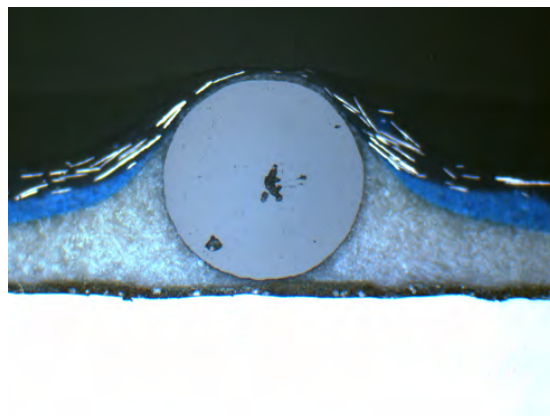


Introduction:

High yields and efficiency paint operations is crucial for reaching high quality standards in automotive business. Evaluation of small defects in the paint layer that is not necessarily visible can be done in an automated solution eliminating the risk of grinding away the target relevant for the examination. This solution demonstrates a materialographic process for targets down to 10 microns.



Material Name: Paint Layers

Sample comments: Painted layers with small defects on car-parts.

5 different types of samples - identified by color:

1. Yellow
2. Blue metallic
3. Dark grey
4. Red
5. Light grey

Developed by: Birgitte Nielsen

Date: 30-07-2015

Cutting

Equipment: Accutom-100

Cut-off wheel: 10S15

Feed rate: 0,5 mm/s

Comments: Cutting only necessary to reduce the size of the samples so that they fit in to the ø30 mm sample chairs.

On one side - cutting approximately 2 mm from target to minimize the preparation time.





1 - After cutting and glued on sample chairs.

Mounting

Equipment:

Resin: Epofix

Resin add:

Size of mounts: x 30 mm

Comments: All the specimens were glued directly on sample chair $\varnothing 30$ mm for Target-preparation - using quick glue.
Measuring of target distance before mounting.
Mounting in the chair - using metal tape as a barrier.



1 - Mounting in TargetGrip, sample 1 and 2

Grinding/Polishing

Equipment: TargetMaster

Disc diameter: 200 mm / 8"

Specimen holder: TargetGrip

Comments: Preparation times mentioned in the preparation method are approximate, as "Target Mode" was used (for step 1-4).

Removal rates for TargetMode:

Step 1/5: down to 175 µm from Target

Step 2/5: 200 µm (Target Mode)

Step 3/5: 40 µm (Target Mode)

Step 4/5: 10 µm (Target Mode)

Step 5/5: Time mode

Following IRR-values in the configuration:

