



Workshop: Energiföretagens materialrelaterade problem och utmaningar i kraftvärmeanläggningar, KME

Forskningsperspektivet. Hur kan forskningen bidra till att lösa problemen?

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**KME 715 –
Composite Metal Polymer (CMP) for non-stick
improvements in CHP plants**

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Background – deposits on boiler components

- Generates high outage maintenance cost and decreases availability of the plant
- Decreases electrical efficiency of the boiler
- Important factor for corrosion issues in high temperature boiler components such as furnace walls and superheaters
- Also of importance at lower temperatures in the economiser and cone of electrostatic precipitator

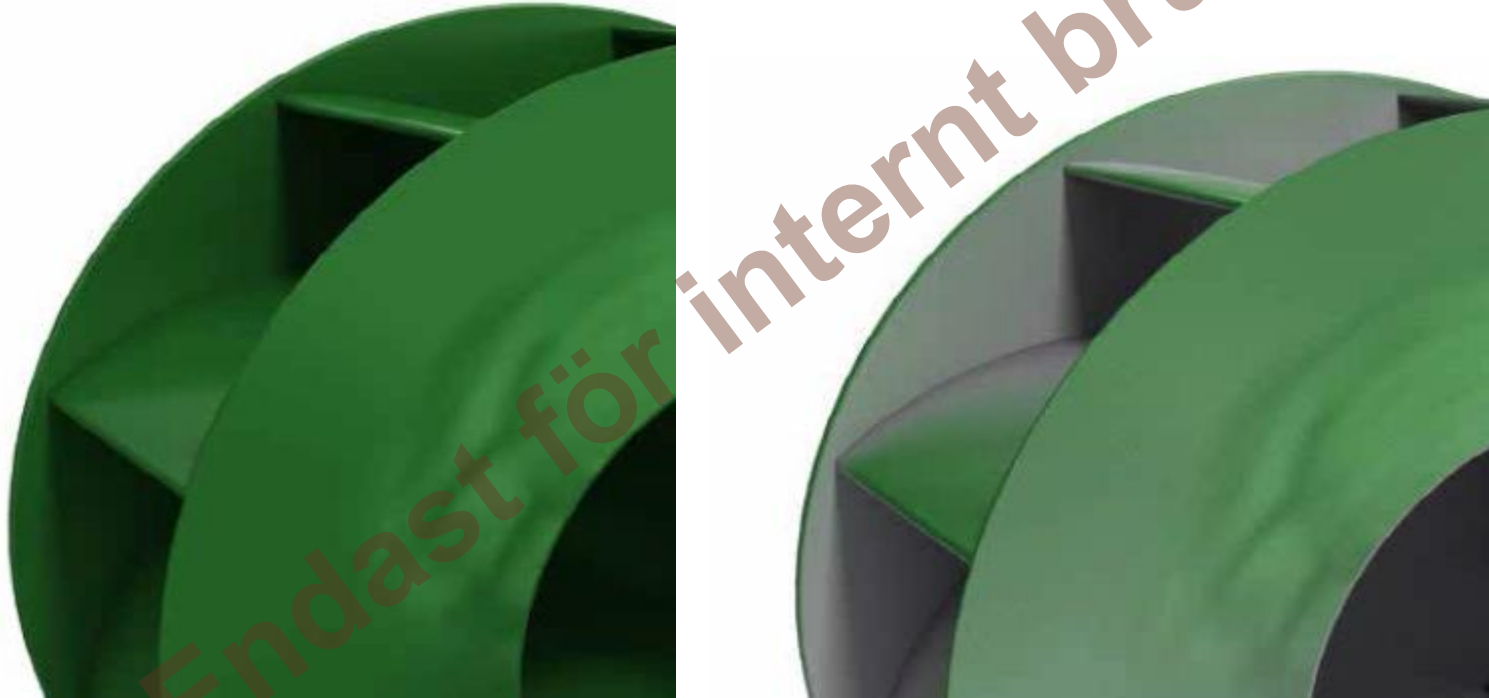


Background – use of the dual non-stick layer at low temperature – flue gas recirculating fan



