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

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Background – deposits on boiler components

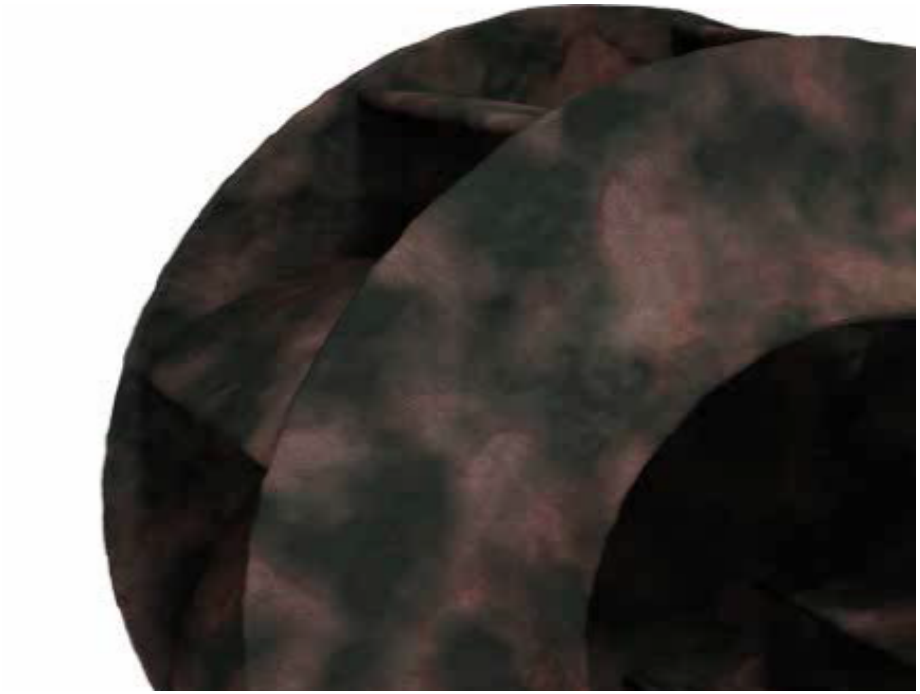
- Generates high outage maintenance cost and decreases availability of the plant
- Decreases electrical efficiency of the boiler
- Important factor for corrosion issues in high temperature boiler components such as furnace walls and superheaters
- Also of importance at lower temperatures in the economiser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

Motivation for the project

From the Project Agreement:

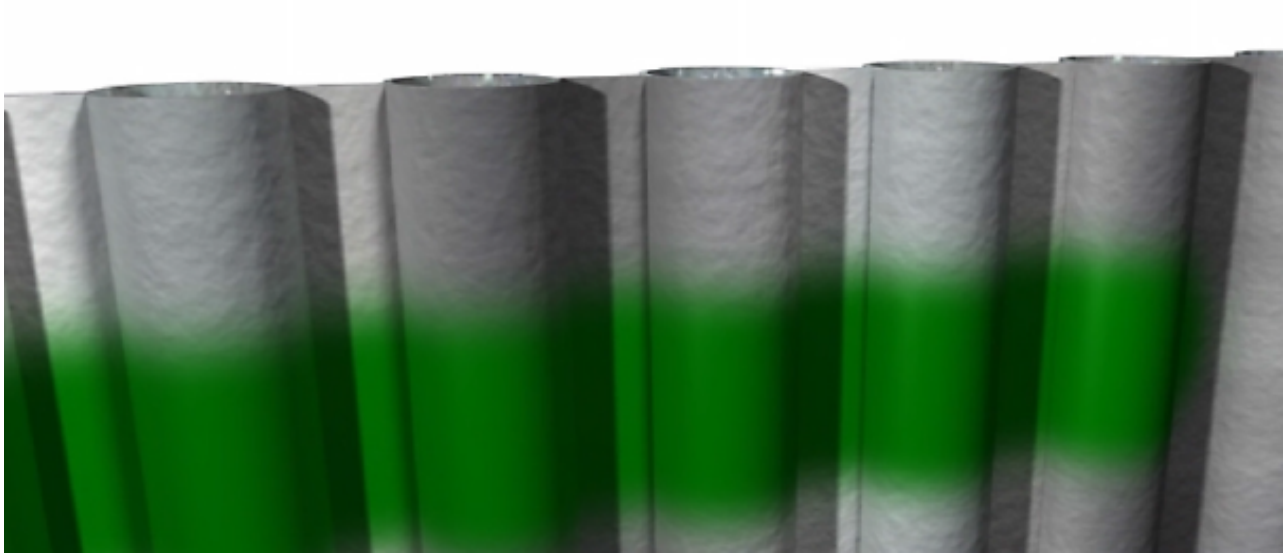
Through surfaces that keep cleaner in both furnace and convection parts the following
advantages are achieved for combined heat and power (CHP) plants:
- Increased electrical efficiency
- Increased fuel flexibility
- Decreased maintenance costs related to corrosion and erosion damages
- Increased availability in general through minimised planned and unplanned down-time
- Increased operation time during top load periods through minimised unplanned down-time

