier of process control system
- Developed applications to support refinery functions via using PI System tools (PI SDK, PI DataLink, etc)
- Building PI Asset Framework and Group level data model
- Provides portal to publish reports, graphical information for all authenticated users

Results / Benefits

- Visible and controllable operations throughout the refineries
- Better situational awareness, stronger focus on corrective actions at all levels
- Users quickly find relevant information
- Closer to planned operations, scheduled activities, events

Unified system cornerstones

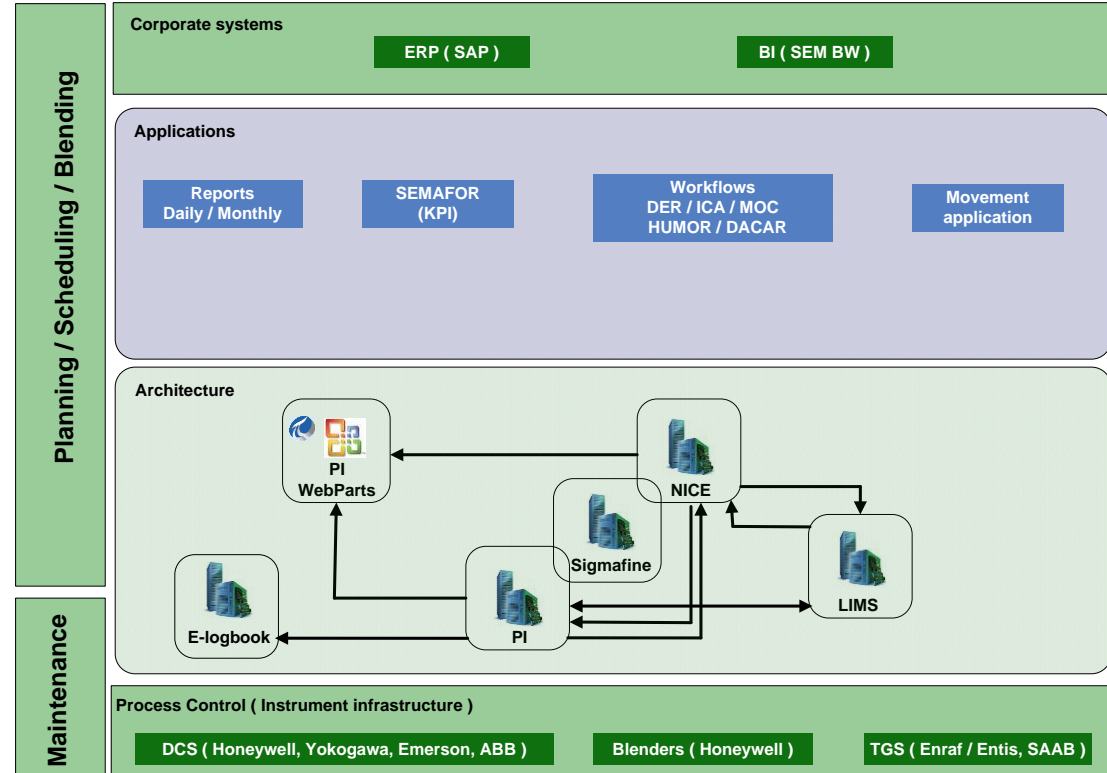


Refinery Information System expectations

- Corporate-wide application and reporting system
- Support integrated and local business processes
- Multilingual environment
- **All based on PI System and applications**

Building the same data model everywhere

- Instrumentation
- Equipment model
- Framework
- Asset model



Results of the project

- Common reports
- Integrated operation
- Group level processing
- Common support



MOL applications



PI DataLink solutions

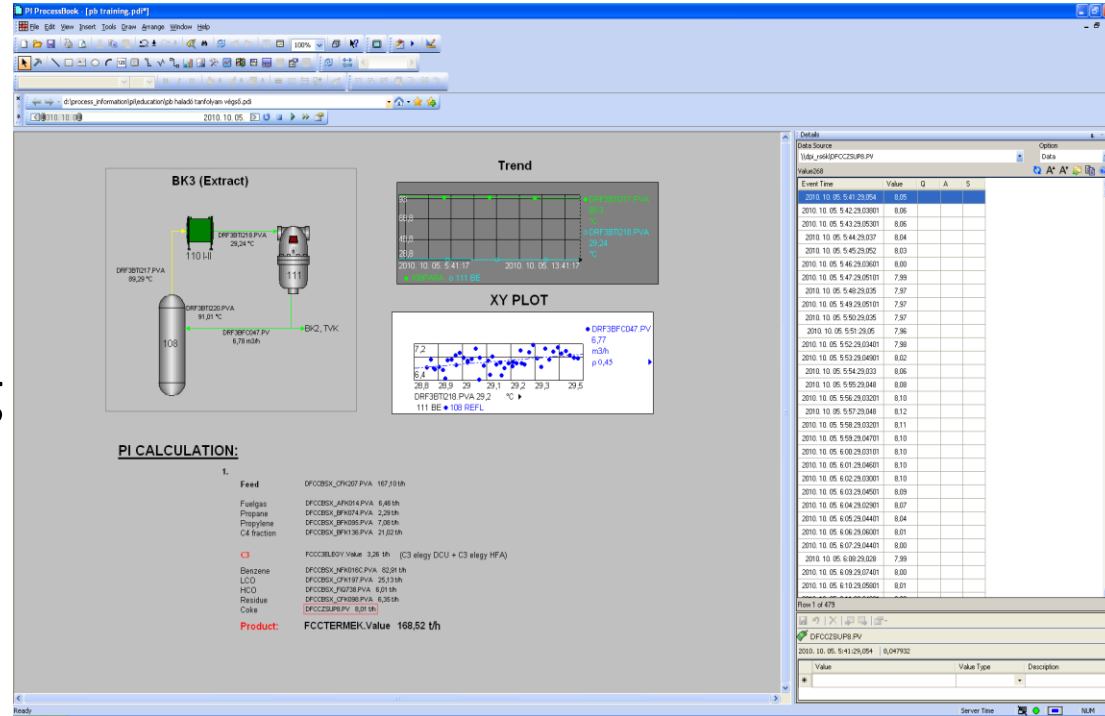
- Energy monitoring
- Technological card checking
- Ad-hoc reports

MIH Technological card

Description	Tag name	EU	Specification	Actual value
Feed processing	EFC308	t/h	max. 4,5	1.8
Quantity of H2	EFC106	Nm3/h	max. 3000	1197
Pressure from compressor No. 321/1-2	HP012B	bar	max. 46*	36.7
Temperature of feed after No. 175	ET001	°C	min. 90	122
Inlet temperature to heater No. 171	ET002	°C	min. 150	138
Outlet temperature from heater No. 171	ETT110	°C	max. 350	241
Inlet pressure to reactor No. 172	EP202	bar	max. 45	36
Outlet pressure from reactor No. 172	EP204	bar	max. 41	36
Temperature of separator No. 173	ET016	°C	max. 260	112
Temperature of steaming out column No. 174/1	ET017	°C	max. 240	40
Pressure of steaming out column No. 174/1	PI 11204	bar	max. 0,8	
Quantity of inlet steam to steaming out column No. 174/1	FI 11307	kg/h	max. 250	
Temperature of the bottom of vaccum dryer no. 174/2	TR 11107	°C	max. 230	
Pressure of vaccum dryer No. 174/2	PR 11210	mbar	10-250	
Temperature of the product after cooler No. 178	TR 11108	°C	max. 130	

