Kilpailukykyä älykkäämmällä kunnossapidolla.

Towards Industrial Internet: Smart Maintenance

T-110.6000 Internet and Computing Forum

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Jari Collin 9.2.2015 Efora



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Efora Oy – the biggest industrial maintenance company in Finland

- Efora was established in the beginning of 2009 as a Joint Venture between Stora Enso and ABB
- Provides maintenance services for Stora Enso's mills in Finland (Imatra, Varkaus, Heinola, Uimaharju, Oulu and Veitsiluoto)
- From 1st November 2013 Efora has been 100% owned by Stora Enso
- With 850 professionals and 190 M€ revenue, Efora is the biggest player in the industrial maintenance services market in Finland





Production lines

15 paper & board production lines

Over 4 Mt paper and board

6 pulp production lines

Over 2 Mt pulp

15 arkituslinjaa

• Over 1 Mt

6 mill power supply lines

Heat and power over 1000 MW



Efora strategy 2015-17

Key Strategies



1. Grow business via value-based lifecycle management

2. Increase internal effectiveness and efficiency

3. Strengthen supplier networks and cooperation Strategic Intent

Industrial Competitiveness via Intelligent Maintenance



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New smarter way of working – uner piloting

Offer new digital online services that enable self-guided continuous improvement on organization, team and individual levels: New valued added services for customers Manage Efora demand and supply Internal services for Efora teams information across the customer plants: Selected services for key suppliers Monitor operational efficiency and the ٠ performance of machines in real-time Turn operative data into predictive Self-guided continuous improvements maintenance actions Manage distributed operations remotely • Customer Ffora Supplier via shared information with the customer "INTELLIGENT ACTION" (personalized (personalized (personalized and key suppliers view) view) view) Cut waste and increase the level of automation Virtual Value-based Internal Supplier "Efora Service Factory" life-cycle mgmt efficiency co-operation Efora Online Channel "INFORMATION" (common platform) Customer's IT systems Build new capabilities on top of the existing Efora's IT systems operative processes and IT systems: Operative processes and Develop processes further "DATA" IT-systems Utilize current IT systems better • Improve data correctness Focus on competence development with ٠ the customer and key suppliers

Piloting new capabilities in selected production lines

				Production lines
Piloting of new	"DOADD"		יים וווסיי	1 Imatra KA1
	BUARD	PAPER	PULP	2 Imatra KA2
capabilities	(Renewable Packing*)	(Printing and Reading)	(Bio-materials)	3 Imatra KA4
				4 Imatra KA5
				5 Imatra KL2
1 - Value based life-cycle management				6 Imatra KL3
				7 Imatra PK6
				8 Tainion Sellu
				9 Oulu PK6
				10 Oulu PK7
				11 Oulu Sellu
2 - Internal effectiveness and efficiency		_		12 Oulu Arkittamo
	Pilot 1 Imatra KA2	Pilot 2	Pilot i3	13 Uimaharju KL1
				14 Uimaharju KL2
			Uimaharju	15 Heinola KK1
			KL1	16 Heinola Sellu
				17 VL PK1
		Oulu		18 VL PK3
		DK7		19 VL PK2
				20 VL PK5
3 - Supplier networks an co-				21 Veitsiluoto Sellu
operations				22 Veitsiluoto Arkittamo
				23 VA PK3
				24 Varkaus Sellu





Targets of Smart Maintenance – pilot project

1. Create and test new capabilities in limited production environment (microcosm)

- Implement improvements as 'learning by doing' –exercise together with SE and selected key partners by using temporary ICT solutions
- Finalize capability road maps and final ICT solutions based on the pilot learnings
- Collect customer requirements for Efora process renewal

2. Improve the performace on maintenance in the pilot production lines

- Downtime (h)
- Planning accuracy (%)
- OEE (%)
- Usage of online channel (%)

targets agreed per production line targets agreed per production line targets agreed per production line new metrics

3. Establish new, virtual "Efora Service Factory" way of working



Predictive maintenance





Approach

- The behavior of production data is modelled by using machine learning applications
- DNA-system included 20.300 measurements before failure situations (class 1 / red) vs. normal situations (class 2 / blue)
- Data characteristics are classified based on 1h measurement (average and mean deviation), total 40.600 characteristics are analyzed.





Key characteristics of data



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Conclusion



30 % of all failures are identified if the probability of wrong alarms is allowed to be max 0,2 % of all alarms

50 % of all failures are identified if the probability of wrong alarms is allowed to be max 2.4 % of all alarms



The use of mobile apps in field maintenance work





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Jätä ilmoitus kohteesta				
Lisää kuva tai kuvia				
Toimintopaikka				
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Laite				
IM_604-517 AC-moottori ASML14C-				
Ilmoituslaji				
21 - Häiriöilmoitus Efora				







Smarter maintenance