- Fan needed cleaning every week

Background – use of the dual non-stick layer at low temperature – flue gas recirculating fan

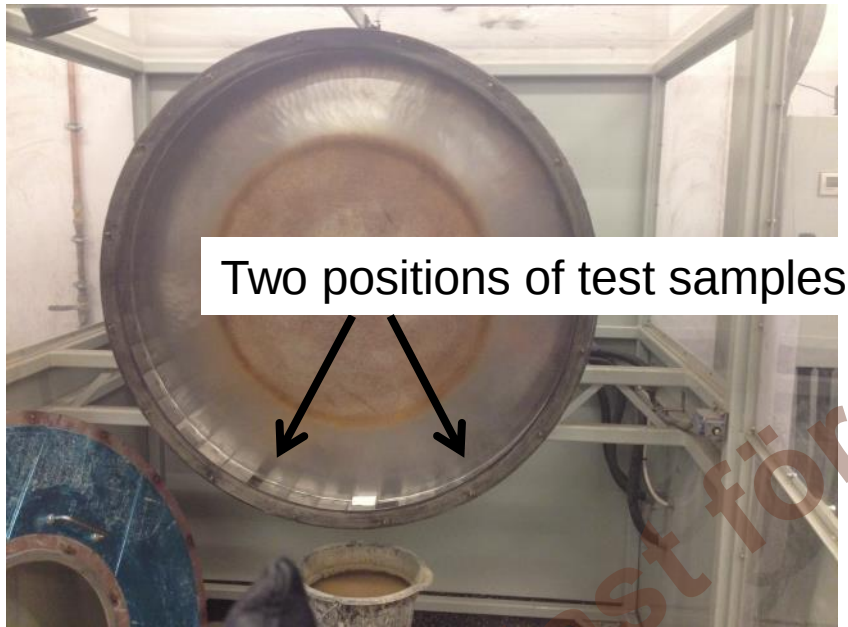


- Ni-base and non-stick material were applied (left schematic)
- After one firing season, no cleaning had been needed (right schematic)
- Apparently, some non-stick material was still left