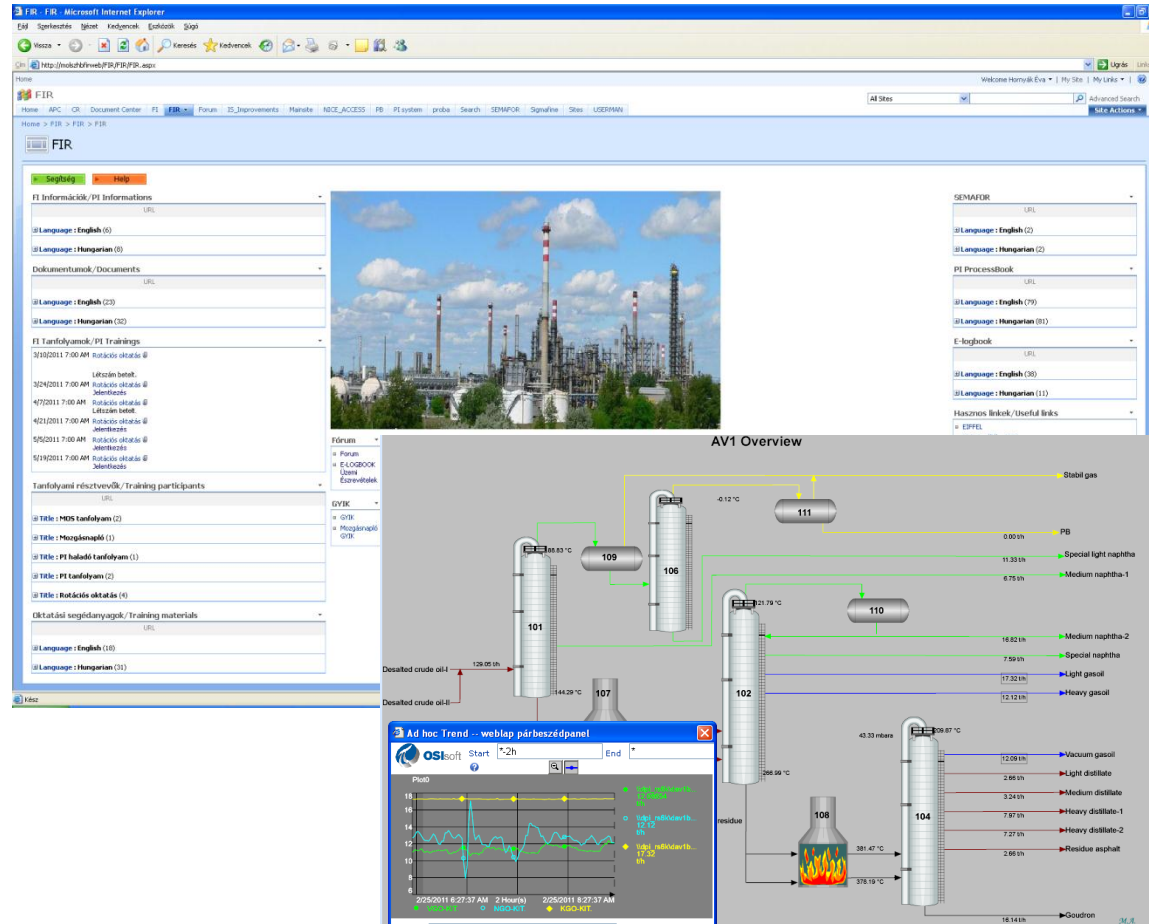
PI ProcessBook

- Graphical displays for PI WebParts
- Present relevant information and historical data
- Compare and check PI Tag values
- Create calculations



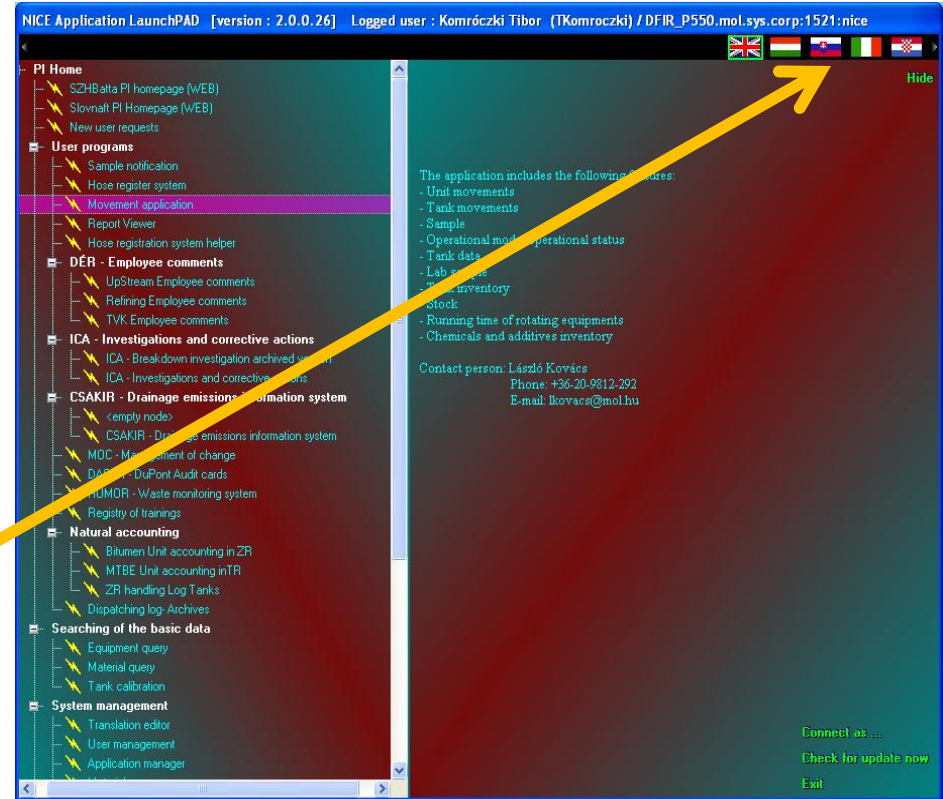
PI WebParts

- Upload ProcessBook flow sheets
- Organize training
- Share important information and documentations



