

# SAA (NG) & TSA WITH ZIRCONIUM - CHROMIUM III SEALING

December / 7 / 2016

Kirk BUCKNOR  
Metallurgist  
Safran Landing Systems



# Who is SAFRAN?

- ◆ French owned, international high tech group of companies
- ◆ Tier 1 supplier of systems & equipment in its core markets of Aerospace, Defense & Security
- ◆ Has over 70, 000 employees worldwide with locations in the Americas, Europe, Asia Pacific, Africa and the Middle East
- ◆ Generated sales of over 17 billion euros in 2015
- ◆ Comprised of a number of companies:



# TERMINOLOGY:

DM&P	:	Materials and Processes Department (Group of each company people working on Materials & Processes)
Segment	:	(Safran Surface Treatments) Segment, Group of each company people working on Surface Treatments and attached to Materials and Processes Department
TRL	:	Technology Readiness Level
TRL 6	:	Technology Readiness Level 6 (From 1 to 9), Level indicated that Solution is tested on Industrial Units with significant Component
Pr	:	SAFRAN Process Specification
CAA	:	Chromic Acid Anodizing
SAA	:	Sulfuric Acid Anodizing
SAA NG	:	Sulfuric Acid Anodizing New Generation (without the use of Hexavalent Chromium)
TSA	:	Tartric Sulfuric Anodizing
TSA LC	:	Tartric Sulfuric Anodizing Long Cycle
SNF	:	Sulfo – Nitro – Ferric (pickling solution)
NG	:	New Generation

# Such as achievement would not have been possible without strong collaborations between SAFRAN Companies and its Key partners



In 2008, SAFRAN created the Materials and Processes Direction (DM&P) to guarantee the efficiency of the Group in those technical fields.

DM&P is constituted by a Central Team connected with the Research Teams of each companies.

Such an organization made it possible to study Anodizing Replacement with :

- Collaborative studies between SAFRAN Companies (through the SAFRAN Surface Treatments Segment),
- Participation of SAFRAN Experts,
- Collaboration with Key External Competencies (such as IRT-M2P),
- Collaboration with Industrial Partners.



# Global Strategy for CAA and SAA replacement...

- The alternatives are selected based on the following 3 criteria :



REACH Compliant

Eliminate Hexavalent Chromium to comply with European Environmental regulations (REACH).



Technical results

No down grade of the performance of the protection in terms of corrosion and mechanical affects on produced components.



Supply Chain

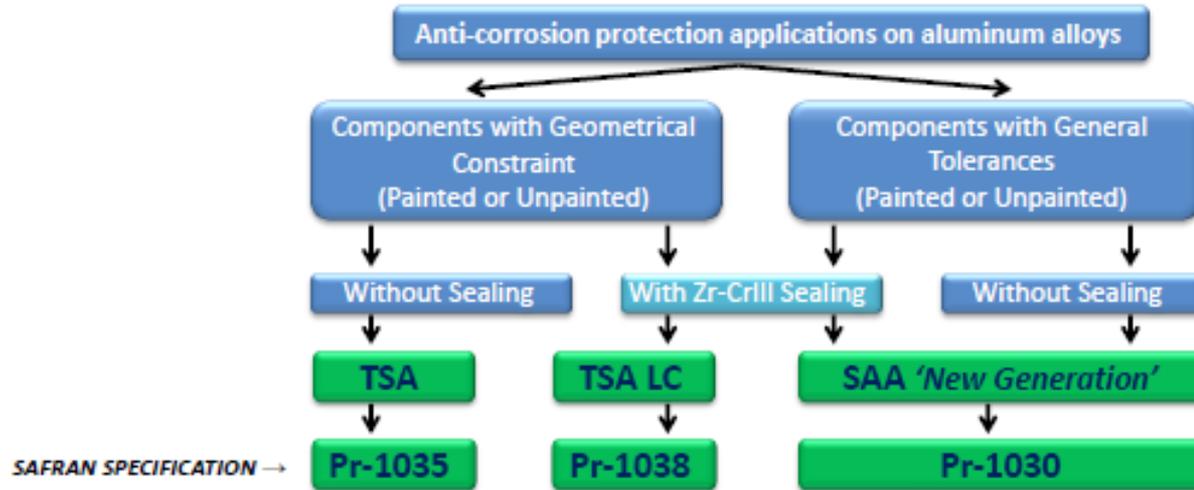
Minimize the Changes on the Existing Supply Chain.