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



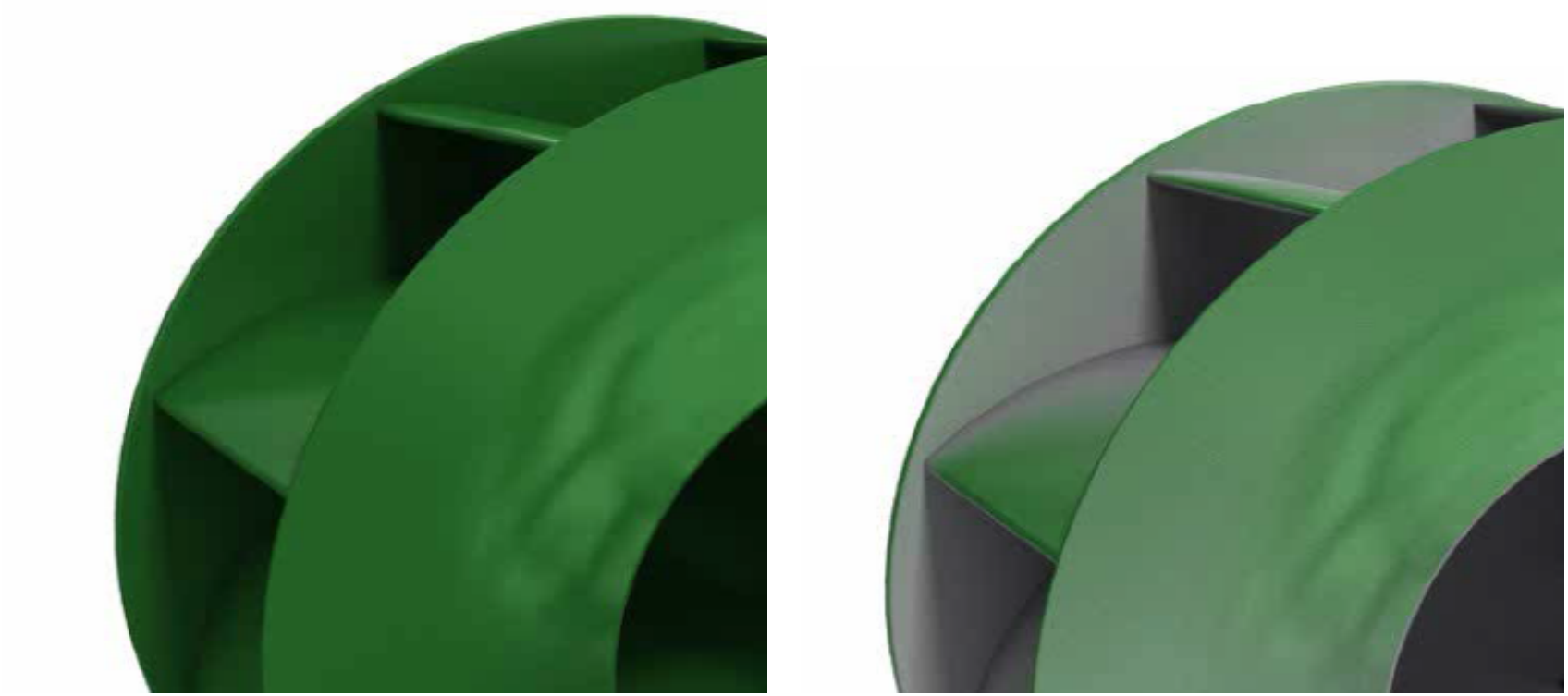
- Fan needed cleaning every week

Background – Application of the layer



