

## Optimized Control Concepts for Power Plants Supported by Dynamic Simulation

BB / OB / CB = Bark / Oil / Coal Boiler GB / RB / CPB / WB = Gas / Recovery/ Chemical Process / Waste Boiler HRSG = Heat Recovery Steam Generator TG = Turbine TGC = Turbine with Condenser ACC = Accumulator Aux.Cond. = Auxiliary Condenser GT = Gas Turbine ( ) = New unit	D = Data logger measurements S = Study for operation strategy and control concept M = MODYSIM simulation used to verify system performance I = Implementation of control concept
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2008	<b>Stora Enso, Langerbrugge, Belgium</b> Task: Optimization of steam-net performance, design of control concept, implementation of new control concept Plant: 2 x BB, TG, TGC, ACC, 2 x GB	<table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%; text-align: center;">S</td> <td style="width: 25%; text-align: center;">M</td> <td style="width: 25%; text-align: center;">I</td> </tr> </table>		S	M	I
	S	M	I			
2008	<b>M-real, Stockstadt, Germany</b> Task: Optimization of steam-net performance, design of control concept Plant: RB, CB, BB, 4 x TB, (ACC)	<table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%; text-align: center;">S</td> <td style="width: 25%; text-align: center;">M</td> <td style="width: 25%;"></td> </tr> </table>		S	M	
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2007	<b>M-real, Biberist, Switzerland</b> Task: Optimization of steam-net performance, design of control concept Plant: HRSG, WB, 2 x GB, TG, (ACC)	<table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%; text-align: center;">S</td> <td style="width: 25%; text-align: center;">M</td> <td style="width: 25%;"></td> </tr> </table>		S	M	
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2007	<b>Propapier, Eisenhüttenstadt, Germany</b> Task: Optimization of steam-net performance, design of control concept Plant: WB, TGC, ACC	<table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%; text-align: center;">S</td> <td style="width: 25%; text-align: center;">M</td> <td style="width: 25%;"></td> </tr> </table>		S	M	
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2007	<b>Weyerhaeuser, Red River, USA</b> Task: Optimization of steam-net performance, design of control concept Plant: BB, RB, TG, ACC	<table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%; text-align: center;">S</td> <td style="width: 25%; text-align: center;">M</td> <td style="width: 25%;"></td> </tr> </table>		S	M	
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2007	<b>UPM Caledonia, Scotland</b> Task: Optimization of steam-net performance, design of control concept, implementation of new control concept Plant: BFB, TGC, ACC	<table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%; text-align: center;">S</td> <td style="width: 25%; text-align: center;">M</td> <td style="width: 25%; text-align: center;">I</td> </tr> </table>		S	M	I
	S	M	I			
2007	<b>Stora Enso, Maxau, Germany</b> Task: Optimization of steam-net performance, design of control concept Plant: BB, GB, 2 x TG, ACC	<table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%; text-align: center;">S</td> <td style="width: 25%; text-align: center;">M</td> <td style="width: 25%;"></td> </tr> </table>		S	M	
	S	M				
2007	<b>IP, Riverdale, USA</b> Task: Optimization of steam-net performance, design of control concept Plant: 2 x RB, 2 x BB, HRSG, 3 x TG, (ACC)	<table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%; text-align: center;">S</td> <td style="width: 25%; text-align: center;">M</td> <td style="width: 25%;"></td> </tr> </table>		S	M	
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2007	<b>Propapier, Burg, Germany</b>	<table border="1"><tr><td></td><td>S</td><td>M</td><td></td></tr></table>		S	M	
	S	M				
	Task: Optimization of steam-net performance, design of control concept					
	Plant: WB, HRSG, 2 x TG, (ACC)					
2007	<b>Porin Prosessivoima, Pori, Finland</b>	<table border="1"><tr><td></td><td>S</td><td>M</td><td>I</td></tr></table>		S	M	I
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	Task: Optimization of steam-net performance, design of control concept, implementation of new control concept					
	Plant: 2 x CPB, BB, TG					
2007	<b>Mondi, Swiecie, Poland</b>	<table border="1"><tr><td></td><td>S</td><td>M</td><td></td></tr></table>		S	M	
	S	M				
	Task: Optimization of steam-net performance, design of control concept					
	Plant: RB, 2 x CB, BB, TG, TGC, ACC					
2006-07	<b>SCA, Obbola, Sweden</b>	<table border="1"><tr><td>D</td><td>S</td><td>M</td><td>I</td></tr></table>	D	S	M	I
D	S	M	I			
	Task: Optimization of steam-net performance, design of control concept, implementation of new control concept					
	Plant: RB, BB, TG, ACC					
2006-07	<b>Metsä-Botnia, Kaskinen, Finland</b>	<table border="1"><tr><td>D</td><td>S</td><td>M</td><td>I</td></tr></table>	D	S	M	I
D	S	M	I			
	Task: Optimization of plant operation, implementation of new control strategies					
	Plant: RB, BB, TGC, ACC					
2006	<b>Neste Oil Oy, Kilpilahti, Finland</b>	<table border="1"><tr><td></td><td>S</td><td>M</td><td></td></tr></table>		S	M	
	S	M				
	Task: Optimization of steam-net performance, design of control concept					
	Plant: 2 x OB, TG, TGC, GT, HRSG					
2006-07	<b>Domtar, Marlboro Mill, USA</b>	<table border="1"><tr><td>D</td><td>S</td><td>M</td><td>I</td></tr></table>	D	S	M	I
D	S	M	I			
	Task: Optimization of steam-net performance, design of control concept, implementation of new control concept					
	Plant: BB, RB, (ACC)					
2005-06	<b>Södra Värö, Sweden</b>	<table border="1"><tr><td></td><td>S</td><td>M</td><td>I</td></tr></table>		S	M	I
	S	M	I			
	Task: Optimization of steam-net performance, design of control concept, implementation of new control concept					
	Plant: BB, RB, (TG), ACC					
2005	<b>Metsä-Botnia, Kaskinen, Finland</b>	<table border="1"><tr><td></td><td>S</td><td>M</td><td></td></tr></table>		S	M	
	S	M				
	Task: Optimization of steam-net performance, design of control concept					
	Plant: RB, BB, TGC, ACC					
2005	<b>Soporcel, Portugal</b>	<table border="1"><tr><td></td><td>S</td><td>M</td><td></td></tr></table>		S	M	
	S	M				
	Task: Optimization of steam-net performance, design of control concept					
	Plant: 2 x HRSG, BB, RB, 3 x TG, TGC					
2005	<b>ENCE, Spain</b>	<table border="1"><tr><td></td><td>S</td><td>M</td><td></td></tr></table>		S	M	
	S	M				
	Task: Optimization of steam-net performance, design of control concept					
	Plant: HRSG, BB, RB, TG, TGC, ACC					