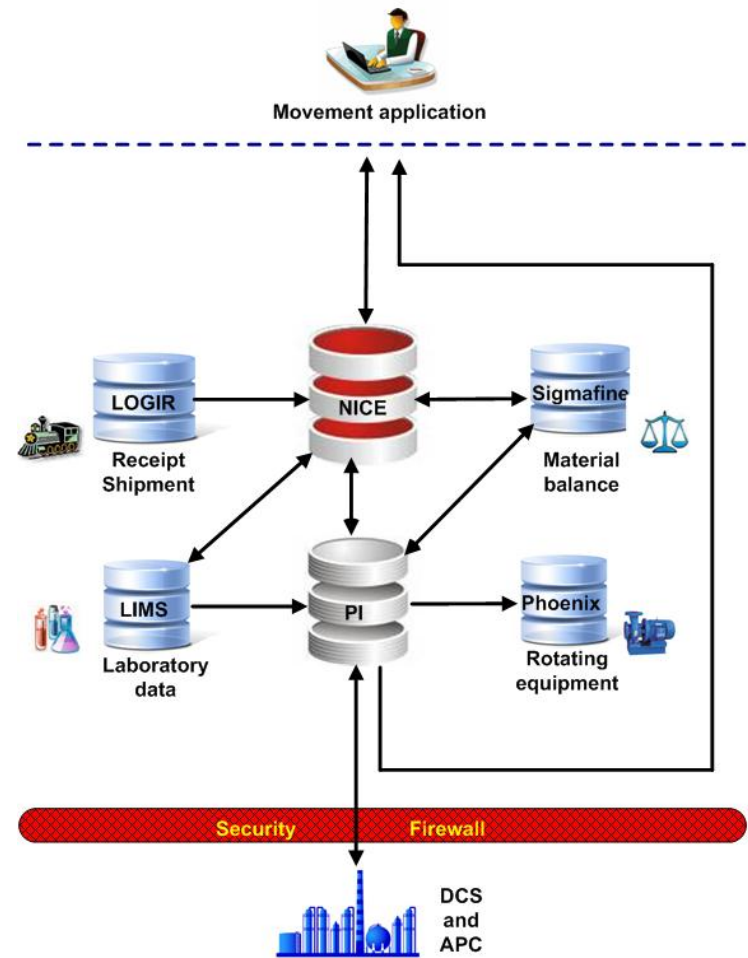
NICE applications

- PI SDK based application
- Centralized, structured
- Individual role levels
- Automatic version handling
- Used by everyone
- Multilanguage

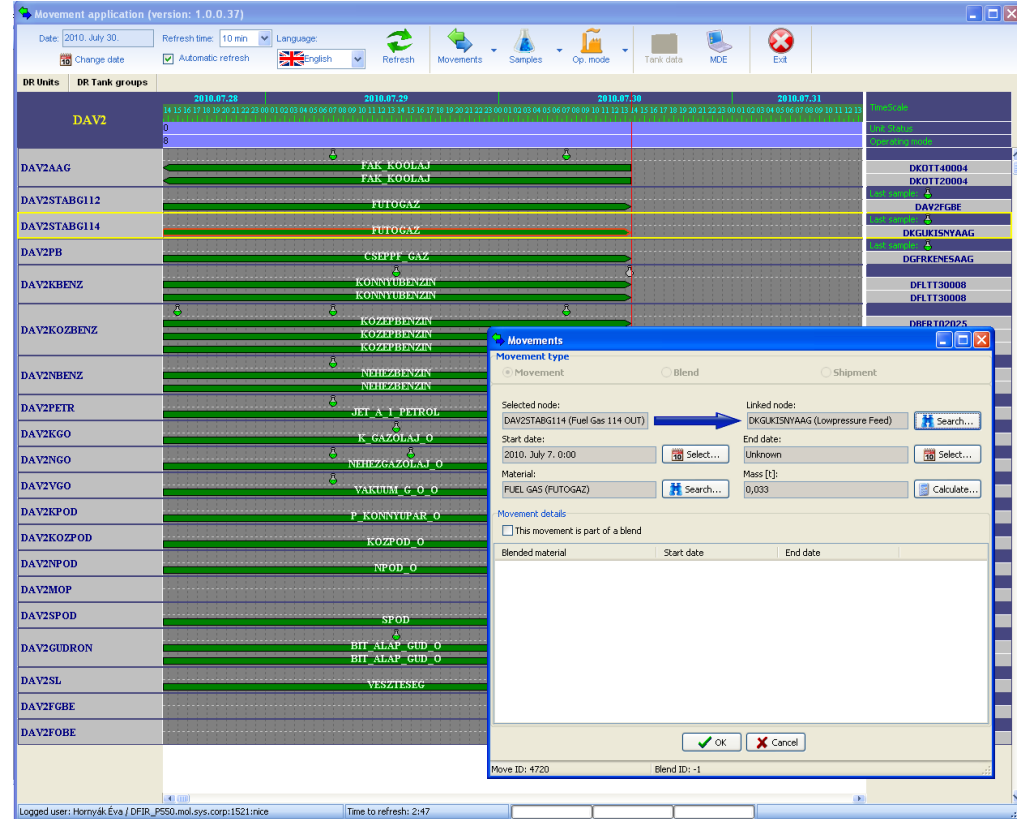
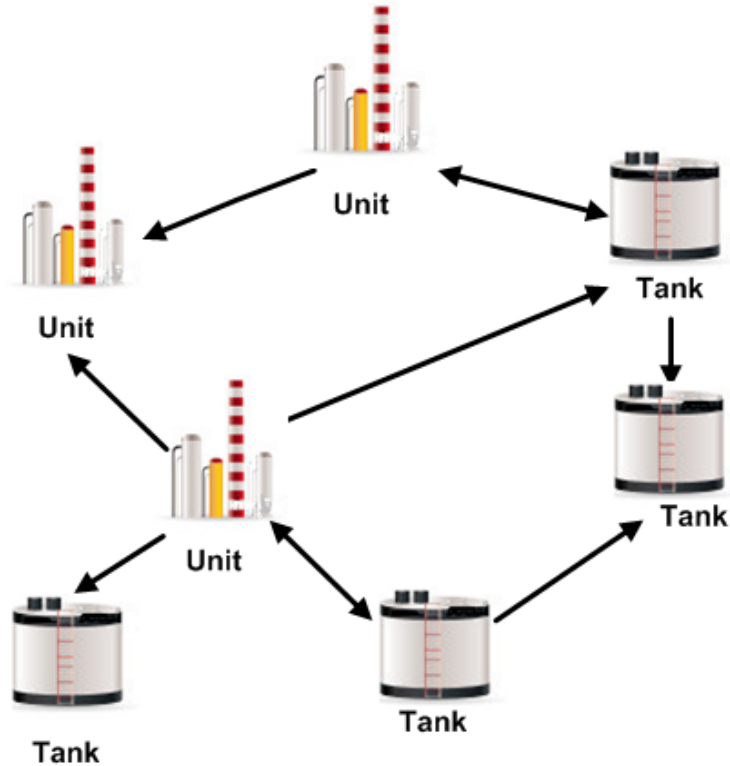


Movement application

- PI SDK based application
- Follow movements (unit and tank)
- Sample information
- Inventory
- Chemicals
- Rotating equipments

