

WTE plant MVA Bonn

Description:

Operational: 05. Mai 1992

3 lines, in total 211.000 Mg/a throughput

Average calorific value: 9 MJ/kg

VonRoll grate, prisma-shaped beam

32 t/h throughput per line

505 MWh steam for the neighbouring heat generating plant HKW Nord (87,6 Mio kWh electricity & 206 Mio kWh heat)



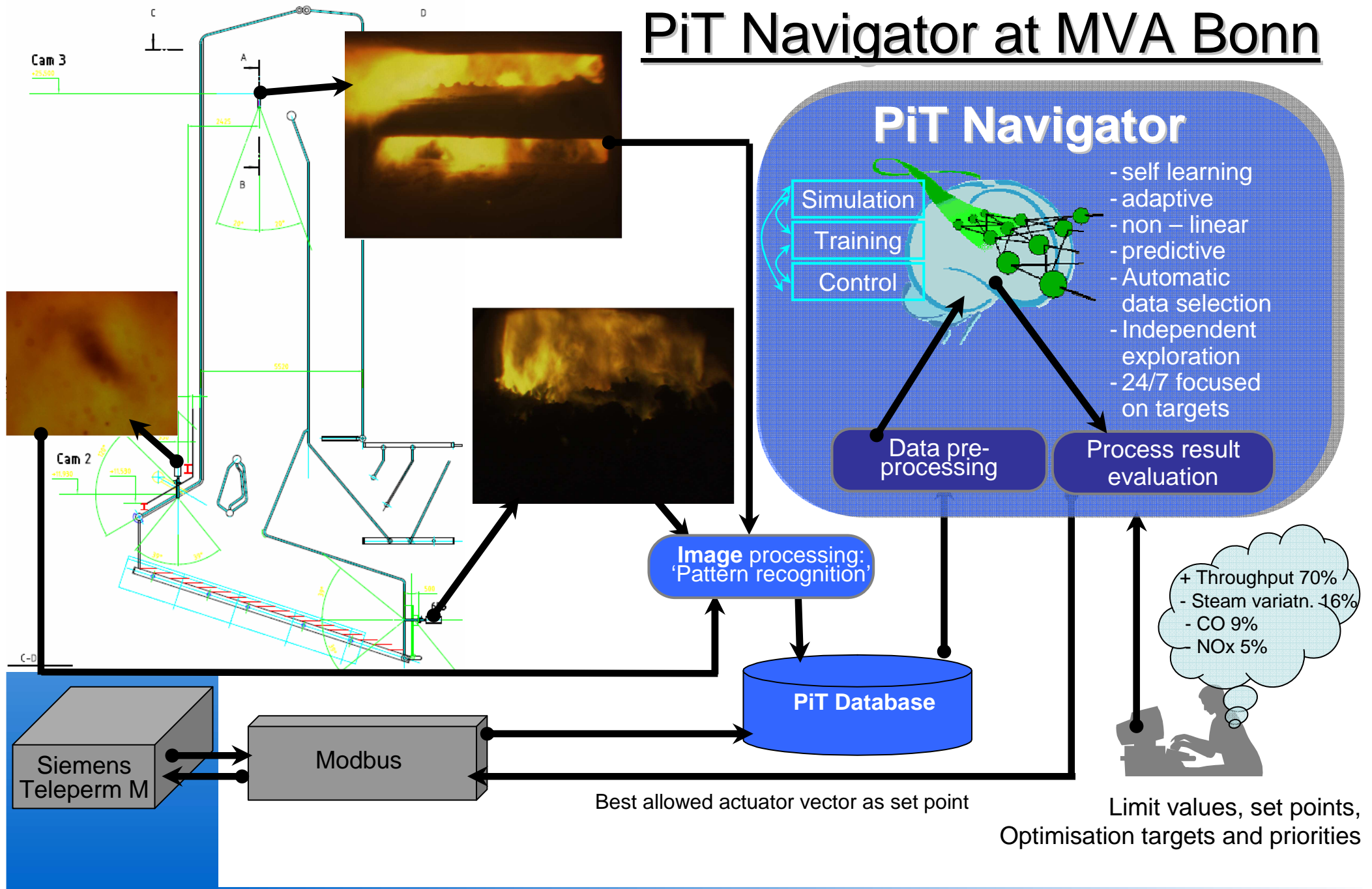
Optimisation targets:

