

SEASIDE CLASS

Quality product and environmental problems

ESTAL CONGRESS 2006

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WHAT'S SEASIDE

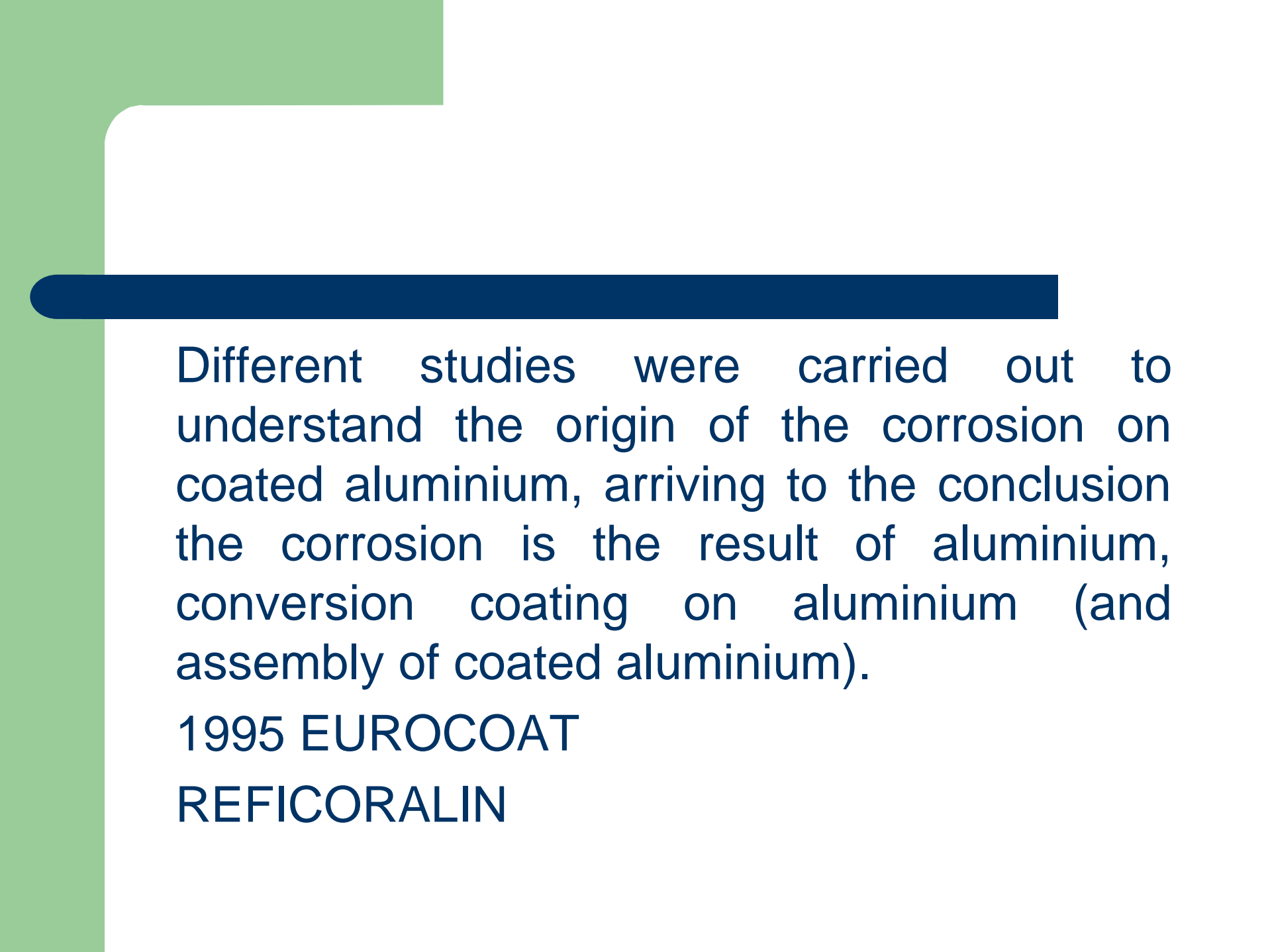
SEASIDE is a new classification introduced by QUALICOAT to define more precisely the pretreatment cycle before conversion coating bath.

To be classified SEASIDE, the pretreatment must have an alkaline and an acid step before the conversion coating. The aluminium removal must be at least 2 g/m² total and 0,5 g/m² for every step.