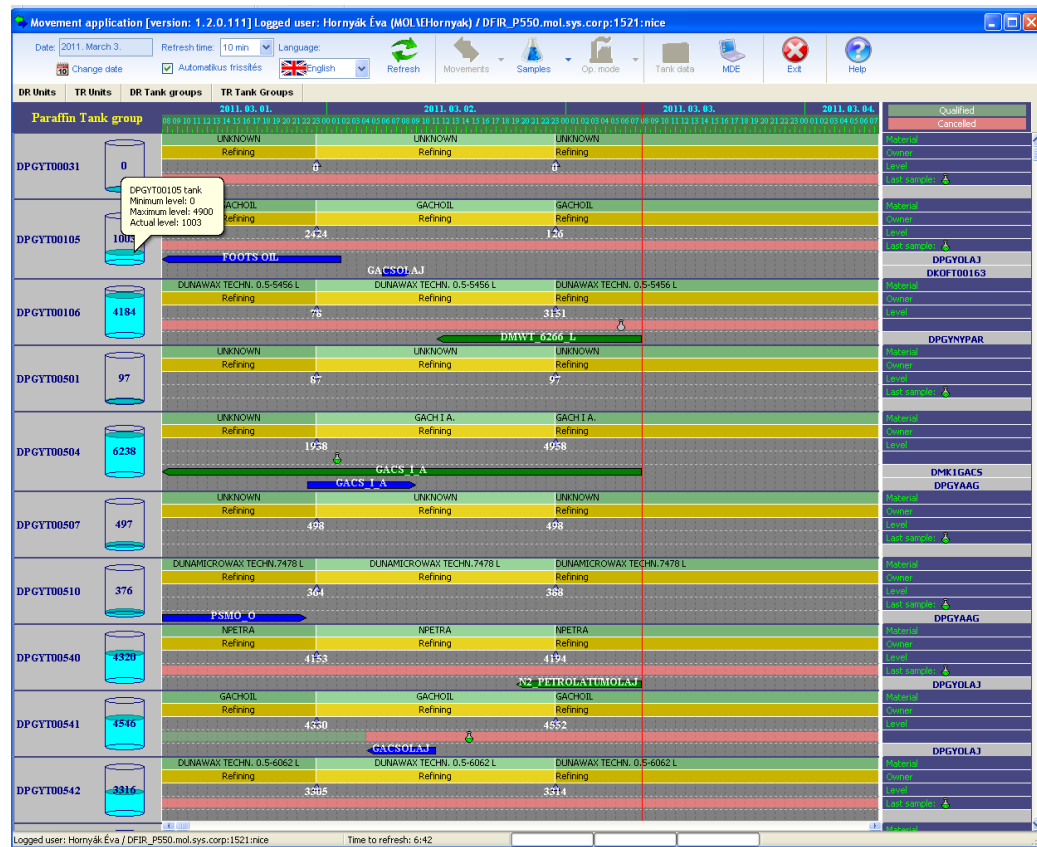
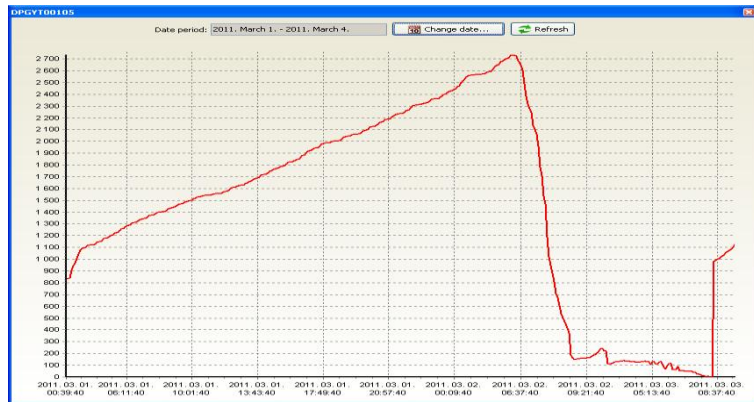


Movement application




Tank movements

- Tank movements history
- Tank level data
- Sample information



Sample information

- Connection with LIMS and PI System
- Users can log-in samples easily
- Detailed sample result information



Sample notification

Sampling point: DAV2STABG114_M (Fuel Gas 114 OUT)

Date: 2011. March 3. 9:11

Material:

Sample mode:

Laboratory:

Batch ID:

Comment:

☐ OK ☐ Cancel

Movement application [version: 1.2.0.111] Logged user: Hornyák Éva (MOL\EHornyak) / DFIR_P550.mol.sys.corp:1521:nice

Date: 2011. March 3. Refresh time: 10 min Language: English

☐ Change date ☒ Automatic refresh

Movements Samples Op. mode Tank data MDE

DR Units TR Units DR Tank groups TR Tank Groups

2011. 03. 01. 2011. 03. 02.

DAV2

0 11

Sample analyses

Date: 2011. March 2. 7:00

Sampling point: DAV2NBENZ_M

Sample number: 1866096

FIR Material: NEHEZBENZIN

LIMS Material: BEN_N

Batch identifier:

Recipe identifier:

Layer identifier:

Result	Value	Measure	Convenient (LAB)	Convenient (DISP)
10_SZAZALEK_ATDESZT	94.5	C°	Y	Y
30_SZAZALEK	113.3	C°	Y	Y
50_SZAZALEK	124.7	C°	Y	Y
5_SZAZALEK_ATDESZT	86.6	C°	Y	Y
70_SZAZALEK	136.3	C°	Y	Y
90_SZAZALEK	150.5	C°	Y	Y
95_SZAZALEK_ATDESZT	156.8	C°	Y	Y
ATDESZT_MENNYISEG	98.2	%(V/V)	Y	Y
D15	0.7424	g/cm3	Y	Y
KEZDO_FORRPONT	61.4	C°	Y	Y
VEGFORRPONT	166.2	C°	Y	Y

Logged user: Hornyák Éva / DFIR_P550.mol.sys.corp:1521:nice Time to refresh: 9:43

Inventory data

MDEForm

Unit Movements
Tank movements/shippments
Tank Inventories
TF Inventories

Export to Excel Print inventory Date: 2011. February 25. Select...

	Tank	Handler	Material Code	Material	Level [mm]	Temp [C°]	Den Lab [kg/m3]	Pressure [bar]	Vol Net Lab [m3]	Weight Net [t]
1	TTART01001	Refining	00001361	C4-FRAKCIO	5393	-3,9	600,9	1	426,05	256,013
2	TTART01002	Refining	00001112	TEL C4 FRAKCIO	6763	-3,1	599,4	1	591,602	354,606
3	TTART01003	Out of operation	00000000	ISMERETLEN	0	0	0	0	0	0
4	TTART01004	Refining	00034195	MTBE	5149	-3,4	745,8	2	393,487	293,463
5	TTART01005	Refining	00034195	MTBE	3614	-3,7	745,8	2	223,324	166,555
6	TTART01006	Refining	00034195	MTBE	9438	-3,7	745,9	2	883,818	659,24
7	TTART01007	Refining	00071104	IBUTAN_MOL	3974	-3,4	572,4	1	262,286	150,133
8	TTART01008	Out of operation	00000000	ISMERETLEN	0	0	0	0	0	0
9	TTART01009	Refining	00071106	IZOPENTAN_MOL	8908	-3,8	617,1	1	835,842	515,798
10	TTART05001	Out of operation	00000000	ISMERETLEN	0	0	0	0	0	0
11	TTART05002	Refining	00002931	BIOETANOL	7023	-1,3	788,9	0	2690,814	2132,739
12	TTART05003	Refining	00002935	BIO DIESEL K.K8	5898	7,2	883,1	0	2212,836	1954,155
13	TTART05004	Refining	00052790	FAZISOLAJ	8690	10,5	934,4	0	3261,274	3047,304
14	TTART05005	Refining	00071071	NVERSKOND, "A"	9970	-1,8	675,2	0	3823,613	2581,703
15	TTART05006	Out of operation	00000000	ISMERETLEN	0	0	0	0	0	0
16	TTART05007	Out of operation	00000000	ISMERETLEN	0	0	0	0	0	0
17	TTART05008	Logistic	00004666	ES2-95/ES 4,4 %	4523	-1,4	752,333	0	1707,063	1284,223
18	TTART05009	Logistic	00001148	KÉNMENTES C8...	3475	-1,1	869,6	0	1295,622	1126,673
19	TTART05010	Refining	00002949	METANOL	5336	-1,4	796,1	0	2045,368	1628,317
20	TTART10001	Logistic	00001147	C8 FRAKCIO	4318	7,3	882,7	0	3346,619	2954,061
21	TTART10002	Out of operation	00000000	ISMERETLEN	0	0	0	0	0	0
22	TTART10003	Logistic	00001115	BENZOL-TOLLU...	5996	9,1	854,6	0	4668,809	3989,964
23	TTART10004	Logistic	00004666	ES2-95/ES 4,4 %	9657	-0,4	753,333	0	7737,686	5828,799
24	TTART20001	Out of operation	00000000	ISMERETLEN	0	0	0	0	0	0
25	TTART20002	Logistic	00005140	DIZELGÁZO. BIO	9536	34,2	842,467	0	12134,385	10223,219
26	TTART20003	Logistic	00012840	DIZELGÁZO. BIO	8260	16,1	843,8	0	11164,182	9420,337
27	TTART20004	Refining	00012840	DIZELGÁZO. BIO	13082	20	843,2	0	17723,99	14944,868
28	TTART20005	Logistic	00001152	C9 FRAKCIO	4110	5,4	942,6	0	5416,626	5105,662
29	TTART20006	Logistic	00001247	IMP.KÉNES GÁ...	6534	5,3	843,5	0	6796,67	7419,991
30	TTART20007	Logistic	00001246	SPEC_GAZOLA...	2476	8,7	843,3	0	3096,606	2611,368
31	TTART20008	Logistic	00001246	SPEC_GAZOLA...	13045	4,9	843,7	0	17877,212	15083,004
32	TTART20009	Logistic	00011975	95-OS MOT.B.AL	6158	0,6	742,2	0	8302,02	6161,759
33	TTART20010	Logistic	00004741	VEGY_BENZ	2547	9,2	668,067	0	3207,718	2143,076
34	TTART20011	Out of operation	00000000	ISMERETLEN	0	0	0	0	0	0
35	TTART20012	Logistic	00051116	VEGY_BENZIN	2409	7,4	672,8	0	3017,481	2030,161
36	TTART20013	Logistic	00004655	ES2-95 (<10 P...	14331	3	744,8	0	19873,536	14801,81
37	TTART20014	Logistic	00004655	ES2-95 (<10 P...	14281	-1,4	743	0	19945,76	14819,7
38	TTART20015	Logistic	00004655	ES2-95 (<10 P...	14332	-0,1	747,267	0	20072,428	15000,125