- Reduction of standard deviation by 0,1 t/h steam (compared to former control)
- Standard deviation steam 0,75t/h (@ set point of 32t/h)
- 94% of steam values have a deviation of less than 1.5t/h

Reasons to use the PiT Navigator:

- Installation was done parallel to the existing control system (**Redundancy**)
- Self learning adaptivity
- Achievement of targets was guaranteed

PiT Navigator at MVA Bonn



PiT Navigator screen Shot: Actuator variables

Anzeige der aktuellen Linie Istwert

MVA Bonn L2

PiT-Navigator powitec

PIT-Stellgroessen PIT-Parameter Log

PIT-Navigator Stellgroessen

Stellgroesse	PIT Min.		Aktueller Wert	PIT Max.	
Zuteiler	17.5 %	⏮		60.0 %	⏭
Rostgeschwindigkeit	0.0 %	⏮		80.0 %	⏭
Gesamtmenge Primaerluft	20000.0 Nm3/h	⏮		32000.0 Nm3/h	⏭
Primaerluft Zone 1	5000.0 Nm3/h	⏮		8000.0 Nm3/h	⏭
Primaerluft Zone 2	8000.0 Nm3/h	⏮		14000.0 Nm3/h	⏭
Primaerluft Zone 3	5000.0 Nm3/h	⏮		8000.0 Nm3/h	⏭
Primaerluft Zone 4	2500.0 Nm3/h	⏮		2800.0 Nm3/h	⏭
LUV0 Temperatur	120.0 °C	⏮		210.0 °C	⏭
Gesamtmenge Sekundaerluft	3000.0 Nm3/h	⏮		14000.0 Nm3/h	⏭

Schreib-Modus

Umschaltung zwischen den einzelnen Phumi-Bedienflächen

Minimal- und Maximal-Wert der Stellgrößen Eingabebuttons Aktivierung Schreib-Modus

MVA Bonn L2

PiT-Navigator

powitec

PiT-Stellgroessen PiT-Parameter Log

PiT-Navigator, Parameter der Regelung

O2-Sollwert	7.50 %		O2-Istwert			
Anteil Primaerluft Zone 1	0.24		Anteil Primaerluft Zone 2	0.48		
Anteil Primaerluft Zone 3	0.19		Anteil Primaerluft Zone 4	0.09		
Sollwert PA-Menge bei 30 t/h	24000 Nm3/h		Sollwert PA-Menge bei 33 t/h	26500 Nm3/h		Istwert PA-Menge
Sollwert SA-Menge bei 30 t/h	11000 Nm3/h		Sollwert SA-Menge bei 33 t/h	12500 Nm3/h		Istwert SA-Menge
Temperatur Zone 4 Min	560.0 °C		Temperatur Zone 4 Max	610.0 °C		Temperatur Zone 4 Aktuell
Zuteiler/Rostgeschwindigkeit-Sollwert	1.55					Zuteiler/Rostgeschwindigkeit-Istwert
Druck-Zone1-Sollwert	2.45					Druck-Zone1-Istwert
Feuerlaenge Min	1.20		Feuerlaenge Max	1.25		Feuerlaenge aktuell
Dampfleistung-Sollwert			Dampfleistung-Istwert			Dampfleistung-Prognose 5m