Background – schematic of non-stick layer after use

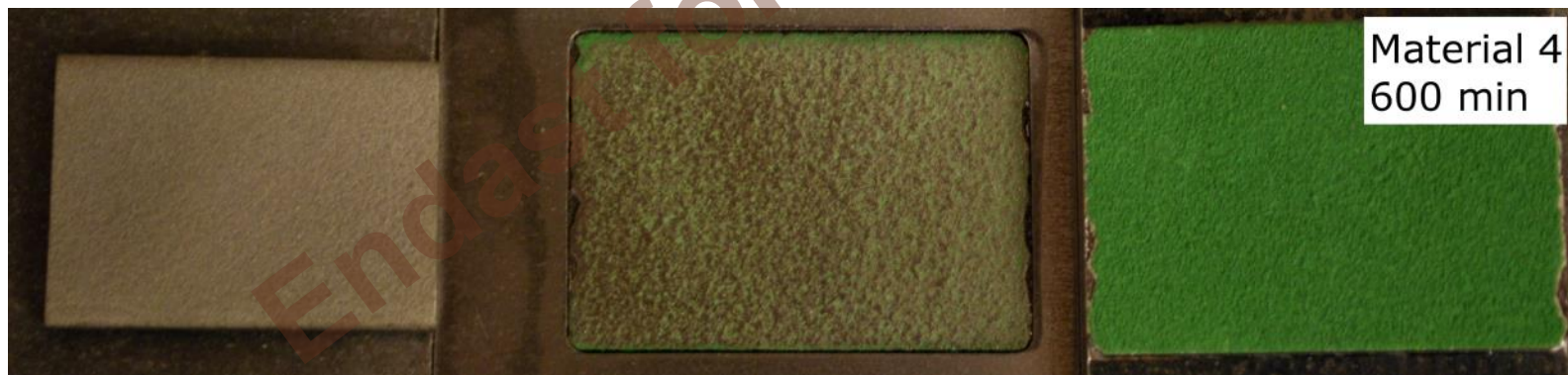


Wear tests



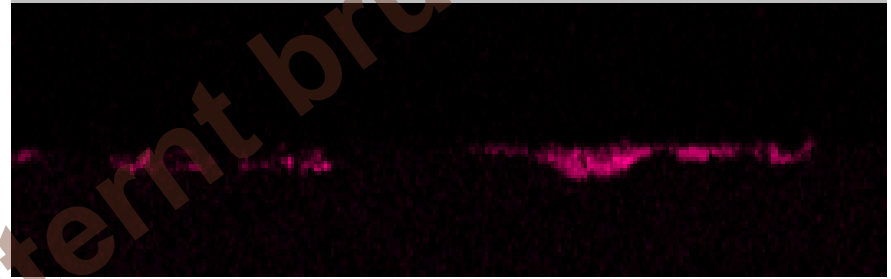
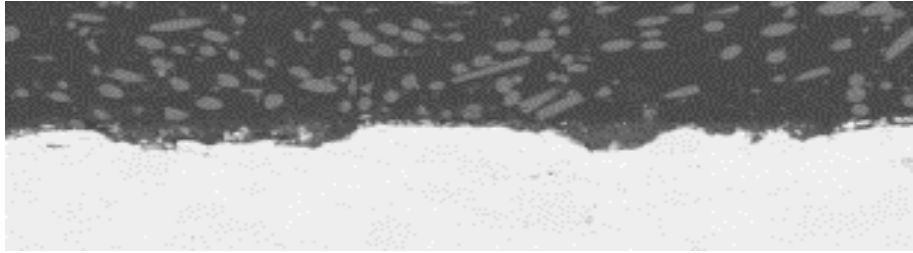
- Samples are attached to the inner circumference of the test apparatus
- Exposure of maximum 48 samples simultaneously

Results, Material 4 (BN-silicate)



Results, Material 1 (PTFE), 600 min

F K series