WHY?

SEASIDE can be considered the final step of a long **discussion** and evolution on a better qualification of pretreatment.

The main reason of this evolution is the filiform corrosion, or corrosion phenomena, on coated aluminium in 90's years.



Different studies were carried out to understand the origin of the corrosion on coated aluminium, arriving to the conclusion the corrosion is the result of aluminium, conversion coating on aluminium (and assembly of coated aluminium).

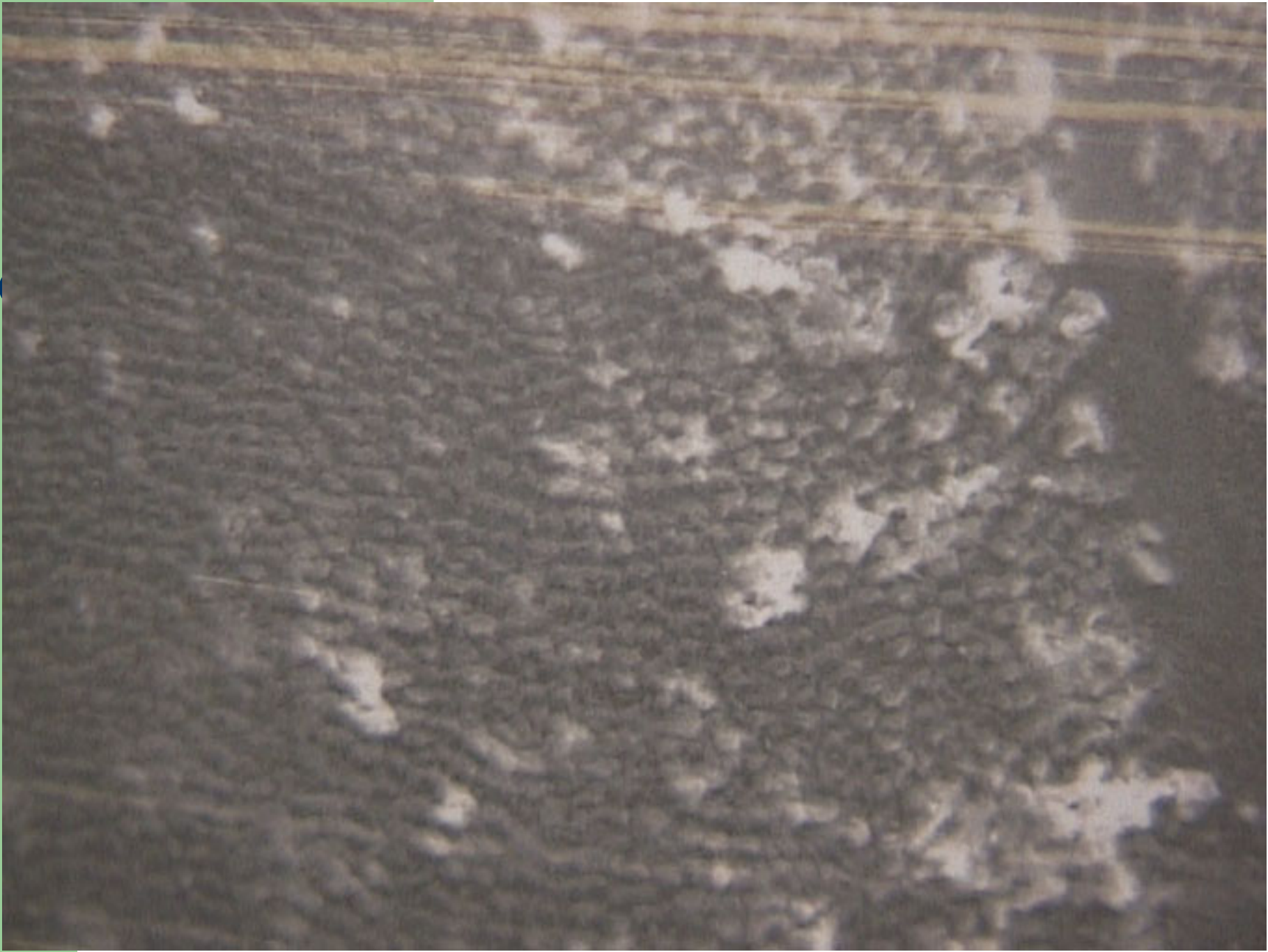
1995 EUROCOAT

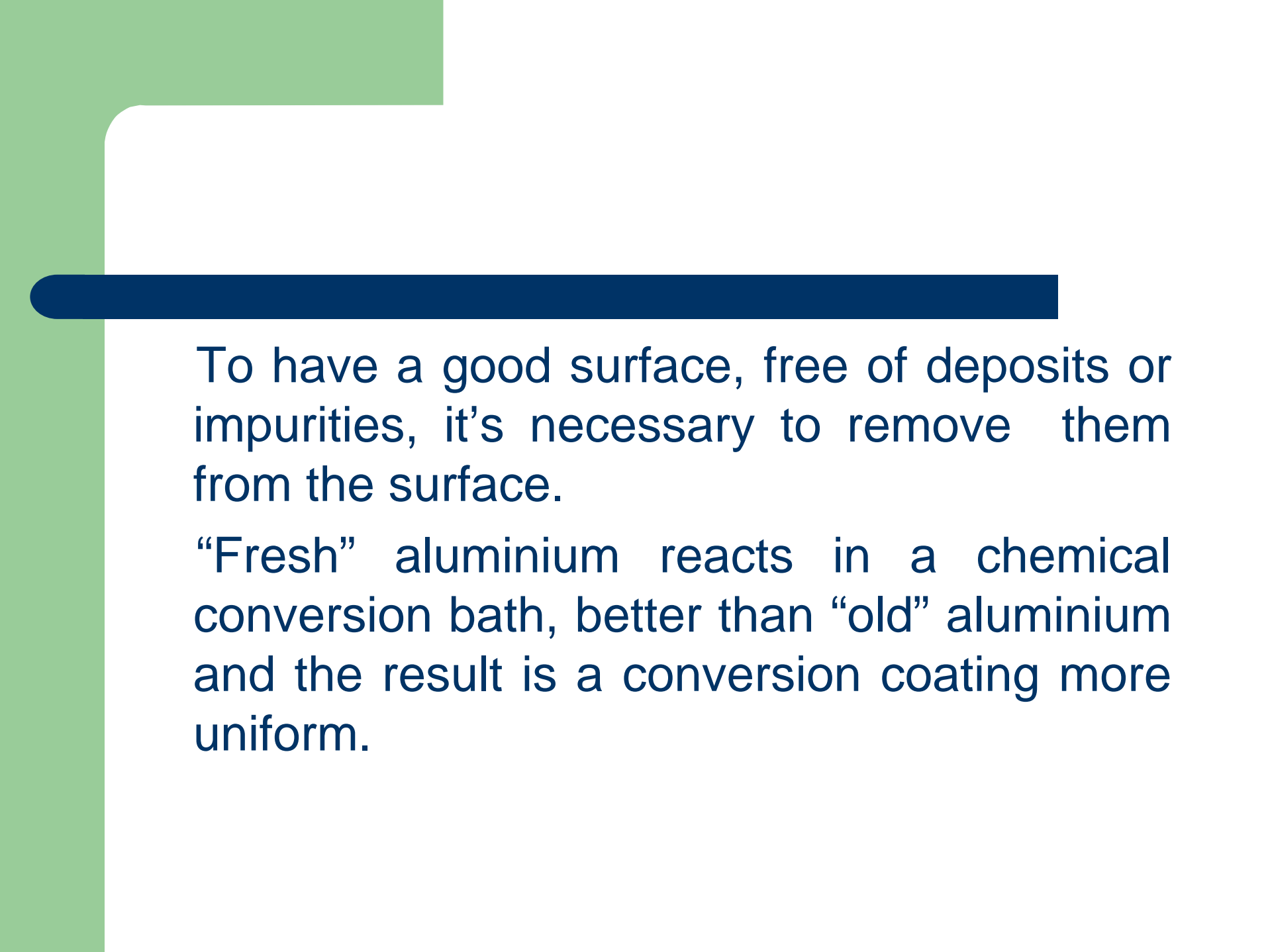
REFICORALIN



Aluminium is naturally covered with a very thin layer of aluminium oxide, but not only.