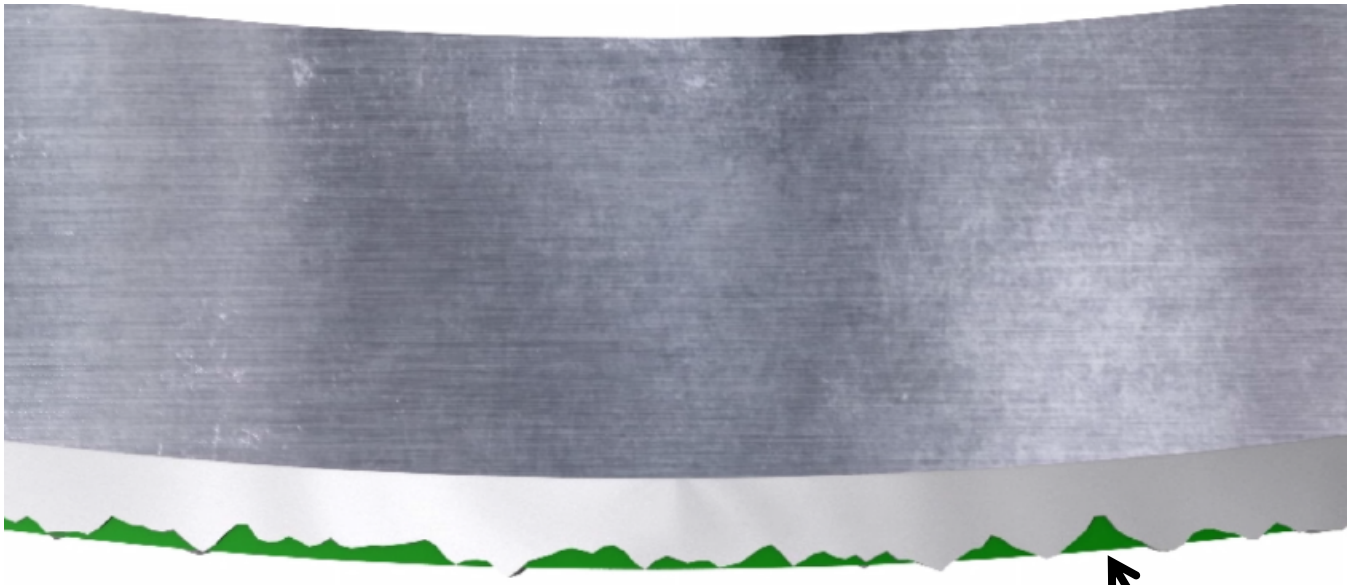
- A Ni-base material is applied to the C-steel (grey)
- On top of this layer, the non-stick material is deposited (green)