Rotating equipments
Chemicals

Last saved: 2011. February 25. 0:33
Saved by: Kovács Eszter

Save

Close

Inventory modifying...

Tank TTART20009 tank

Handler Logistic

Material 95 MOGAS PREBLEND Search...

Level [mm] 6158 Temperature [C°] 0,6

Temperature in lab [C°] 15 Density in lab [kg/m3] 742,2

Pressure [bar] 0

Comment

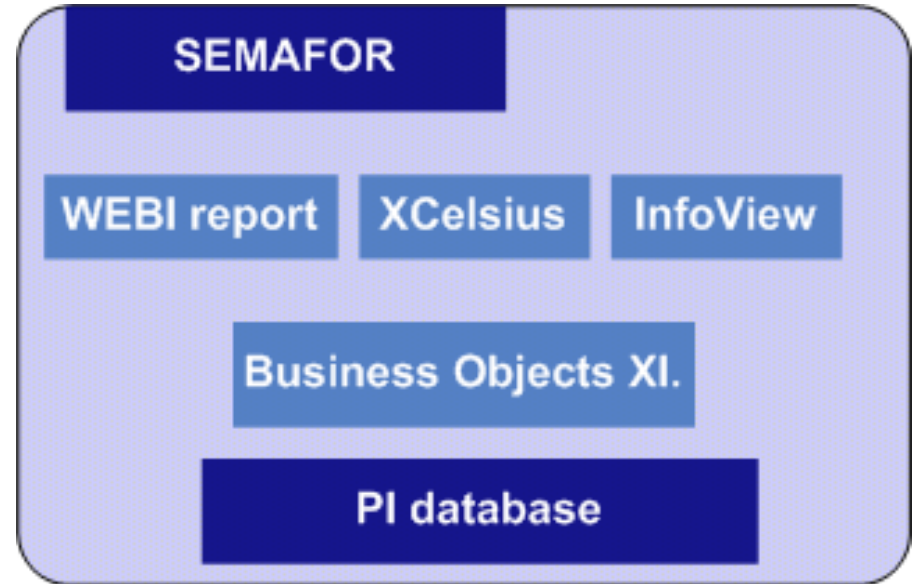
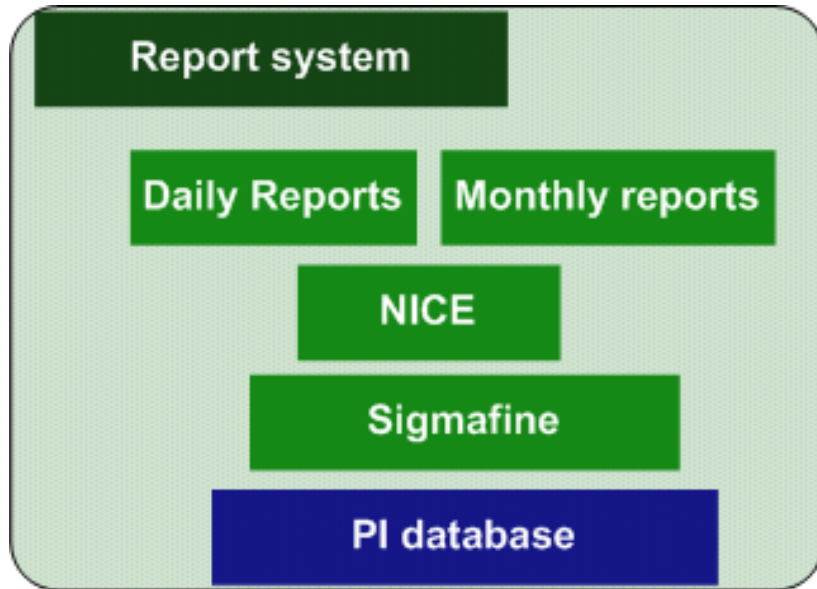
OK Cancel

Some other applications

- PI SDK based applications
- Reporting system
- Operational KPI system – SEMAFOR
- APC monitoring
- Analyzer Reliability and Graphical User System - ARGUS
- Investigation and corrective actions
- DuPont Audit Card



Reporting system



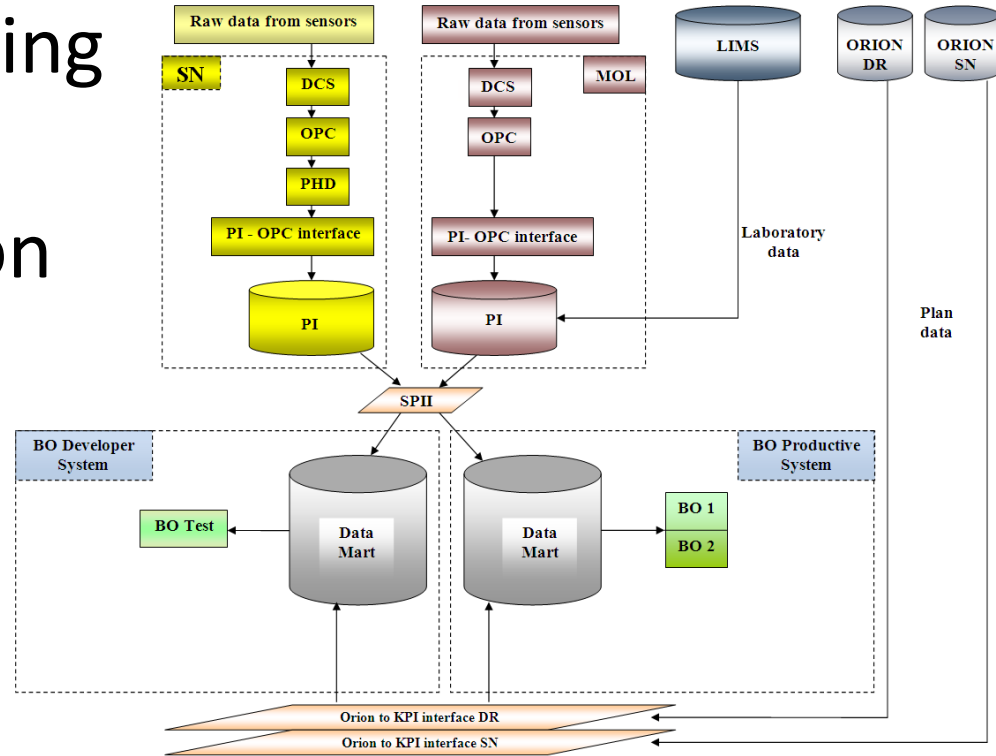
Report system

- Unify the stream of information
- Helps to recognize anomalies
- Bridge between the different data