- Predicted and real wear behaviour almost identical

Exposures in Vesthamnsverket

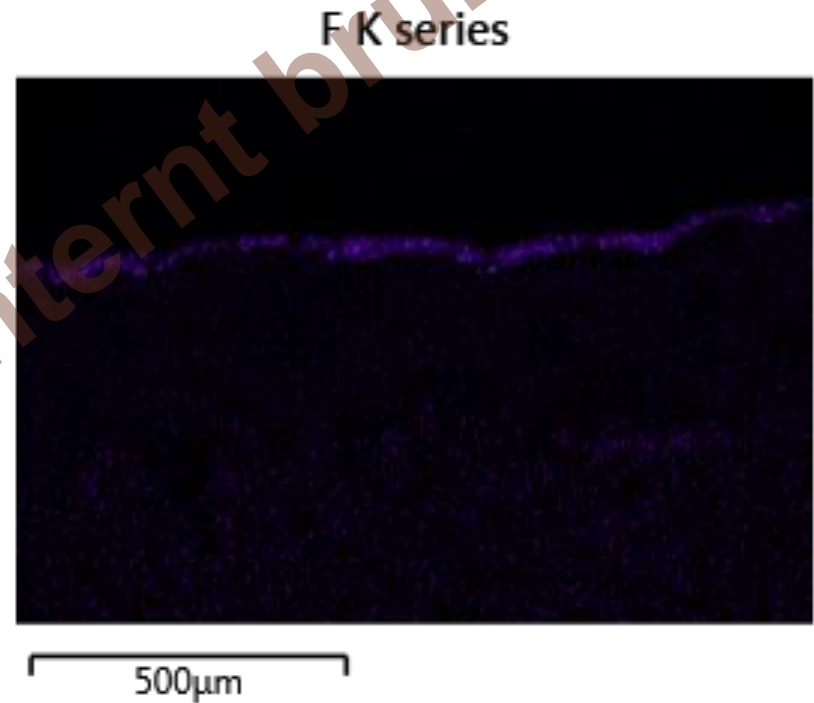
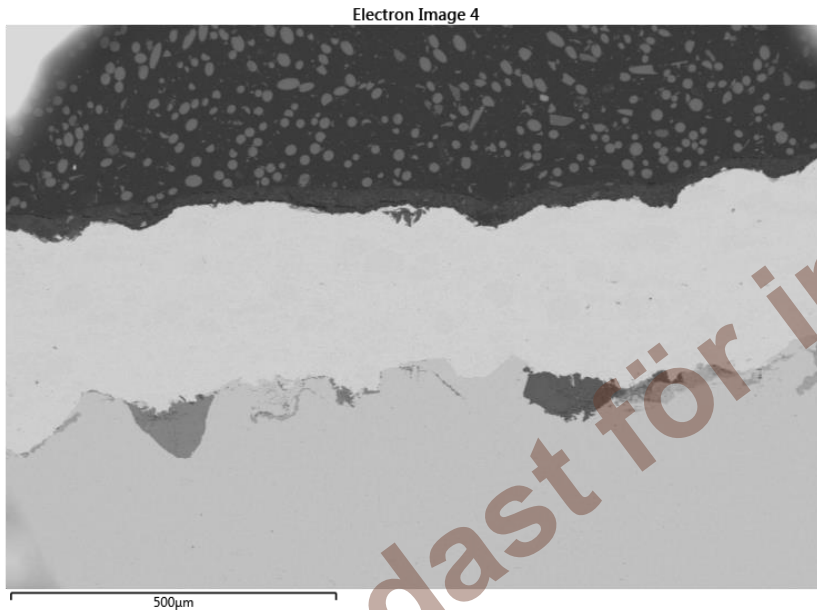
Material (No)	Type	Tmax (°C)	Furnace	SH-HT	SH-LT	Eco	ESP Cone
1	PTFE	250				X	X
2	Ceramic	400	X				X
3	No info	550			X		X
4	BN-silicate	?	X	X			
6	PTFE mix	250				X	X
7	No info	650			X		
8	Silicone	590			X		
9	BN	850	X	X			
10	Graphite based	1200	X	X			