On the surface we can find also other compounds, depending of chemical composition of aluminium alloys, or impurities due the reaction with the dirt or water or strong deposit depending from the metallurgical history of the aluminium (next picture shows a water spot on the aluminium surface).

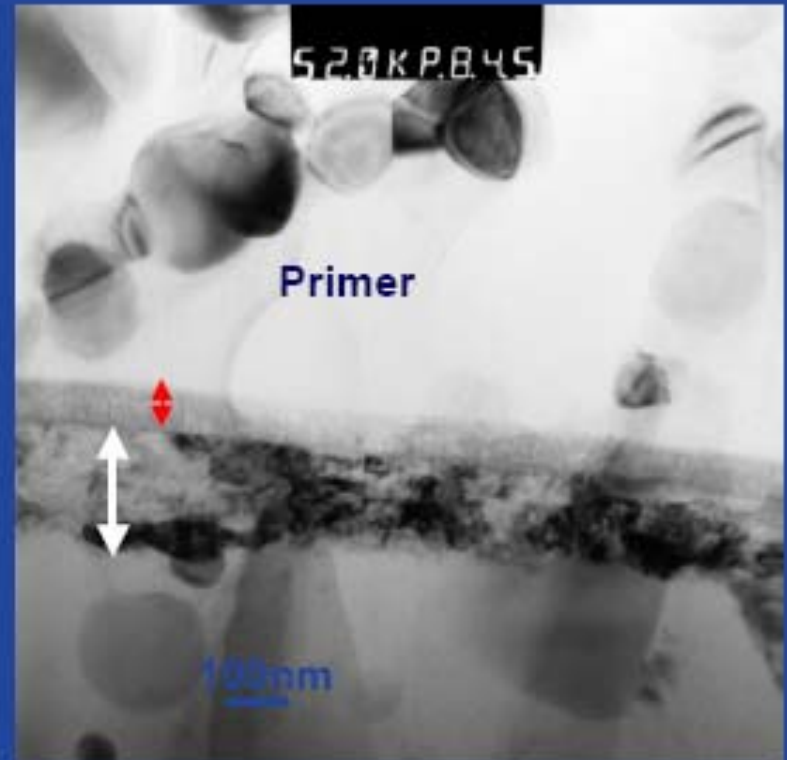
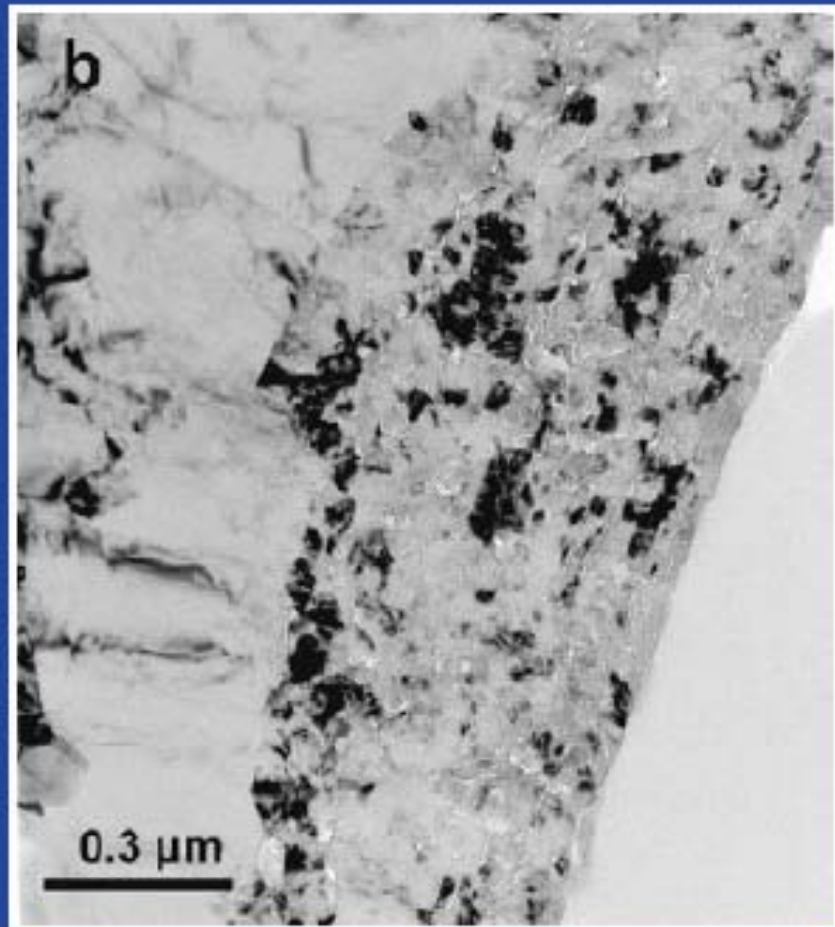




To have a good surface, free of deposits or impurities, it's necessary to remove them from the surface.