- Main objectives was to propose a **Single Substitution per Special Process** with its common specification available for each SAFRAN companies :

- Special Process Qualification in accordance with Pr Specification,
- Reduction of the number of Requested Qualifications,
- Globalization of SAFRAN (companies) needs.

SAFRAN		PROCESS DOCUMENT	
Non-dyed sulphuric acid anodizing of aluminium & aluminium alloys		Pr-1030	
		Revision A Page 1/20	
Contents			
1. Purpose			3
2. Scope			3
3. Applicable documents			3
3.1 Documents required by the application			3
3.2 Documents for information			4

# CAA & SAA replacement: SAFRAN choices = TSA, SAA with Zr-Cr III sealing



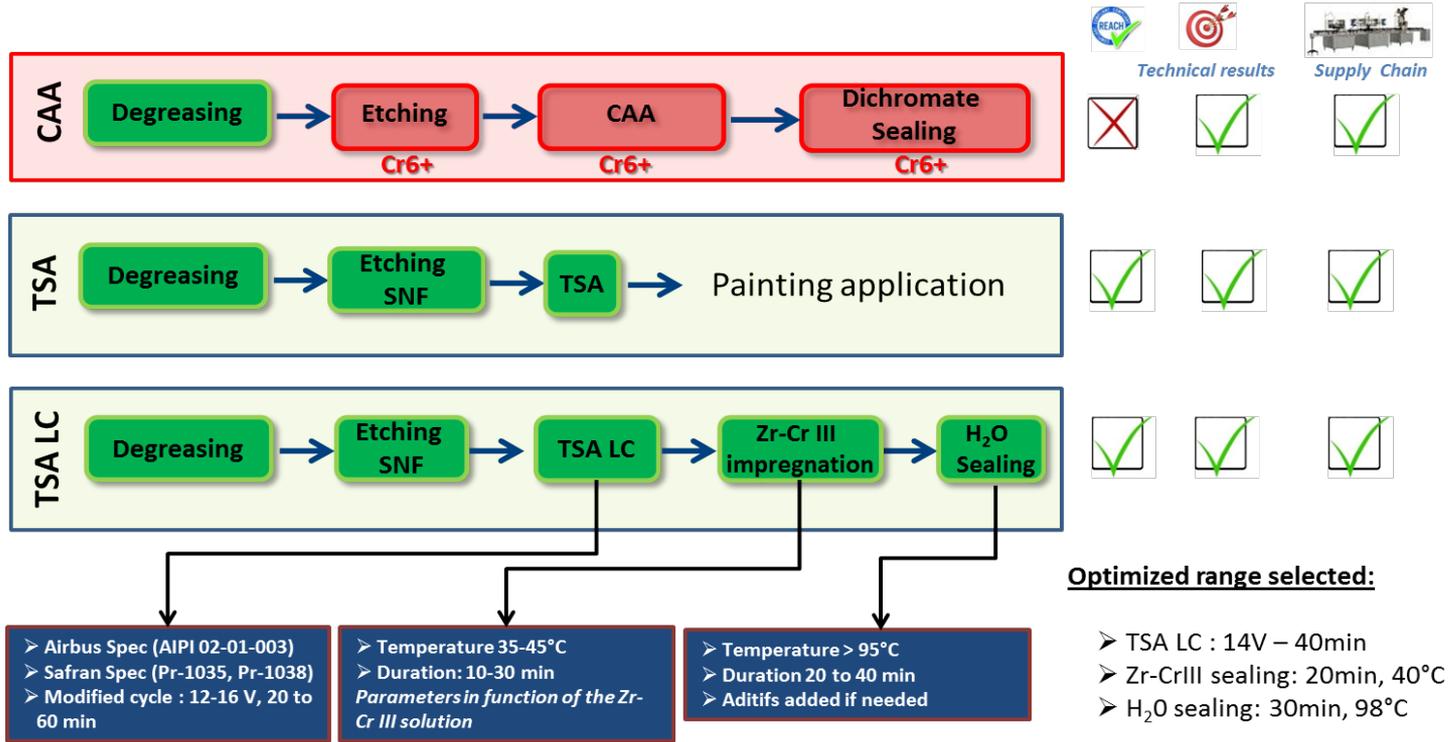
Besides,

- The chosen alternatives proposes the same Zr-CrIII sealing
- TSA LC also chosen by AIRBUS Helicopters