Exposures in Vesthamnsverket

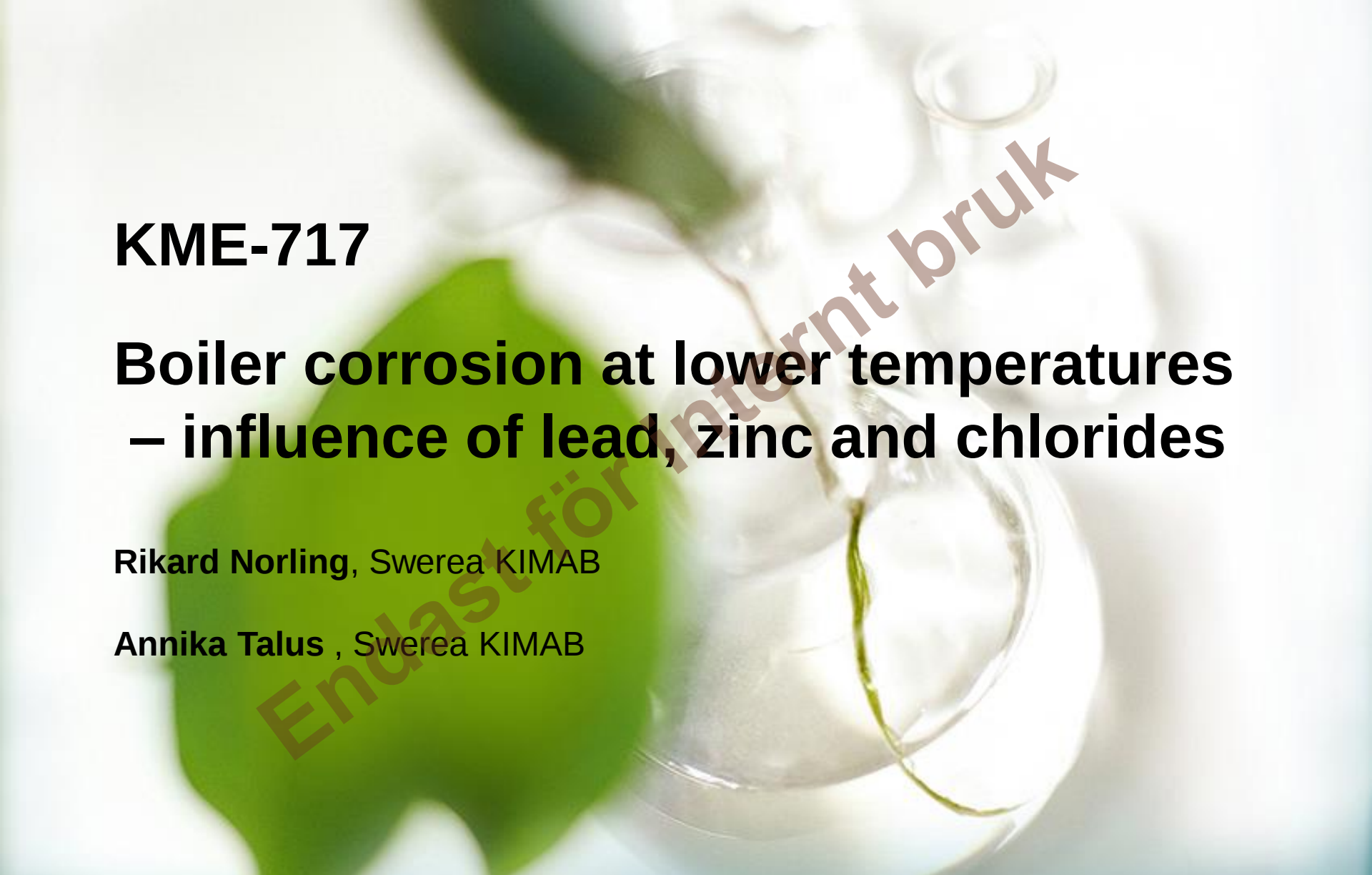


- Samples mounted in ESP after exposure for 1 firing season

Exposures in Vesthamnsverket



- ESP sample, Material 1 (PTFE), after exposure for 1 firing season



KME-717

Boiler corrosion at lower temperatures – influence of lead, zinc and chlorides