2004	<b>Jass, Germany</b>		S	M	
	Task: Optimization of steam-net performance, design of control concept				
	Plant: 4 x GB, 3 x TG				
2004	<b>Obeikan, Saudi Arabia</b>		S	M	
	Task: Optimization of steam-net performance, design of control concept				
	Plant: 3 x GB, 3 x HRSG, (ACC)				
2004-06	<b>Alizay, France</b>	D	S	M	I
	Task: Optimization of steam-net performance, new control concept, implementation of new control concept				
	Plant: BB, RB, 2 x TG, ACC				
2004	<b>Bahia Sul, Mucuri, Brazil</b>		S	M	
	Task: Optimization of steam-net performance, new control concept				
	Plant: 2 x BB, 3 x RB, 4 x TG, TGC				
2004	<b>Braviken, Holmen, Sweden</b>		S		
	Task: Optimization of steam-net performance, new control concept				
	Plant: BB, RB, 2 x TG, ACC				
2004	<b>Riau, Indonesia</b>		S	M	
	Task: Optimization of steam-net performance, new control concept				
	Plant: 2 x BB, 3 x RB, 4 x TG, 2 x TGC, Aux.Cond.				
2003-05	<b>Veracel, Brazil</b>	D	S	M	I
	Task: Optimization of steam-net performance, new control concept, implementation of new control concept				
	Plant: BB, RB, TG, Aux.Cond.				
2003	<b>UPM Chapelle Darblay, France</b>		S	M	
	Task: Optimization of steam-net performance, new control concept				
	Plant: BB, GT, HRSG, 2 x GB, 2 x GT, Aux.Cond., ACC				
2002	<b>SCA Obbola, Sweden</b>	D	S	M	I
	Task: Optimization of steam-net performance, new control concept, implementation of new control concept				
	Plant: BB, OB, RB, TG, ACC, Aux.Cond.				
2002-03	<b>Aracruz, Brazil</b>		S		
	Task: Specification for new control concept				
2001	<b>Aracruz, Brazil</b>		S	M	
	Task: 1. Analysis of 85 MW turbine trip in steam net 2. Developing improved steam-net control concept				
	Plant: 2 x BB, 3 x RB, 5 x TG, TGC, Aux.Cond.				
2001-02	<b>Sunila, Finland</b>	D	S	M	I
	Task: Turbine output increase and steam-net overall control concept,				

