

# AVR Duiven, 3 lines: Results

## Main parameters:

3 Lines for approx. 320.000 t/a throughput

Babcock roller-grid

Boiler for 45 t/h, 400 °C, 40 bar steam

Turbine 10 MWel, heat approx. 17 MWth



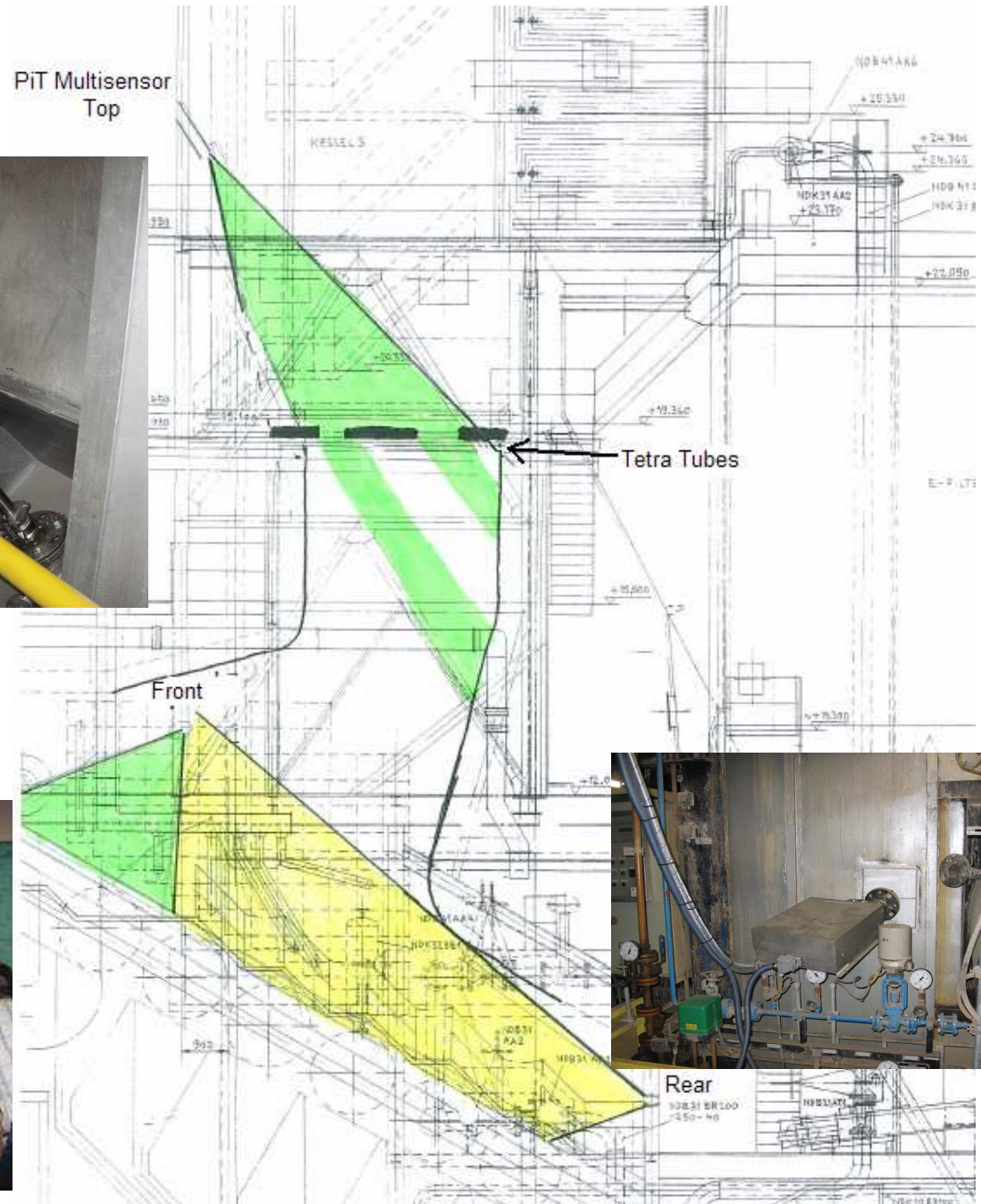
## Defined optimisation targets:

- Lift steam set point for 2,5 %
- The control deviation of set point steam amount shall be for 92 % of the period < +/- 7,5 %