SiC#500 = 1800 µ/min

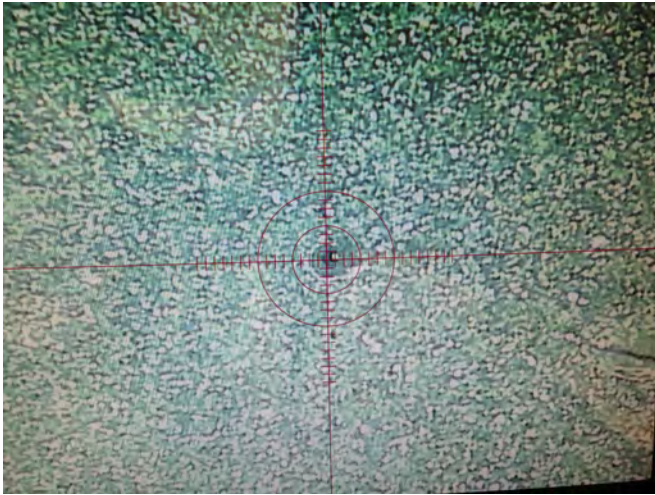
SiC#1200 = 1100 µ/min

MD-Sat = 25 µ/min

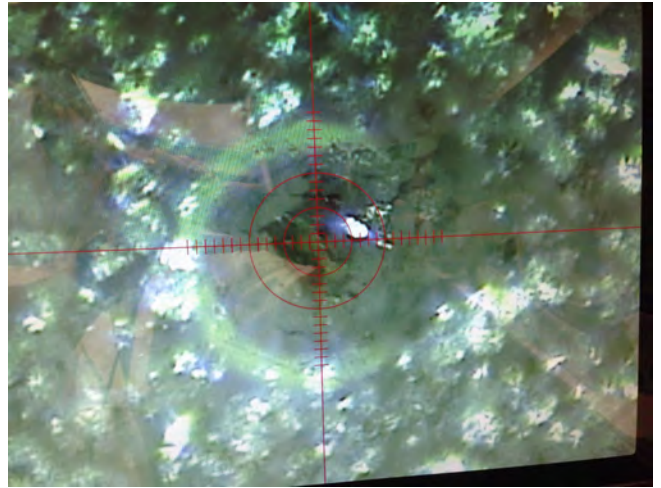
MD-Dac = 5 µ/min



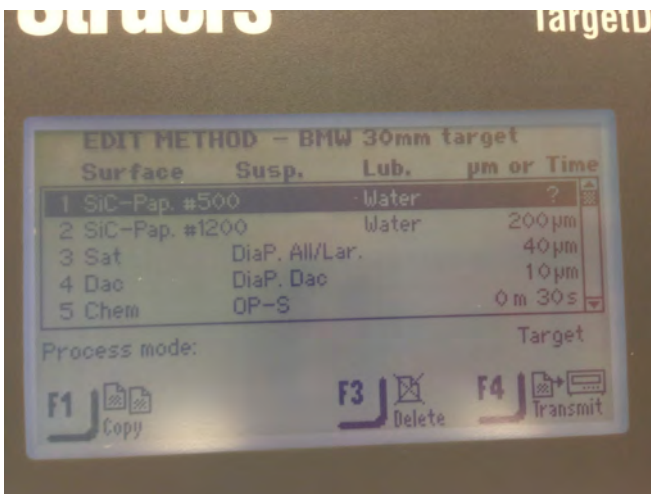
Step	1	2	3	4	5
 Position					
 Disc / Cloth	SiC Foil #500	SiC Foil #1200	MD-Sat	MD-Dac	MD-Chem
 Speed [rpm]	300	300	150	150	150
Dressing [μm]					
 Cooling					
 Suspension			DiaPro Allegro/Largo 9 μm	DiaPro Dac 3 μm	OP-S NonDry
Pre-dosing			2	2	5
Dosing			6	7	13
 Lubricant	Water	Water			
Pre-dosing					
Dosing					
 Force [N] Single/Holder	25 /	25 /	20 /	15 /	10 /
 Holder speed	150	150	150	150	150
Rotation direction	>>	>>	>>	>>	>>
Holder offset					
 Time [min]	2:00	2:00	5:00	3:00	0:30
 Stock removal [μm]					
Pause between steps	No	No	No	No	No
IRR [$\mu\text{m}/\text{min}$]	1.800	1.100	25	5	
 Cleaning program no.					



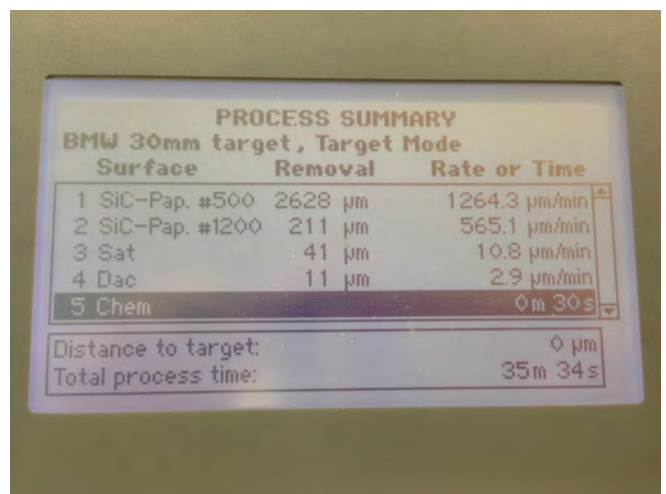
1 - Light grey sample, defect on Target Screen