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



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

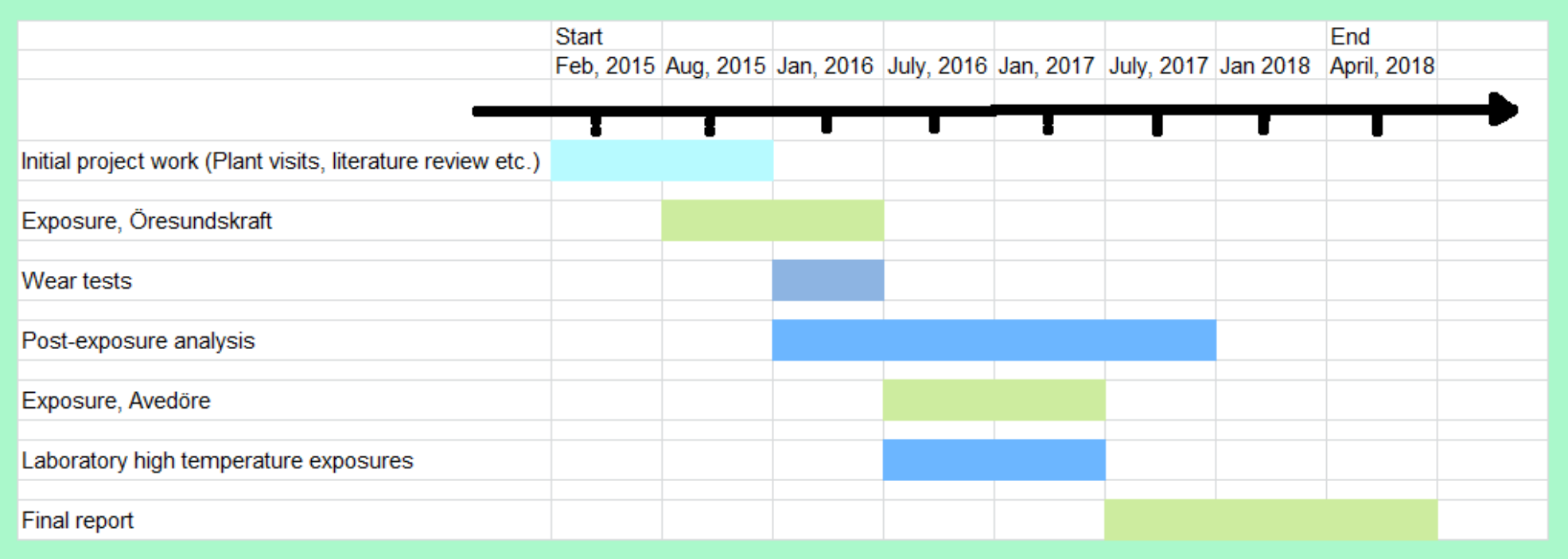
Background – sketch of non-stick layer after use



Background

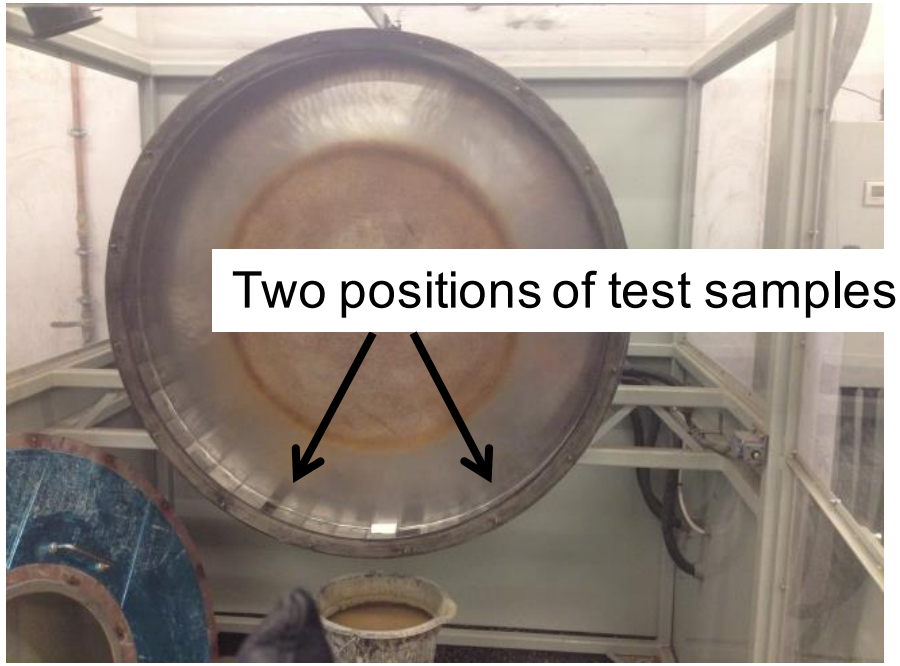
- Aim: Examine non-stick properties of a steel on which a dual-layer of Ni-base metal and a non-stick material have been deposited in sequence.
- 9 different non-stick materials will be examined
- The non-stick layer candidates include both polymeric and composite materials.
- Project plan includes two plant exposures, wear tests and laboratory exposures
- Participating companies: MH Engineering (project leader)
  Öresundskraft Kraft och Värme AB
  Dong Energy Thermal Power A/S
  Swerea KIMAB