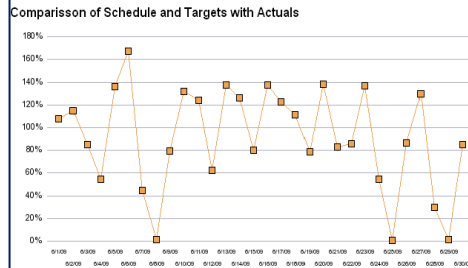
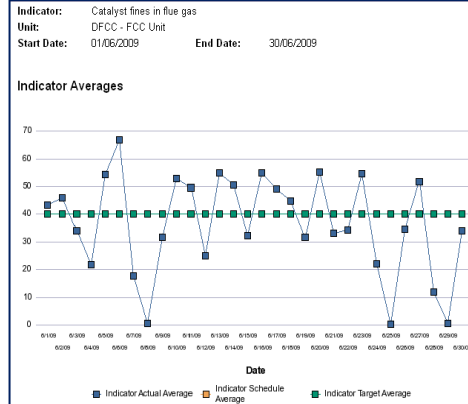
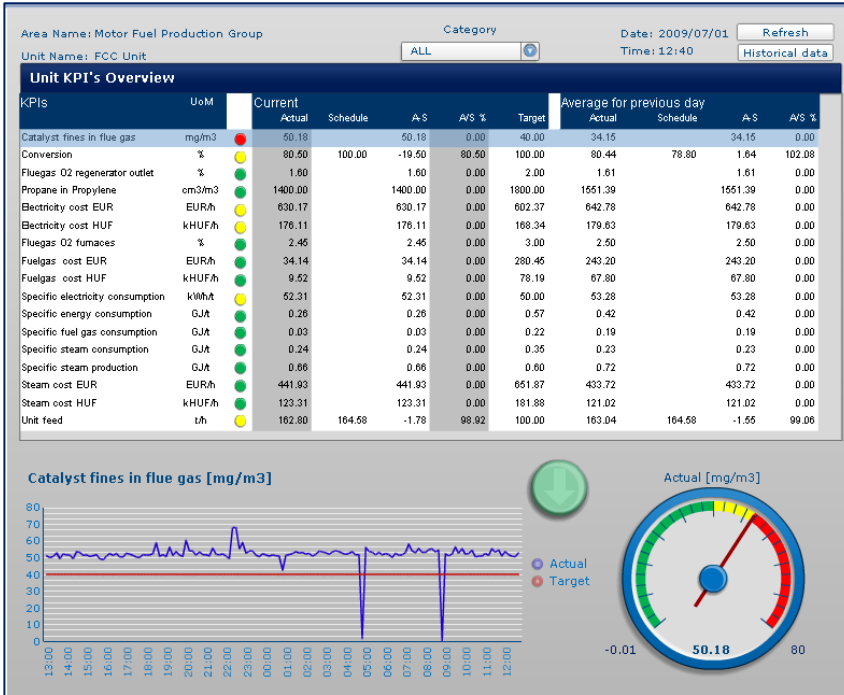
Inventory				
Mir ID: PROD_1_REF4.9_MOL1/DNK/03				
Place: Danube Refinery				
Date: 2011.02.10.				
	Inventory	Storage	Delta	UoM.
Summary				
FEEDS	338980,77	299633,102	-2103,154	t
PRODUCTS	330688,99	333040,877	2649,541	t
OUTSIDER INVENTORIES	261486,84	1730,731	5,278	t
Inside inventories	669669,76	632673,979	546,387	t
Sum CH inventory	931156,6	634404,71	551,665	t
Groups				
1.) Crude oils				
- REB crude	155625,01	63756,298	-5273,141	t
- Raw Condensate	0	0	0	t
- Algyo (H) crude	45183,104	12585,709	1618,906	t
- Paraffinic hungarian crudes	0	0	0	t
- Sulphur hungarian crude	0	0	0	t
- Miscellaneous hungarian crudes	7294,833	6980,587	327,503	t
- Miscellaneous import crudes	0	0	0	t
Crude oils:	208102,95	83322,594	-3326,732	t
2.) Processed with crude oil				
- Slop	102,812	307,683	0,98	t
- Phaseoil	0	0	0	t
- AtmResid	0	0	0	t
- Spent oil	0	0	0	t
Processed with crude oil:	102,812	307,683	0,98	t

Operational KPI system - SEMAFOR

- Daily operation monitoring through KPIs
- Consolidated information and reporting system
- Increase performance transparency