implementation of new control concept  
 Plant: BB, RB, 2 x TG, Aux.Cond.

- 2001 **UPM-Kaukas, Finland**

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 Task: Steam accumulator design and steam-net overall control concept, implementation of new control concept.  
 Plant: BB, RB, 2 x TG, (ACC)
- 2001 **AssiDomän Karlsborg AB, Sweden**

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 Task: Turbine output increase and steam-net overall control concept.  
 Plant: BB, RB, TG, ACC
- 2000-01 **Rautaruukki Oyj / Inesco Oy, Finland**

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 Task: HP pumps optimization with pressure accumulator in rolling-mill process.  
 Plant: 3 x 1 MW pumps, ACC
- 2000-01 **Stora Enso, Port Hawkesbury, Canada**

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 Task: Optimization of steam-net performance, new control concept.  
 Plant: BB, OB, TG, TGC, ACC
- 2000 **Södra Cell AB, Värö bruk, Sweden**

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 Task: Optimization of steam-net performance, improvement of control concept.  
 Plant: BB, RB, 2 x TG, ACC
- 2000 **Frantschach Swiecie, Poland**

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 Task: Steam accumulator design and steam-net overall control concept, implementation of new control concept.  
 Plant: RB, 2 x CB, TGC, TG, (ACC)
- 2000 **Metsä-Serla, Äänekoski, Finland**

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 Task: Optimization of steam-net performance, new boiler and turbine.  
 Plant: BB, TG, ACC, Aux. Cond.
- 2000 **OTOR, St. Etienne, France**

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 Task: Optimization of steam-net performance for new power plant.  
 Plant: 2 x GT, 2 x HRSG, TG, ACC
- 1999-00 **Kymin Voima Oy, Kuusanniemi, Finland**

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 Task: Optimization of steam-net performance, new boiler and turbine.  
 Plant: 2 x BB, 2 x RB, 4 x TG, (TG), ACC
- 1999 **Stora Enso, Gruvöns bruk, Sweden**

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 Task: Optimization of steam-net performance with feedwater tank and accumulator, new control concept.  
 Plant: 2 x RB, (RB), BB, 2 x TG, ACC
- 1995-97 **Metsä-Serla, Kirkniemi, Finland**

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 Task: New co-generation plant with auxiliary boiler.  
 Plant: GT, HRSG, BB, GB, TGC, TG, (ACC), 2 x Aux. Cond.

1996-97	<b>KNP Leykam GmbH, Austria</b> Task: New control concept design. Plant: RB, BB, 2 x TG, ACC		S		I
1996-97	<b>Inapa S.A., Setubal, Portugal</b> Task: Optimization of steam-net performance with new accumulator. Plant: 2 x OB, 2 x TG		S		
1995-96	<b>Savon Sellu Oy, Kuopio, Finland</b>		S		
1991-92	<b>Södra Väröbruk, Sweden</b>		S		I
1990-93	<b>Keravan Energia Oy, Finland</b>		S		I
1990-91	<b>Assi, Lövholmen, Sweden</b>		S		I
1987-88	<b>Bridgewater Paper, England</b>		S		I
1983, 1989-90	<b>Wisaforest Oy Ab, Pietarsaari, Finland</b>		S		I