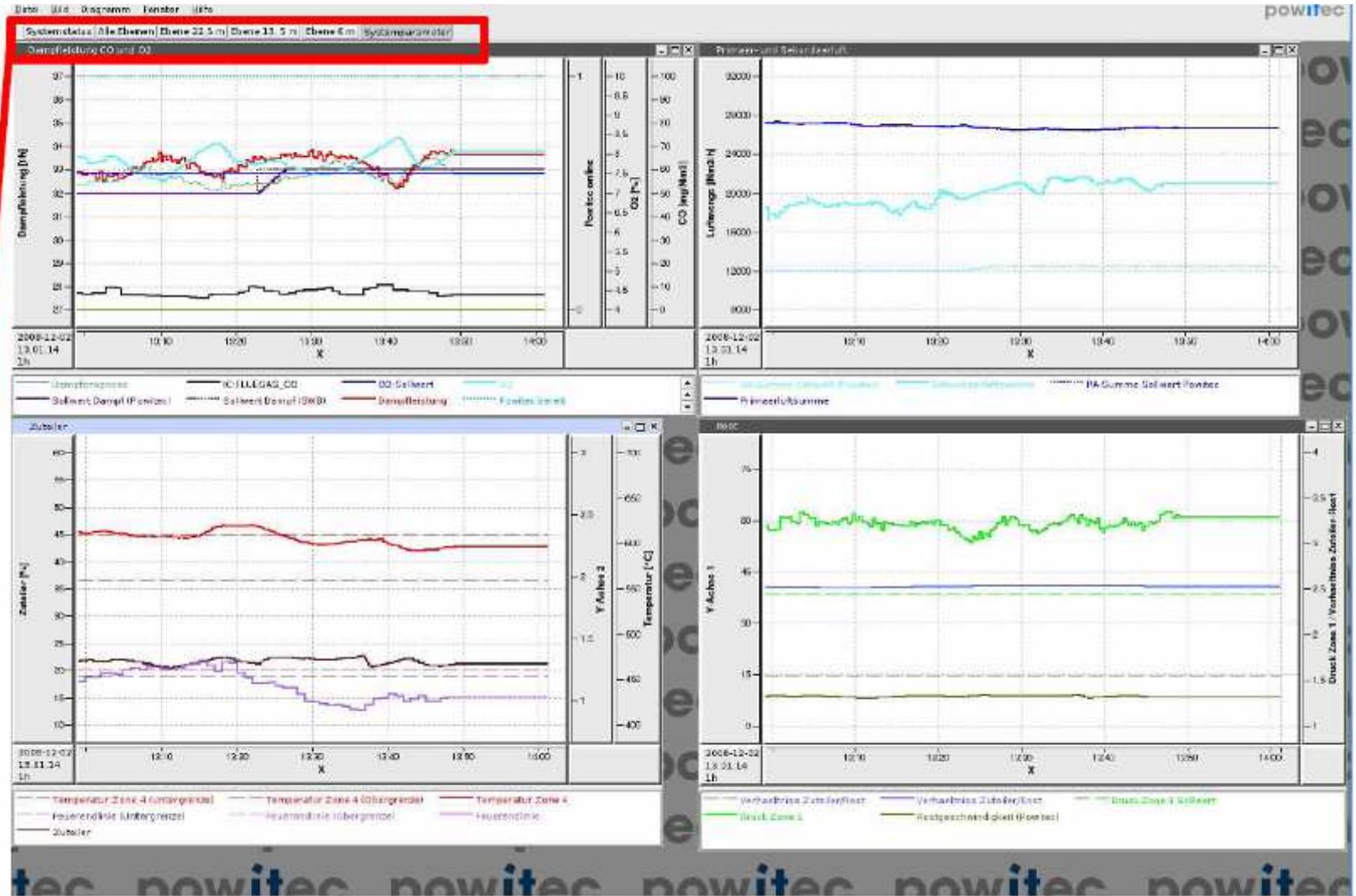
Umschaltung zwischen den einzelnen Indicator-Bedienflächen