## Reasons for decisions for PiT Navigator:

- **self learning adaptivity**
- fast return on investment
- easy handling
- efficient, multi dimensional controller
- guaranteed results

# Installation in Duiven

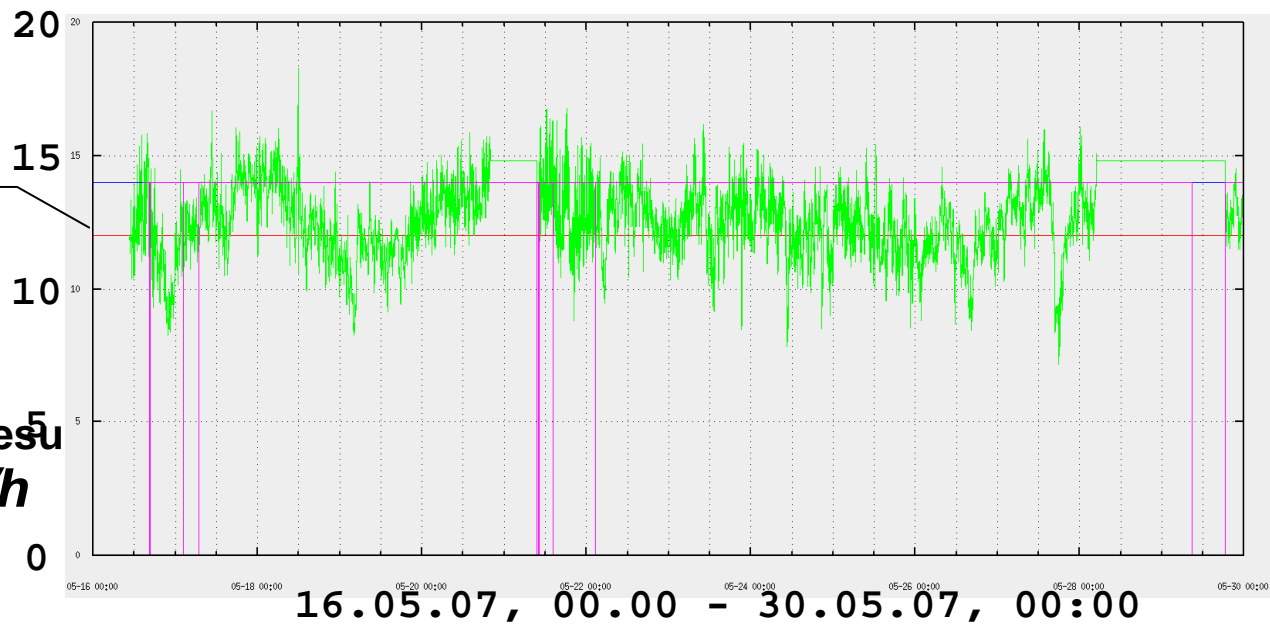


# Steam Production without/with Powitec in AVR

PiT Navigator 'OFF'

Set-point steam  
,old'  
12,65 t/h

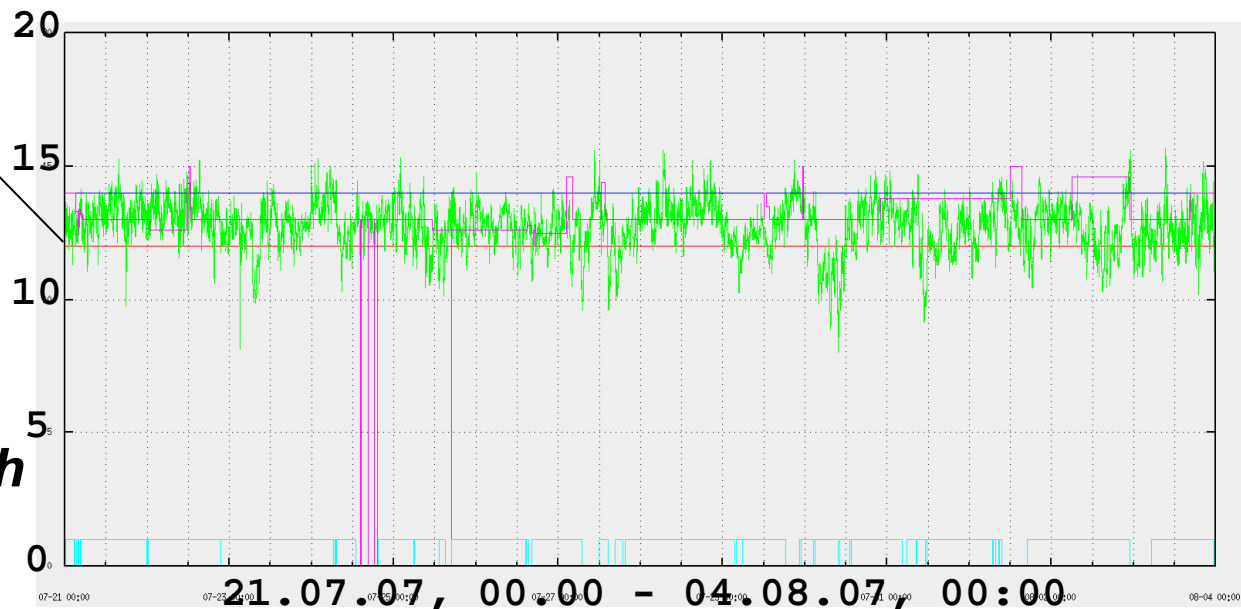
Typical Old Control result  
5,6 .... 18,8 t/h