“Fresh” aluminium reacts in a chemical conversion bath, better than “old” aluminium and the result is a conversion coating more uniform.

TEM cross sections of EN 3000 series alloys



This sample corroded after 2 years of exposure in an industrial environment



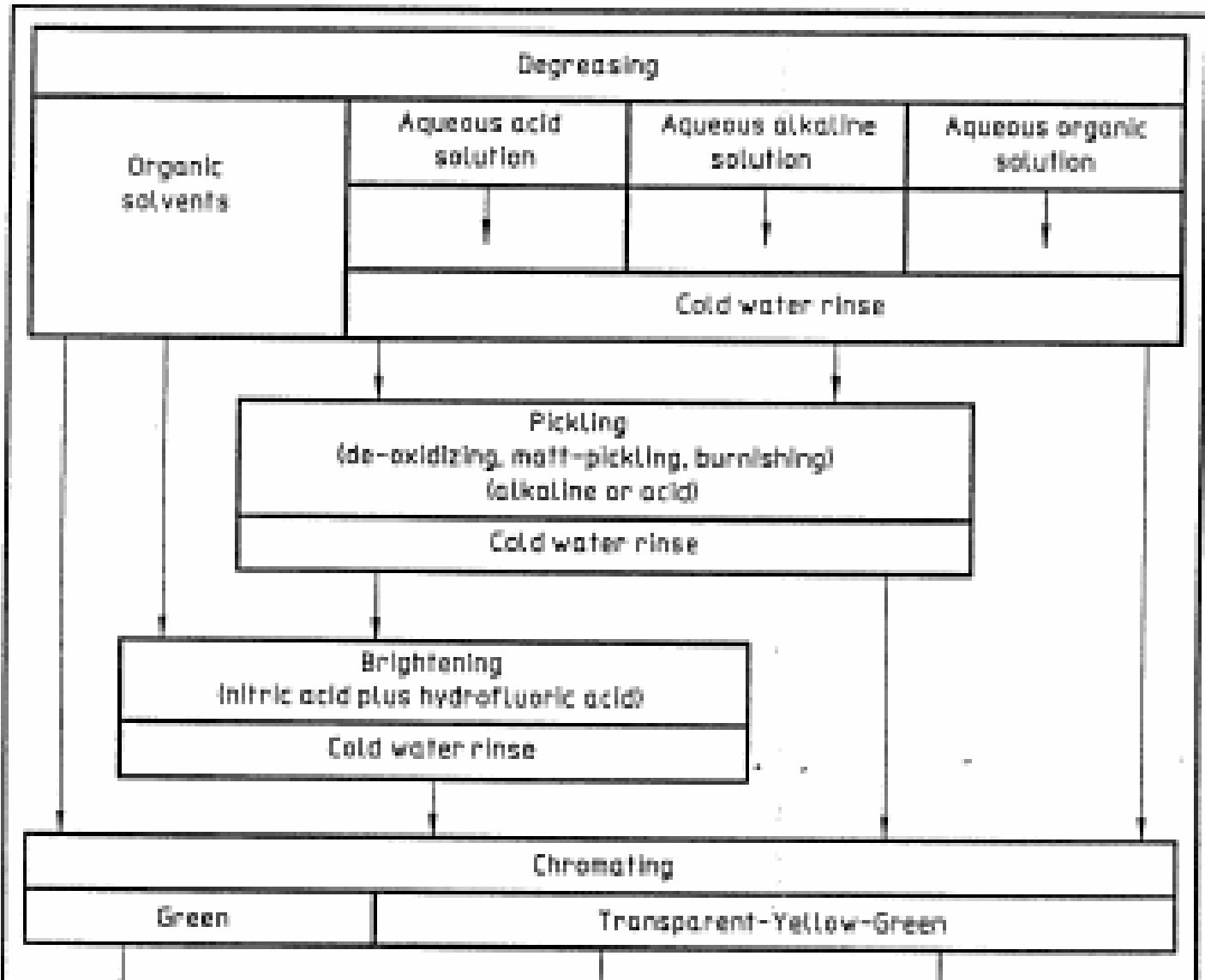
as QUALICOAT we studied more in deep pretreatment step, starting first of all from standard situation.