Anzeige eines Problems

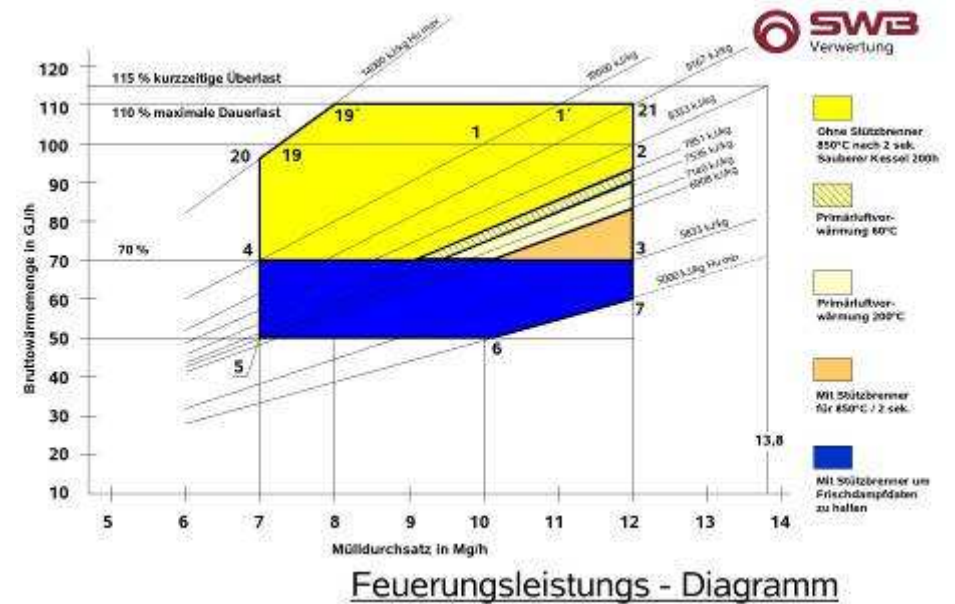
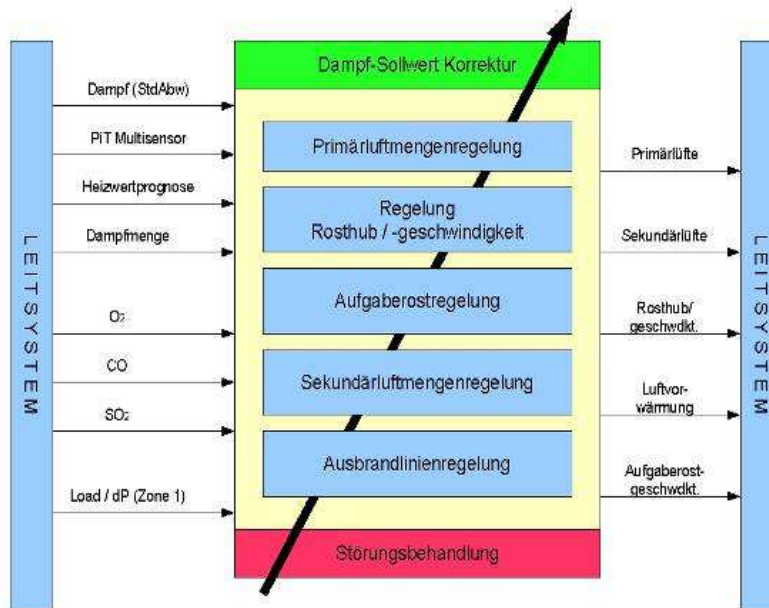
PiT Navigator screen shot: Visualisation of measured variables