Operational KPI system



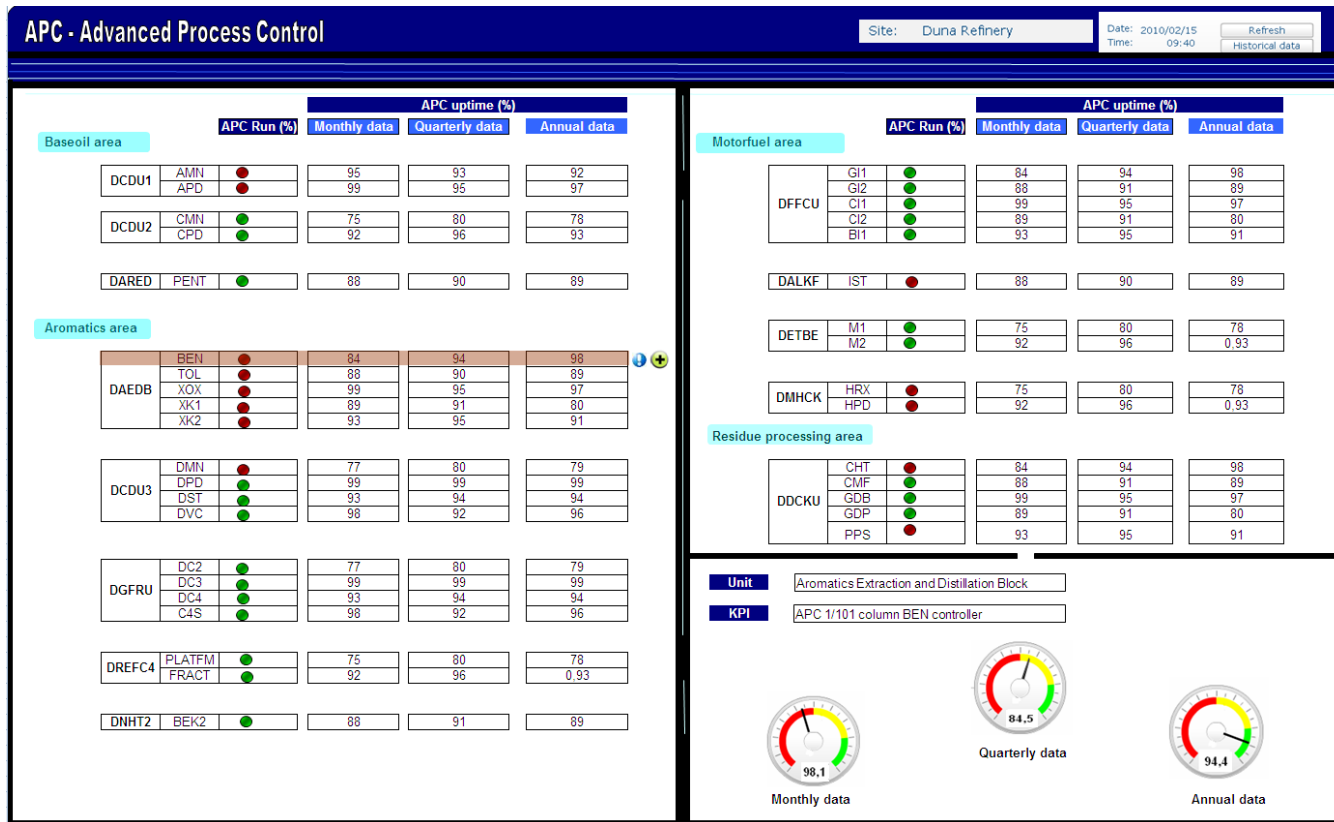
Historical Data Report

Indicator: Catalyst fines in flue gas
Unit: DFCC - FCC Unit
Start Date: 01/06/2009
End Date: 30/06/2009

Table with Data Details

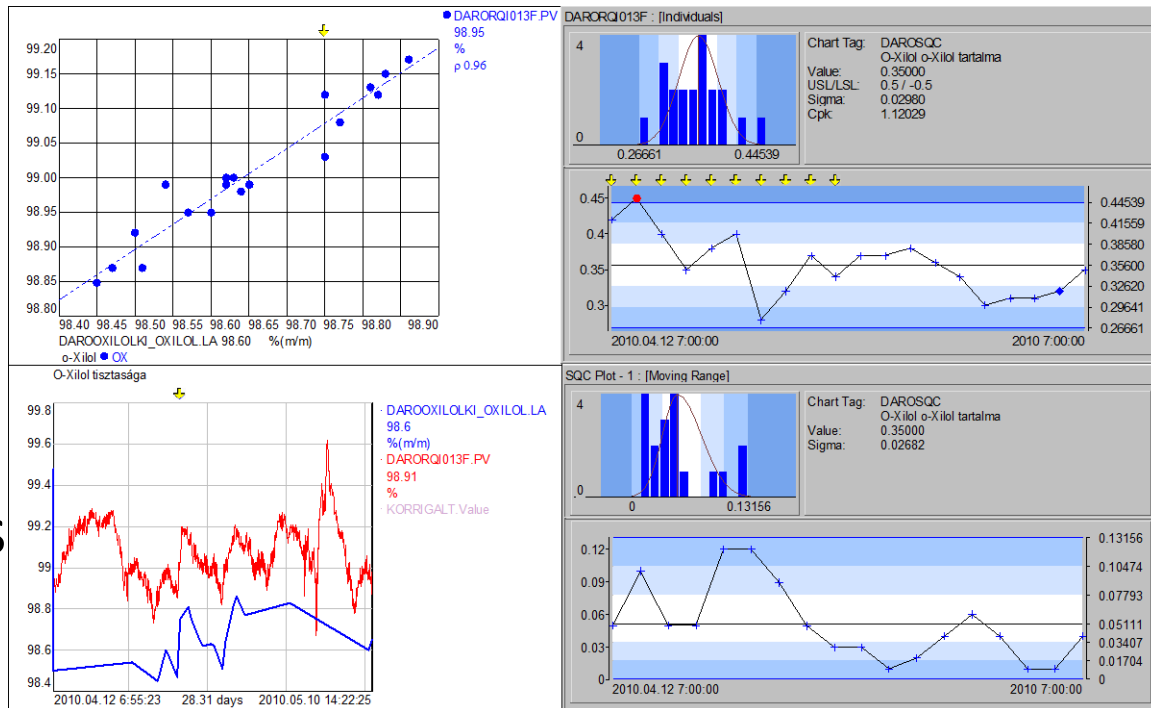
Date	Indicator Actual Average	Indicator Schedule Average	Actual vs. Schedule	Indicator Target Average	Actual vs. Target
6/1/09	43.22			40.00	108.05%
6/2/09	46.05			40.00	115.13%
6/3/09	34.04			40.00	85.11%
6/4/09	21.84			40.00	54.61%
6/5/09	54.38			40.00	135.96%
6/6/09	66.95			40.00	167.37%
6/7/09	17.81			40.00	44.52%
6/8/09	0.62			40.00	1.55%
6/9/09	31.73			40.00	79.32%
6/10/09	52.80			40.00	132.01%
6/11/09	49.57			40.00	123.93%
6/12/09	24.99			40.00	62.46%
6/13/09	55.08			40.00	137.70%
6/14/09	50.49			40.00	126.22%
6/15/09	32.18			40.00	80.44%
6/16/09	55.05			40.00	137.63%
6/17/09	49.07			40.00	122.67%
6/18/09	44.67			40.00	111.66%
6/19/09	31.61			40.00	79.02%
6/20/09	55.35			40.00	138.37%
6/21/09	33.27			40.00	83.17%
6/22/09	34.41			40.00	86.03%
6/23/09	54.69			40.00	136.73%
6/24/09	21.97			40.00	54.93%

Advanced Process Control monitoring



Analyzer Reliability and Graphical User System

- Continuous validation of process analyzers
- Western electric patterns
- Common platform for laboratory and process data



Investigation and corrective actions

- Quick and easy investigation process
- Statistical analysis
- Historical data
- Decrease the number of unit shut-downs