The first question that we posed to us was: is the reference standard DIN 50939 able to answer our question?

The answer was: NO

The same answer also using the other standards ISO 10546 (Chemical Conversion coating – Rinsed and non-rinsed chromate conversion coatings on aluminium and aluminium alloys).

Why they can't answer our questions



Lockheed testing of EN AW-3005



Aceton degrease

Z19 degrease

Ridolene degrease

NaOH etch+ deox.



1cm

1 μ m metal removal

A. Afseth: PhD thesis 1999



ALUMINIUM REMOVAL

QUALICOAT decided to introduce a new criteria to qualify pretreatment, called ALUMINIUM REMOVAL; giving a minimum of 1 g/m² and an acid treatment before conversion coating step.

In the meantime other studies were realised by other association or laboratories, one of these has been presented in ESTAL congress in 1999

Filiform corrosion formation on painted aluminium extrusions

Das Auftreten von Filiformkorrosion auf lackierten Aluminiumprofilen

**J. H. Nordlien*, J. Defranco, W. Züst,
M. Benmalek and R. Stuckart**

System	Vertical spray			Horizontal dip			Vertical spray		
Steps:	Chemicals	Concentr.	Approx. etch rates	Chemicals	Concentr.	Approx. etch rates	Chemicals	Concentr.	Approx. etch rates
		approx.	from to		approx.	from to		approx.	from to
Cleaning-etching	Alkaline cleaner	2% vol		Alkaline cleaner	35 g/l		Alkaline cleaner	25 g/l	0.1 g/m ² 0.1 g/m ²
Etch (alkaline)	none			NaOH	20 g/l		none		
				Additive	7 g/l				
Desmut (acid)	Acid solution	4% vol		HNO ₃	20% vol		Acid solution	2% vol	0.9 g/m ² 0.9 g/m ²
Total metal Removal						1.8 g/m ² 9.7 g/m ²			1 g/m ²

5 Conclusions

The FFC susceptibility of extruded 6060/6063 alloys was investigated as a function of bulk metal composition and formation of a reactive surface region. The following conclusions were made:

- 1) A significant improvement in the FFC resistance was obtained as a function of the metal removal and having removed 2 g/m^2 only the bulk FFC properties were noticed.
- 2) GD-OES analysis has shown significant enrichment of alloying elements and impurities in the surface region of extrusions due to the thermo-mechanical history and the bulk composition.
- 3) This enrichment was no longer observed in the GD-OES analysis after a metal removal of 2 g/m^2 .
- 4) Within the limits of 6060/6063 alloy specifications a minor influence of the FFC susceptibility was observed with respect to the bulk alloy composition.
- 5) As a result of the thermo-mechanical history and the bulk composition the concentration of some alloying elements in the surface region could be well beyond the bulk metal concentration and therefore increased FFC susceptibility may be a consequence.