Umschaltung zwischen den einzelnen Indicator-Bedienflächen



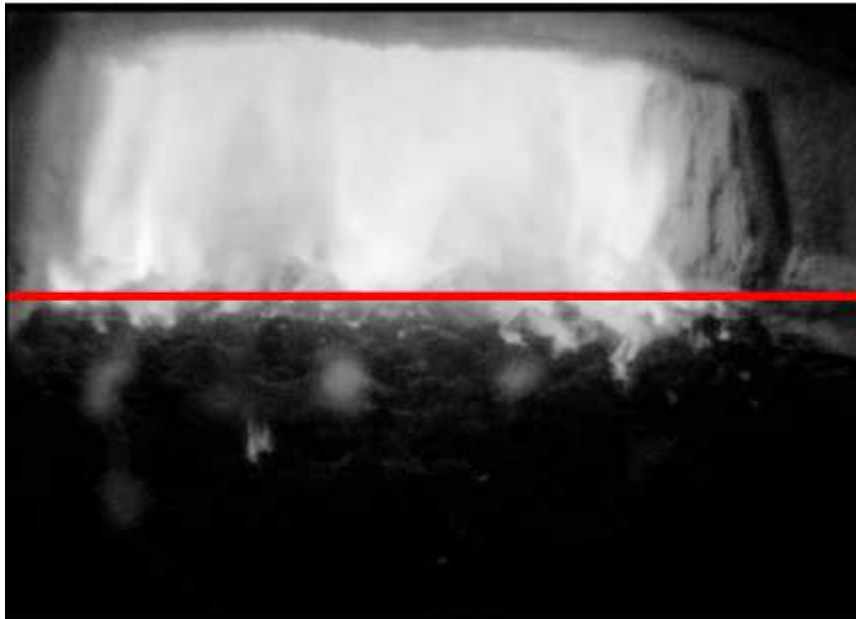


Control by breakdown of targets while considering adjusting ranges

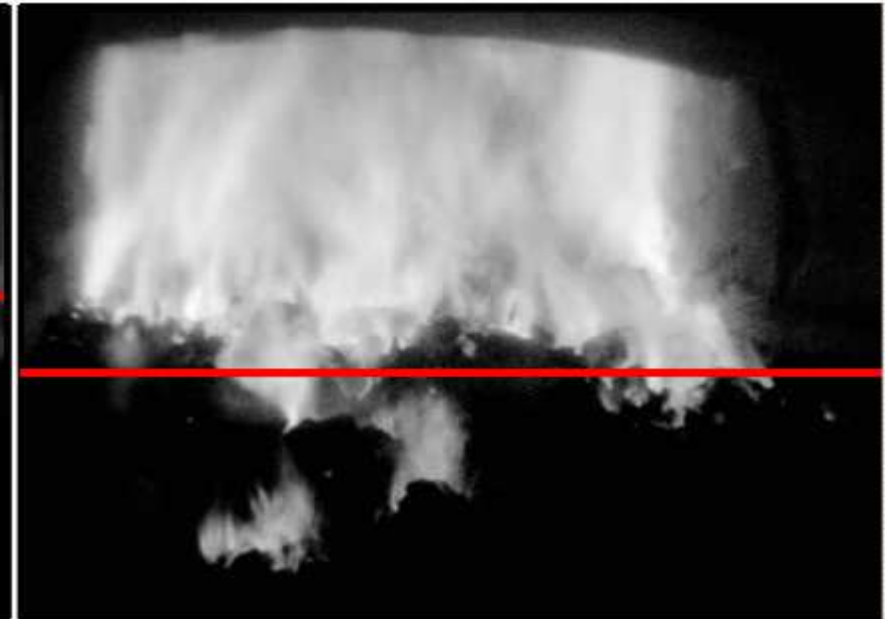


Sub-ordinate targets:

- Minimisation of the steam variation, achieving an increase in steam
- Optimisation of burn out line and temperature on grate 4
- Pressure on zone 1
- CO, O2, NOx