Rikard Norling, Swerea KIMAB

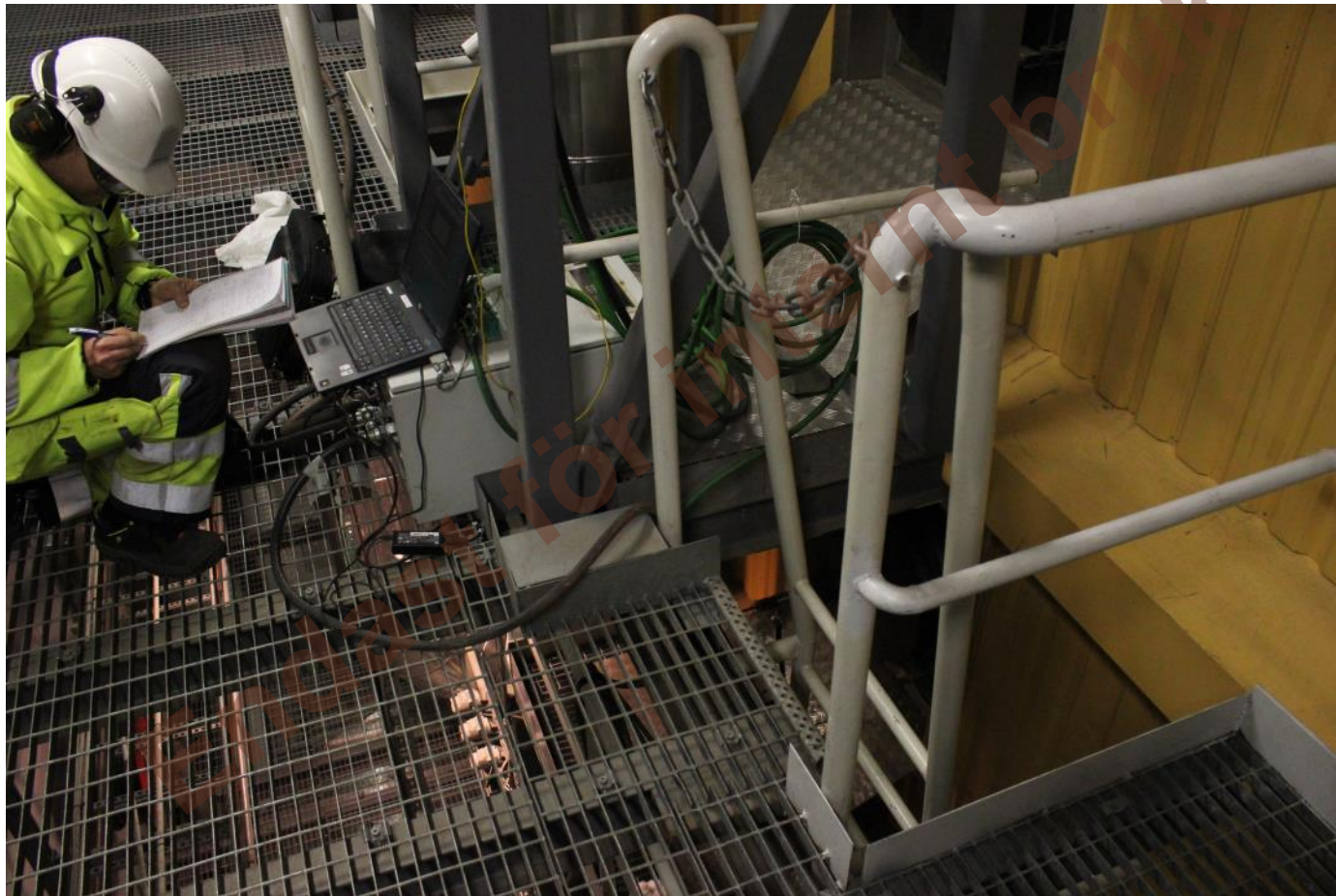
Annika Talus , Swerea KIMAB

Jordbro P7

- BFB boiler
- Commissioned 2010
- 63 MW_{th}, 20 MW_{el}
- Steam data: 80 bar, 470°C
- Fuel 100% recycled (waste) wood
- ChlorOut (system with ammonium sulphate additive)