ICA - Istrage i Korektivne Akcije INA Rijeka - Istrage i Korektivne Akcije

Datoteka Alati Pomoć

Vremenski interval: 1. siječanj 2004 - 5. listopada 2010

	Oznaka	Datum događaja	Lokacija	Istraživanje započeo-	Tip događaja	Uzrok	Opis	Voditelj tima
1	2010/1	5. svibanj 2010 1:30	HDS / BHK (RMHCK)	OPM	Kašnjenje u pokretanju postrojenja	Nedostaci u komunikaciji (100%)	Tijekom aktivacije katalizatora na postrojenju HDS na ulaznoj crpki pojavila se šarža crne	Kardum Stipe (INA)
2	2010/2	5. svibanj 2010 16:00	CO Boiler Baklja Spremnici	OPM	HSE incident/Istjecanje plina	Manjak preventivnih aktivnosti (100%)	Tijekom vraćanja regulacijskog ventila 320 PC 008, baklja se pogasila i bila je bey plamena	Prijči Nenad (INA)
3	2010/3	17. svibanj 2010 10:00	Postrojenje Valum Destilacije (RIADUL)	OPM	Proizvod van specifikacije	Nedostaci u izradi i transportu (100%)	Nakon pokretanja postrojenja Vakuum destilacije postavili smo radne parametre kao i	Prijči Nenad (INA)
4	2010/4	28. lipanj 2010 13:30	DIP Izomerizacija (RLNIS)	OPM	Smanjenje kapaciteta Oprema/Rotirajuća oprema	Nedostaci u izradi i transportu (100%)	Ispad Izomerizacije	Orlović Boris (INA)
5	2010/5	29. lipanj 2010 13:00	Vodopokrbrni sistem	OPM	Oprema/Električni uređaji Obustava dijela postrojenja	Manjak preventivnih aktivnosti (100%)	Zbog nestanka struje Vodopokrbrni sistem i Izomerizacija su ispale iz rada.	Kardum Stipe (INA)
6	2010/6	14. srpanj 2010 15:15	Postrojenje FCC (RFCCU)	OPM	Obustava postrojenja		Zbog ispada blowera zraka, postrojenje FCC islo u obustavu proizvodnje.	Prijči Nenad (INA)
7	2010/10	22. srpanj 2010 14:00	Otpadne vode	Prod. man.	HSE incident/Nesreća (s ozljedama radnika)	Nezadovoljavajući uvjeti na radnom mjestu (100%)	U 14:00 dobio smo dojavu o povredi radnika na sustavu otpadnih voda. Riječ je o	Skender Mario (INA)
8	2010/8	24. srpanj 2010 11:00	Postrojenje Claus	Prod. man.	Obustava postrojenja		Postrojenje Clausa je moralo biti zaustavljeno zbog pada tlaka i začepljenog	Prijči Nenad (INA)
9	2010/7	24. srpanj 2010 14:00	Sistem lož plina Postrojenje HDS 1	OPM	Obustava dijela postrojenja Gubitak iscrpka viševrijednog proizvoda	Nezadovoljavajući uvjeti na radnom mjestu (50%)	HDS 1 unit shut down due to heater S/D because of flue gas system pressure disturbance.	Skender Mario (INA)
10	2010/11	27. srpanj 2010 10:28	Spremnici Urin-Bakar	Prod. man.	HSE incident/Onečišćenje okoliša/Voda	Nepriladna obuka odnosno izobrazba (50%)	Obaviješteni od strane g.Nenadica (Zaštita na radu) g.Vukica (Dorad) o zagađenju	Kardum Stipe (INA)
11	2010/12	27. srpanj 2010 18:55	HDS / BHK (RMHCK)	Prod. man.	HSE incident/Prometna nesreća (sudar, neregularnost kod isporuke)	Manjak preventivnih aktivnosti (50%)	U 18:55 sati ponovljen poziv iz vatrogasne opreme. Josip Podnar vozač vatrogasnog	Skender Mario (INA)
12	2010/9	28. srpanj 2010 10:42	Spremnici Urin-Bakar	HSE	Gubitak iscrpka viševrijednog proizvoda HSE incident/Onečišćenje	Nepriladno upravljanje promjenama (100%)	Na cijevovodu P45 (cijevni most) na poziciji gat-4 došlo do izbijanja desela. Na	Orlović Boris (INA)
13	2010/13	4. kolovoz 2010 21:00	Postrojenje Claus	Prod. man.	HSE incident/Istjecanje plina Obustava postrojenja HSE incident/Opasnost od		U 17:35 dojava dežurnog inženjera, g.Dražbenovića, užarena opskrta na psci Clausa	Prijči Nenad (INA)
14	2010/14	6. kolovoz 2010 16:37	Postrojenje FCC (RFCCU)	Prod. man.	Oprema/Rotirajuća oprema Obustava postrojenja		Na FCC-ju je u 19:25 ispio plinski kompresor te su odmah šli u obustavu postrojenja jer	Prijči Nenad (INA)
15	2010/17	18. kolovoz 2010 8:00	Postrojenje FCC (RFCCU) Postrojenje Merox 6 (RMRXU6)	Prod. man.	Oprema/Rotirajuća oprema Obustava postrojenja	Manjak preventivnih aktivnosti (100%)	U 8:00 sati došlo je do prekida napajanja električne energije na FCC-u i Vakuum Destilaciji.	Kardum Stipe (INA)
						Nezadovoljavajući uvjeti na	Knj zvučenja radnika sa	

Prijavljeni korisnik: Hornyák Éva Server: DFIR_P550.mol.sys.corp:1521:nice

DuPont Audit Cards

- PI SDK based application
- Helps to handle the audit cards
- Report function
- Select options
- Export to Excel

DACAR - DuPont Audit Cards

File Tools Help

Date interval: 2009. October 12. - 2010. October 12.

Locations

- ☒ Kiválasztott helyszínhez tartozó auditkártyák megjelenítése
- ☐ Kiválasztott helyszín munkatársai által készített auditkártyák megjelenítése

Description

- ☒ Refining MOL
- ☐ TKD SCM Minőségellenőrzés
- ☐ DS Development
- ☐ Refining Slovnaft
- ☐ VURUP

Audit Cards

☒ Started ☒ Pending ☒ Closed ☒ Deleted Conducted by: Legend

☒ Show all auditcards ☐ Show multiple action auditcards only

Identifier	Date of audit	Fixing date	Location	Conducted by	Week
2991	2010. April 11.	2010. April 11. 9:03	Atmoszférikus és vákuumdesztillációs-1 ü...	Bondár Imre	16
19220	2009. October 13.	2009. October 13. 8:...	Fűtőolaj- és puffertároló;	Gémesi Zsolt	40
19230	2009. October 13.	2009. October 13. 8:...	PB keverő és tároló;	Gémesi Zsolt	40
19270	2009. October 13.	2009. October 13. 1:...	Maleinsavanhidrid üzem;	Sándor Norbert	40
19280	2009. October 13.	2009. October 13. 1:...	Kénkinyerő-5 üzem;	Márki Szabolcs	40
19290	2009. October 13.	2009. October 13. 1:...	Készleteltetett kokszoló üzem;	Márki Szabolcs	40
19300	2009. October 13.	2009. October 13. 2:...	Benzinkeverő és tároló;	Bessenyei Gyula	40
19310	2009. October 14.	2009. October 14. 6:...	MTBE üzem;	Czaga László	40
19350	2009. October 14.	2009. October 14. 1:...	Folyamat Információ MOL;	Bábik István	40
19360	2009. October 14.	2009. October 14. 1:...	Kőolajtároló;	Gémesi Zsolt	40

Area audited: Készleteltetett kokszoló üzem;

Accompanied by:

Category	Positive observations
PaH	A területen dolgozók érvényes munkakezdesi engedéllyel rendelkeztek.

Category	Kind	Unsafe Acts and conditions
TaE	UC	Az olajtárolóban a zsomp olajos vízzel feltelt, melynek kiürítése szükséges.
TaE	UC	A P-145-A/B tech. jelű szivattyúnál lütlefejtésre használt DNSO méretű szöveterősítésű gumitömítő külső gumibevonata repedezett az előregedés miatt, cseréje szükséges.

Summary

Duration of Audit (minutes): 24

Number of Employees talked with: 3

Number of Employees working safety: 5

Number of positive Observations: 1

Number of Employees reacting positively: 1

UA+UC: 2 SRV: 0 UA: 0 UC: 2

Logged user: Hornyák Éva / DFIR_P550.mol.sys.corp:1521:nice

Future Plans and Next Steps

- Launch REFIS master program
- Enterprise agreement feasibility
- Group level knowledge sharing
- Group level PI System expert team (COE)
- New project ideas

Questions

- Contact information

Tibor Komróczki

tkomroczi@mol.hu

H 2443 Százhalombatta

P.O.Box:1.



Thank you

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