- Burn out line = 1.14
- < set point of 1.20
- fire is a little to short



- Burn out line = 1.60
- Fire is to long

Automated and
permanent burn out
line control

Test results

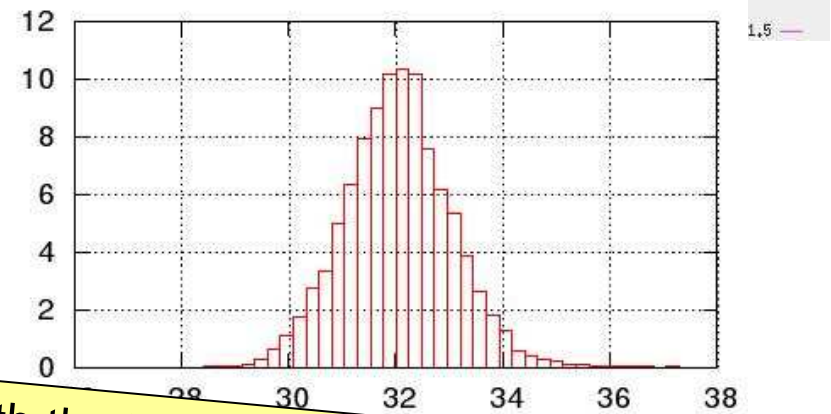
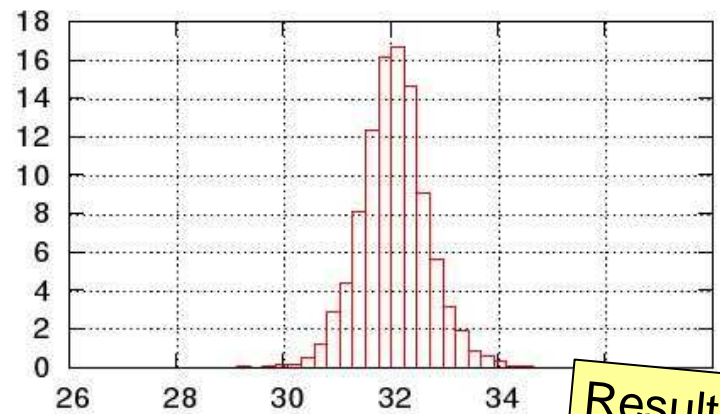
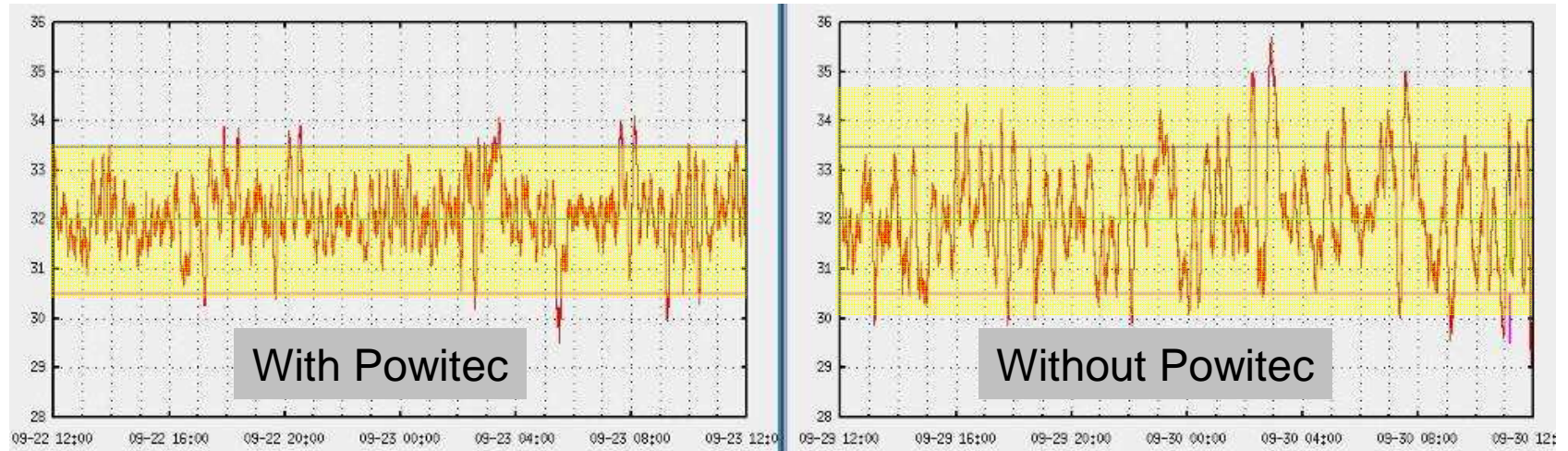
	Powitec	Old system	Improvement in %
Test period	1. week: 22.09-28.09 + 3. week: 06.10-12.10.	2. week: 29.09-05.10 + 4. week: 13.10-19.10	
Standard deviation [t/h] (at set point=32t/h)	0,65	1,01	35,64%
Control deviation steam > 1,5 t/h [%] (at set point =32t/h)	2,90%	12,90%	77,52%
Average steam [t/h] (at set point=32t/h)	32,05	32,04	
Average highest steam per day [t/h]	34,60	35,55	2,67%
Average lowest steam per day [t/h]	29,67	29,23	1,51%
Average O2 in flue air [%]	8,34	8,30	-0,48%
Average CO [mg/Nm3]	10,82	10,46	-3,44%
Standard deviation CO [mg/Nm3]	5,79	6,15	5,85%
Duration CO > 50 mg/Nm3 [min]	36	64	43,75%
Average NOx [mg/Nm3]	92,47	92,09	-0,41%
Standard deviation NOx [mg/Nm3]	15,47	17,38	10,99%
Average SO2 [mg/Nm3]	10,00	7,50	-33,33%
Standard deviation SO2 [mg/Nm3]	7,21	7,53	4,25%
Average throughput [t/h]	10,58	10,52	0,57%
Average calorific value [MJ/kg]	10,19	10,24	
Average (calorific value x average throughput)	107,81	107,72	0,08%