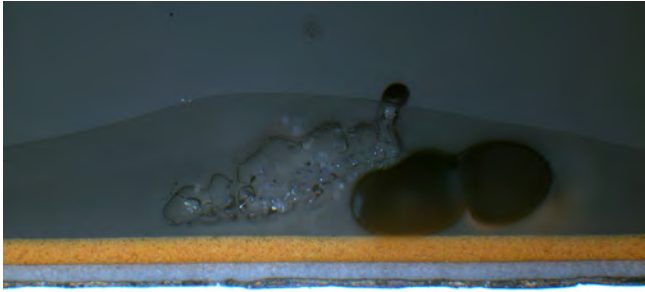
2 - Light grey sample, defect on Target Screen



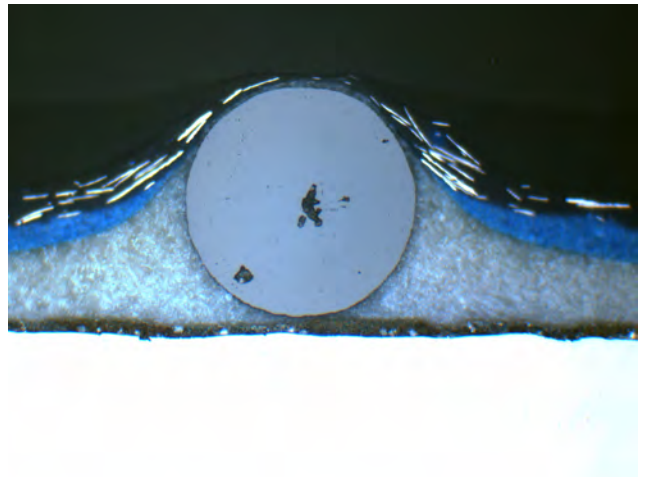
3 - Method overview



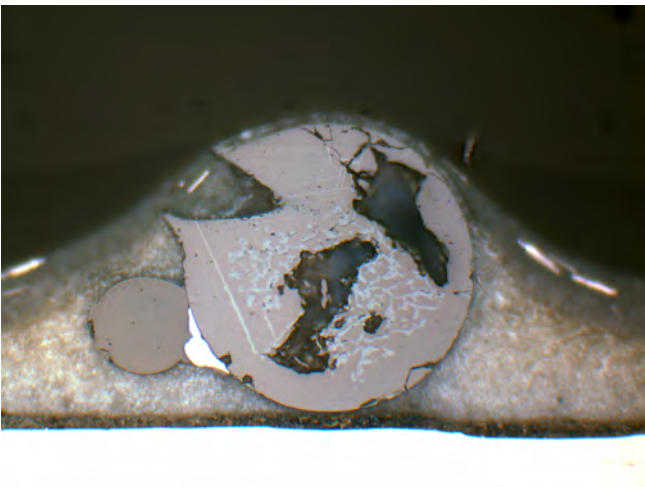
4 - Process summary



5 - Sample 1 Target, BFx200



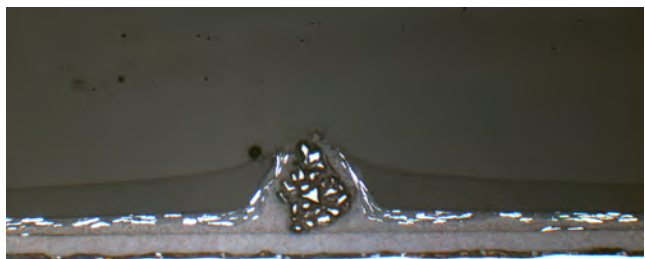
6 - Sample 2 Target, BFx500



7 - Sample 3 Target, BFx500



8 - Sample 4 Target, BFx500



9 - Sample 5 Target, BFx200

Summary

A reproducible method for evaluation of paint defects was developed consisting of:

- Precision cutting with Accutom-100 to isolate the point of interest in distance of < 200 µm.
- Mounting and aligning the sample in special holder, Target Grip,
- Controlled Material Removal (CMR) with TargetMaster in a 5 step method reaching the paint defect in 12,5 minutes

Signed by: Birgitte Nielsen

Date: 31-07-2015

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