Field testing



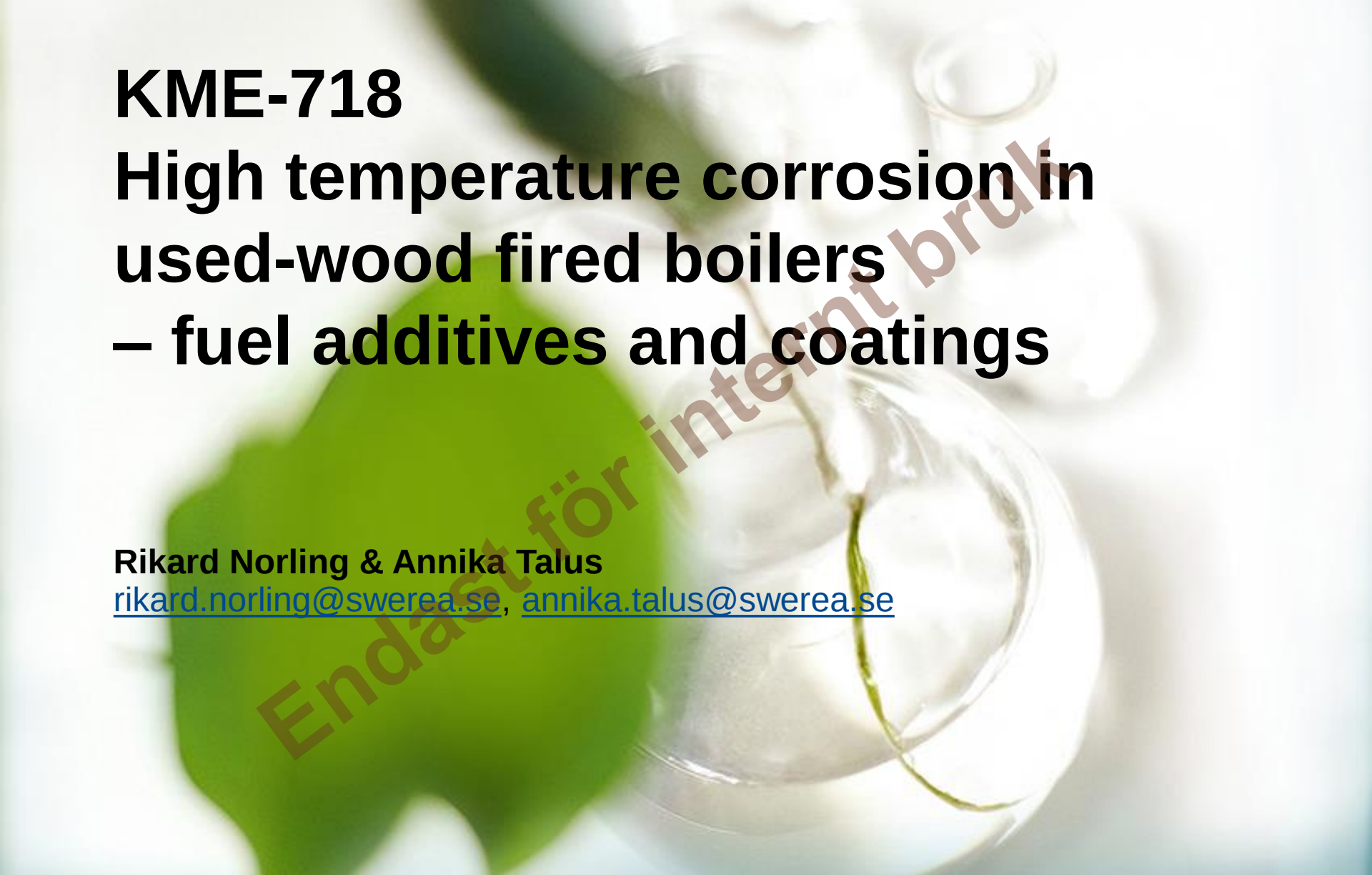
Selection of deposit probe results

T		#1		#2	
(°C)		Wind	Lee	Wind	Lee
350	Chlor Out				
300					
250					
350	No Chlor Out				
300					
250					

- 3 h test, with and without ChlorOut in operation

Conclusions

- Deposit tests and calculations suggest that use of ChlorOut will not give a major negative impact on the corrosivity of deposits
- Laboratory corrosion tests suggest that presence of SO₂ in the gas will have a positive influence on the corrosion attack



KME-718

High temperature corrosion in used-wood fired boilers – fuel additives and coatings

Rikard Norling & Annika Talus

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Background

The project builds on projects KME-508, KME-512 and KME-708, which for used-wood fired boilers have shown that:

- co-firing with treated sewage sludge can reduce water wall corrosion, at least in short-term tests lasting up to 14 h
- an FeCrAl alloy (Kanthal APMT) has excellent water wall corrosion resistance when tested as solid material, indicating its potential as a coating material

Participants in KME-718

9 partners:

- Amec Foster Wheeler
- Andritz
- E.ON
- Fortum
- MH Engineering
- Sandvik Heating Technology
- Sandvik Materials Technology
- Swerea KIMAB
- Vattenfall AB

Experimental

2 test campaigns with two types of sludge (2 weeks each)

- 13% sludge as delivered mixed with used wood.
- 4.6 wt% (dry basis)

Endast för internt bruk

Preliminary results – corrosion measurements

Furnace wall corrosion-probes

- Less corrosion for both materials when sewage sludge is co-fired.
- Greatest effect at metal temperatures of around 400 °C.
- Greatest effect for low alloyed steel 16Mo3.

Preliminary results – cross section analyses

Furnace wall corrosion-probes

Alloy 625

400 °C

In general more corrosion with oxide formation for Alloy 625 sample with no sludge

Endast för internt bruk

Thank you for listening!

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