Guaranteed: 0,9

More Plastic

Targets over-achieved

Test results



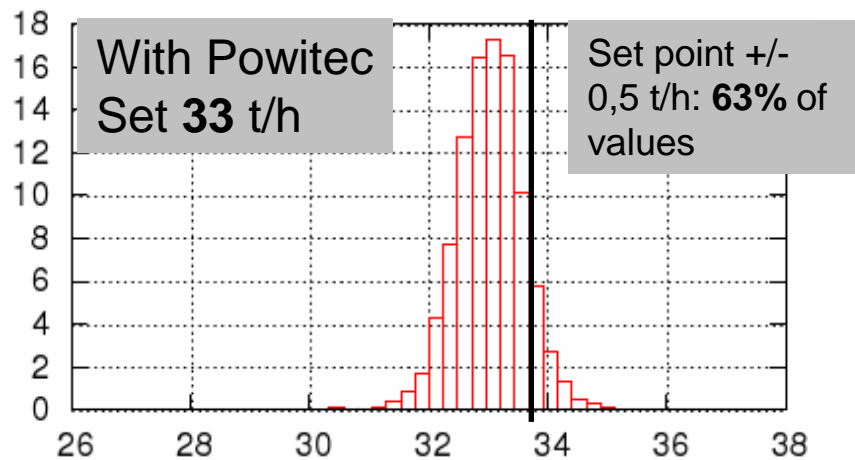
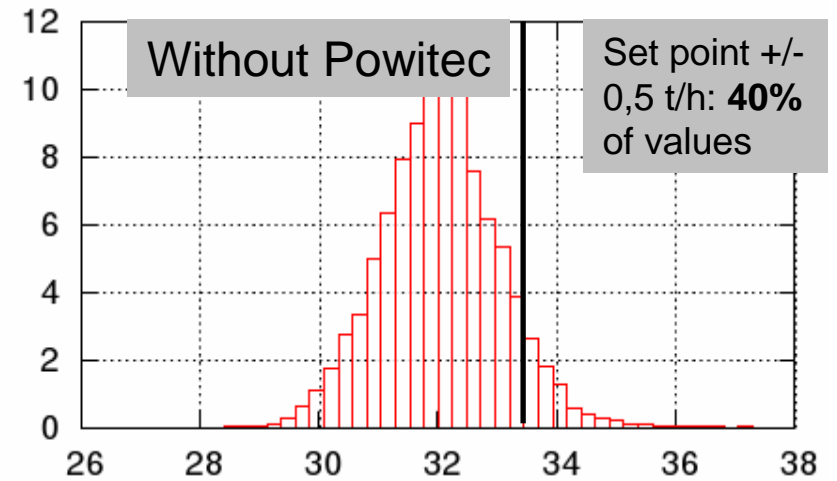
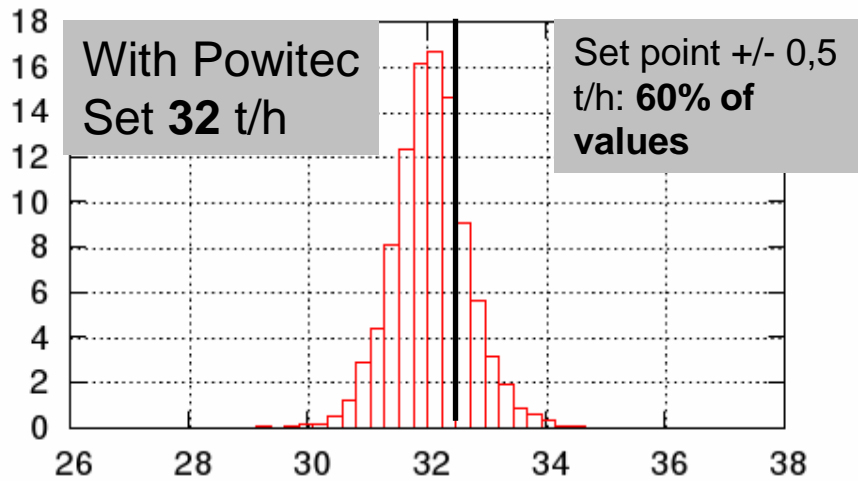
Result: With the PiT Navigator ON, more values are near to the set point of 32 t/h and the number of values with deviation was largely reduced.