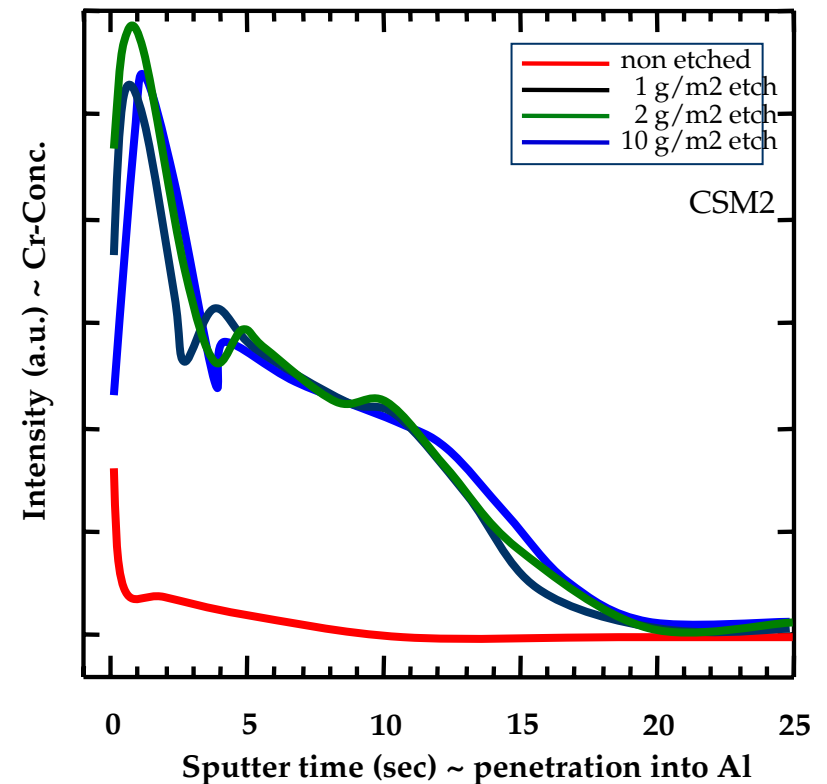
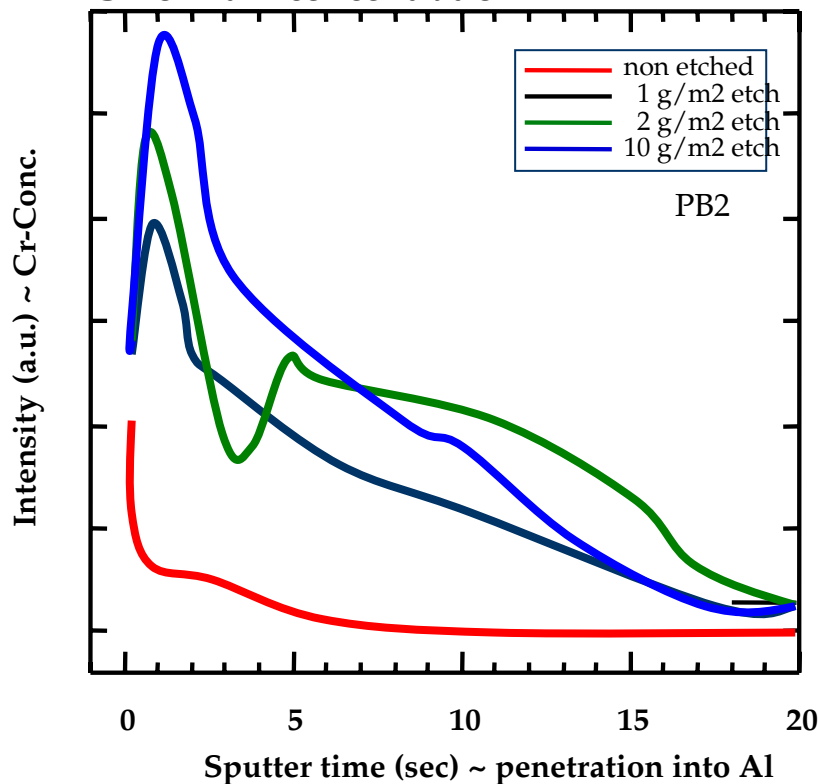
Element concentration of various stages of metal removal and various chemical etching prior to GDOS