Project plan Feb 2015-April 2018



- Post-exposure analysis include droplet tests in addition to conventional methods.
- Laboratory exposures include polymeric non-stick materials

Wear tests



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

Resultat, Material 4

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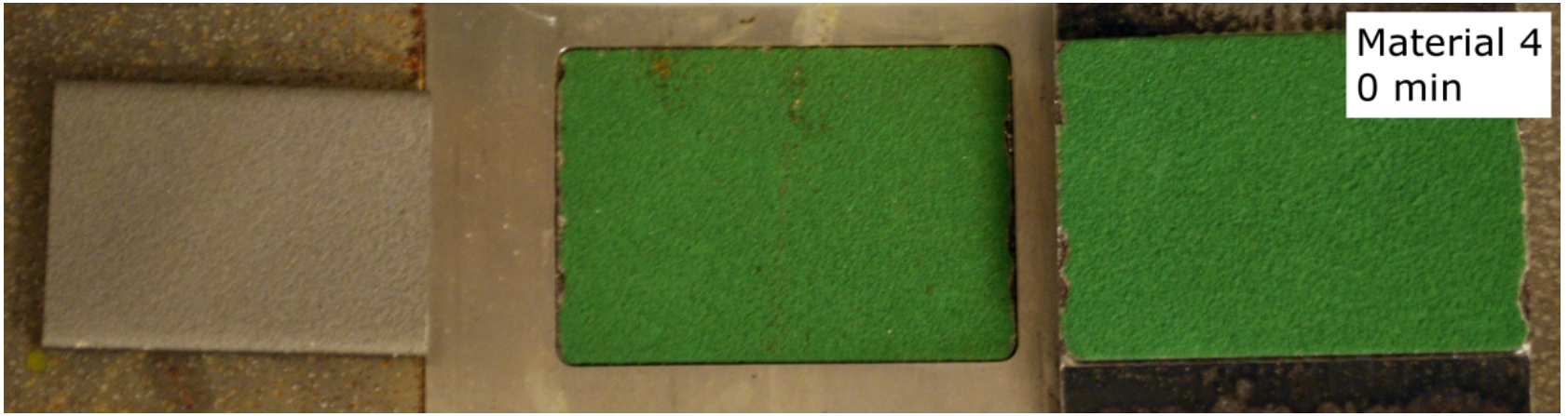
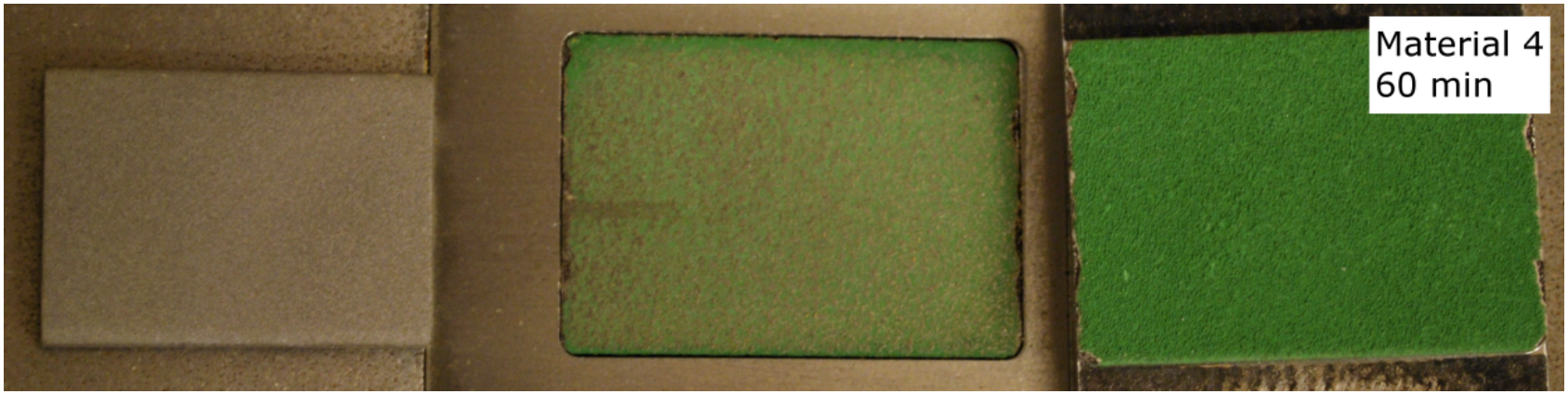
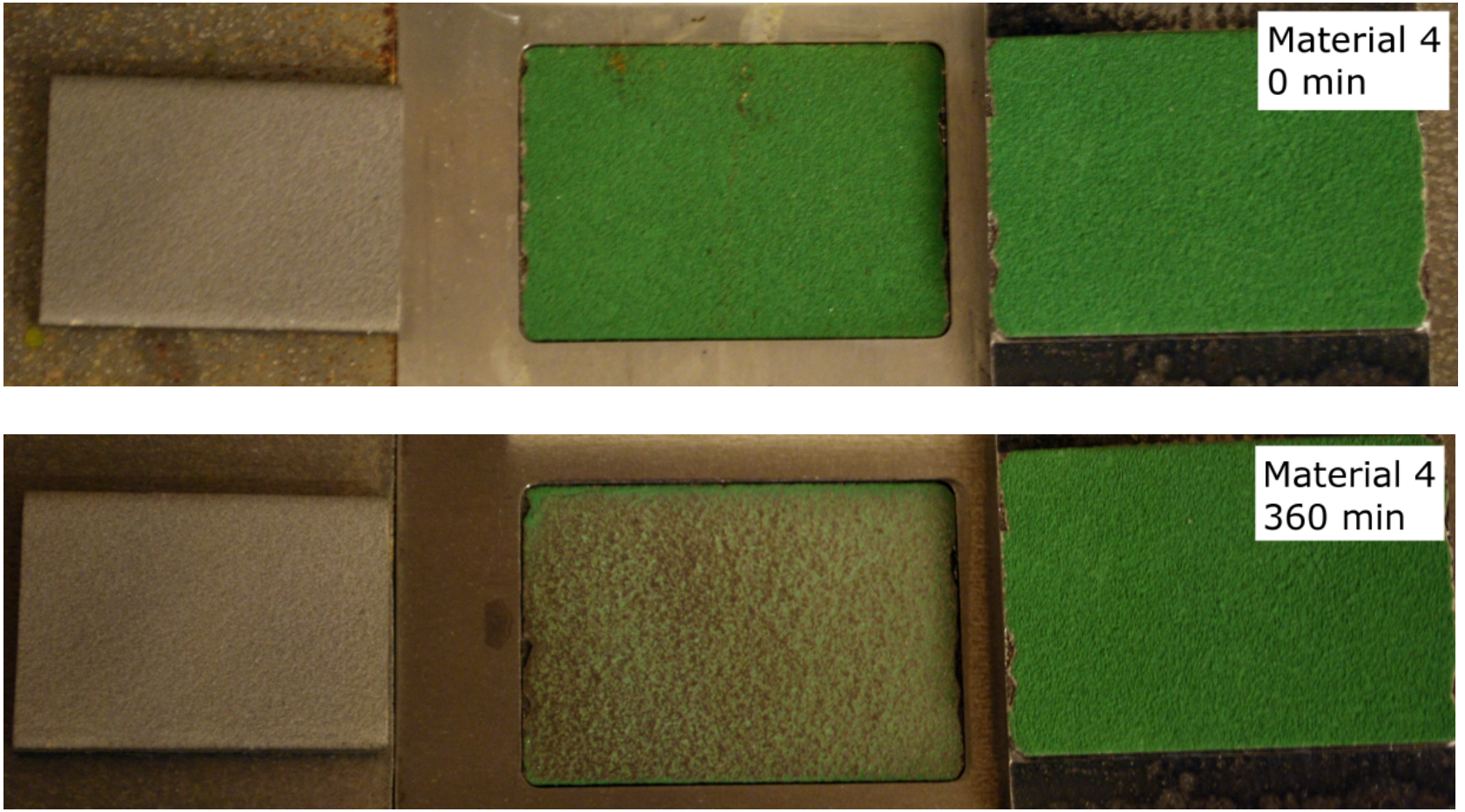
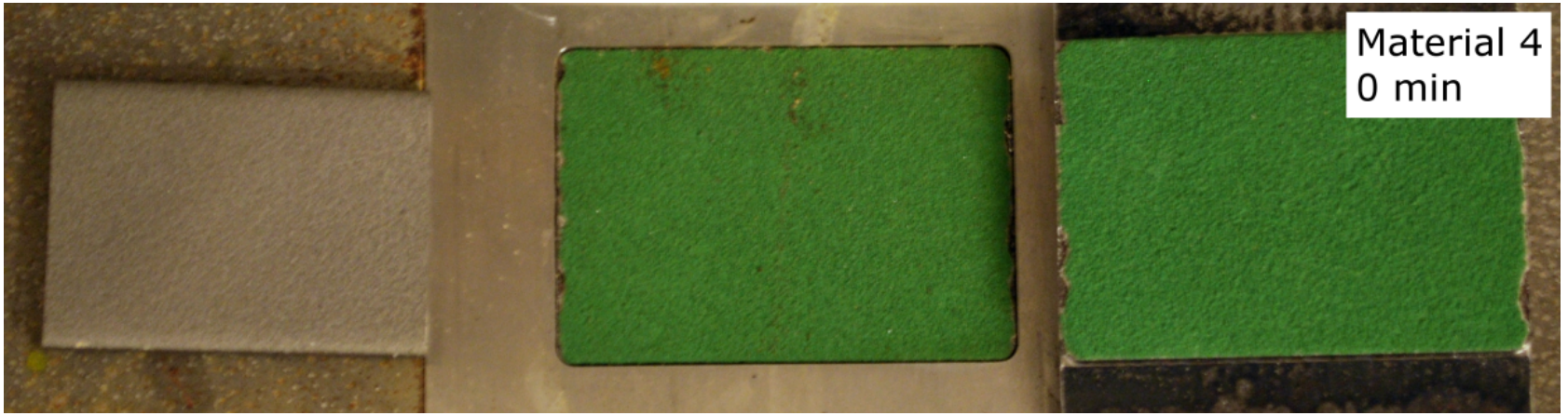




Resultat, Material 4



Resultat, Material 4



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			

Exposure of point-welded ½ tube shields

Thank you for your attention!

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