Results of set point increase to 33 t/h steam

Value	Old system	Powitec set point =32 t/h	Powitec set point =33 t/h	Improvement %
Test period	29.09-05.10 + 13.10-19.10	22.09-28.09 + 06.10-12.10.2008	12.11-26.11	
Standard deviation steam [t/h]	1,01	0,65	0,55	45,54%
Control deviation steam > 1,5 t/h [%]	12,90%	2,90%	1,00%	92,25%
Average steam [t/h]	32,04	32,05	33,03	3,09%
Average O2 in flue gas [%]	8,30	8,34	7,52	9,40%
Average CO [mg/Nm3]	10,46	10,82	9,88	5,54%
Duration CO > 50 mg/Nm3 [min]	64	36	28	56,25%
Average NOx [mg/Nm3]	92,09	92,47	89,34	2,99%
Average SO2 [mg/Nm3]	7,50	10,00	7,31	2,53%
Average throughput [t/h]	10,52	10,58	10,84	3,04%
Average calorific value [MJ/kg]	10,24	10,19	10,18	
Average (calorific value x throughput)	104,6	104,96	107,40	2,68%

Though the set point was increased, the standard deviation steam was decreased!

Results of set point increase to 33 t/h steam (Nov & Dec 2008)



**With Powitec:
Smooth and
stable operation**

Development set point increase to 33 t/h

Value	Powitec set point =33 t/h	Powitec set point =33 t/h	Improvement %
Test period	12.11.08-28.11.08	01.12.08-31.12.08	
Standard deviation steam [t/h]	0,56	0,64	-14,29%
Control deviation steam > 1,5 t/h [%]	1,20%	0,40%	66,67%
Average steam [t/h]	33,03	33,00	0,09%
Average O2 in flue gas [%]	7,47	7,66	-2,54%
Average CO [mg/Nm3]	10,1	13,94	-38,02%
Average NOx [mg/Nm3]	90,47	90,41	0,07%
Average SO2 [mg/Nm3]	7,13	4,60	35,48%
Average throughput [t/h]	10,86	11,59	6,72%
Average calorific value [MJ/kg]	10,16	9,45	
Average (calorific value x throughput)	107,47	106,84	-0,59%

1. Despite a decreased calorific value and increased standard deviation, peaks in steam were reduced.
2. The PiT Navigator independently adapted to the change of waste quality. The reduced control deviation shows an increased „knowledge“ of the self-learning PiT Navigator.

Conclusion by MVA Bonn

- Acceptance
 - Management, through:
 - Results
 - Outstanding support of Powitec
 - Operators: Through positive experience
- Relief of workload
 - Operators can concentrate on trouble-shooting instead doing routine jobs
- Achievement of targets:
 - More even, smooth operation
 - Increased throughput, by 3-4%
 - Reduced emissions:
 - CO – 3,4%
 - NOx – 1,8%
 - SO2 – 4,9 %
- Consequently:
 - Purchase order for installation on line 1, to be operational in March 2009
 - Purchase order for installation on line 3, to be operational in Sept. 2009