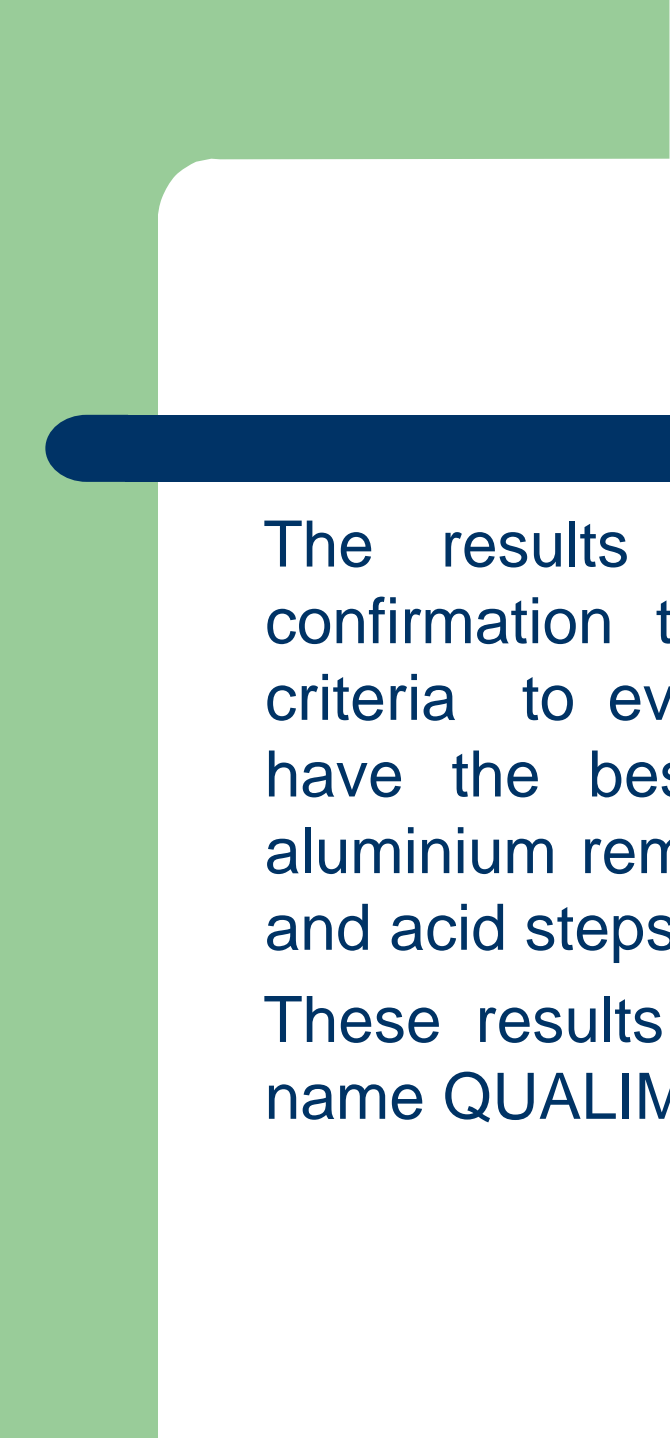
Pre-treated Lead polluted material (6060)

Pre-treated Common sample material (6060)

Chromium concentration

Chromium concentration





The results of these research has been a confirmation that aluminium removal is a correct criteria to evaluate the pretreatment cycle, but to have the best results is necessary to increase aluminium removal to 2 g/m² and also have alkaline and acid steps.

These results were accepted in France giving the name QUALIMARINE to this pretreatment cycle.



The same cycle has been accepted in QUALICOAT with the name SEASIDE.

This cycle is not compulsory for the coater (the minimum is 1 g/m²).

Other studies are running in QUALICOAT to include also different cycles and the results must be evaluated before QUALICOAT meetings in November; and new testing method must be introduced .

SEASIDE PROGRAMM

First step

- a) Filiform corrosion test (DIN 65472, EN 12206-1, EN 3665, ISO 4623-2) is more selective than AASS;
- b) Aluminium removal of 2 g/m² is better than 1 g/m², in the acceptable limit of QUALICOAT specifications for AASS;
- c) Aluminium plays an important role;
- d) Personally think the filiform corrosion as testing method need a modification in the procedure

SEASIDE PROGRAMM

Second step

We are studying different pre-treatment cycles only with 2 g/m²:


- 1) Acid etching of 2 g/m²
- 2) Alkaline etching of 2 g/m² (+ a dip in acid)
- 3) Alkaline and acid (1,5 g/m² and 0,5 g/m²)

The results will be discussed next QUALICOAT meetings.


ENVIRONMENTAL PROBLEMS

The title of my presentation is: “SEASIDE CLASS **Quality product and environmental problems.**”

The reason of this is that to increase the etching of aluminium means more sludge in the residual water and also reducing the life of the bath.



I think that environmental problems are one of most important challenge that the coaters (/anodisers) and the associations, including also quality label, have to take it into account. For this reason QUALICOAT is always interested to qualify new products or processes provided that they are conforming to the specifications (f.i. chromium free products).



In my point of view as QUALICOAT we can't decide about the best processes for environmental problem,

But we can cooperate (JTC) with other associations to find the solutions or the alternatives friendly for the environment (IN THE FRAME OF QUALICOAT SPECIFICATIONS).