PiT Navigator 'ON'

Sliding Set-point steam  
,new'  
12,70 t/h

Control result:  
10,0 .... 13,9 t/h




# AVR Duiven, line 1: Results



	PiT Navigator <b>ON</b>		PiT Navigator <b>OFF</b>		Difference 
	Average	Standard dev.	Average	Standard dev.	
Standard dev. Steam		0,59		0,63	-6,3% 
Steamproduktion [kg/s]	13,76		13,86		-0,7%
Steam Min [kg/s]	10,13		10,02		-1,1%
Steam Max [kg/s]	16,53		16,67		-0,8%
Throughput [t/h]	16,10		15,70		2,5% 
O2 [Vol%]	6,7		6,3		6,0%
CO [mg/Nm3]		0,7		0,89	-27,1%

Worse Same Better

Result:  
Increased  
throughput at  
reduced CO

 = Guarantee

# AVR Duiven, Line 2: Results

	PiT Navigator <b>ON</b>		PiT Navigator <b>OFF</b>		Difference 
	Average	Standard dev.	Average	Standard dev.	
Standard dev. Steam		0,77		1,14	<b>-32,5%</b>
Steamproduction [kg/s]	12,7		12,65		<b>0,2%</b>
Steam Min [kg/s]	10,0		5,6		<b>-44,0%</b>
Steam Max [kg/s]	13,98		18,9		<b>-26,0%</b> 
Throughput [t/h]	16,6		16,2		<b>2,5%</b>
O2 [Vol%]	8		8		<b>0%</b>
CO [mg/Nm3]	4,9		16,9		<b>-71,0%</b>

Worse Same Better

 = Guarantee

Theo Kampschreuer, Production Manager  
 AVR Afvalverwerking B.V.:  
 "The optimiser software operates line 1 and 2  
 in Duiven both to the full satisfaction of the  
 operators and the management. The  
 efficiency was significantly improved on both  
 lines!"

AVR Duiven, line 1, long term results from 2008

	Powitec active	Powitec not active	Improvement
<b>Steam set point [kg/s]</b>	13,38	13,27	2,17%
<b>Control deviation [kg/s]</b>	0,69	0,87	20,40%
<b>Control deviation [%]</b>	5,22	6,56	
<b>Control deviation &lt; 0.5kg/s [%]</b>	43,00	38,00	13,64%
<b>O2 [%]</b>	6,91	7,01	1,46%
<b>CO [mg/Nm3]</b>	8,09	11,36	28,83%
<b>Throughput [t/h]</b>	15,07	14,82	1,72%

# AVR Duiven, line 2, long term results from 2008

	<b>Powitec active</b>	<b>Powitec not active</b>	<b>Improvement</b>
<b>Steam set point [kg/s]</b>	13,53	13,42	2,93%
<b>Control deviation [kg/s]</b>	0,78	1,06	26,89%
<b>Control deviation [%]</b>	5,77	7,90	
<b>Control deviation &lt;0.5kg/s [%]</b>	41,00	32,00	27,64%
<b>O2 [%]</b>	7,09	7,22	1,77%
<b>CO [mg/Nm3]</b>	7,41	9,19	19,32%
<b>Throughput [t/h]</b>	15,54	15,29	1,62%

Full Bonus  
paid in Dec  
2008