# TSA & TSA LC (Long Cycle)

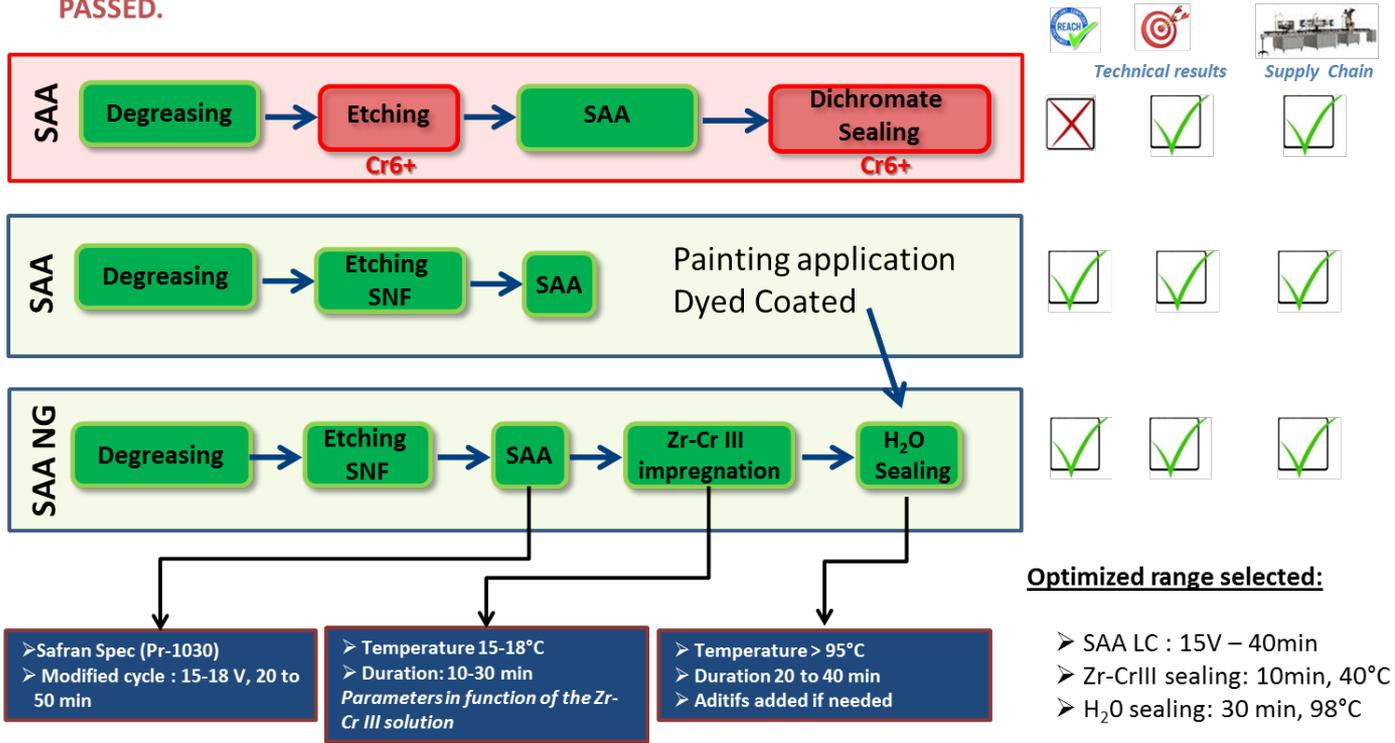
→ REPLACEMENT OF CAA + Cr VI SEALING BY TSA LONG CYCLE + ZR-CrIII SEALING : TRL6 PASSED.



→ TSA LC process time equivalent to the CAA one

# SAA NG (New Generation)

→ REPLACEMENT OF SAA + Cr VI SEALING BY SAA 'New Generation(NG)' + ZR-CrIII SEALING : TRL6 PASSED.



→ SAA 'New Generation' process time equivalent to the SAA one



## ***Corrosion Resistance :***

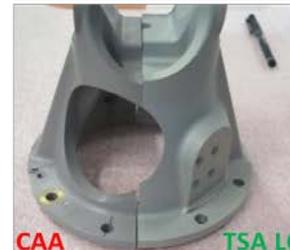
- **No down grade observed and proposed for qualification and process control compared with CAA standards!**  
**Our proposed criteria are more critical than international ones.**
- **Minimum thickness of 4  $\mu\text{m}$  requested to have Robust Zr-CrIII Impregnation.**
- **No downgrade observed on all tested alloys... with potential specific adjustment to be carried out (surface preparation...)**

## ***Fatigue Behavior :***

- **No impact on the value generated by treatment evolution.**

## ***Cosmetic :***

- **Minor Color Change due to Hexavalent Chromium removal in Sealing (SAFRAN standard for CAA is with a 30 milligrams per liter of Dichromate in Sealing Bath).**
- **Communication to customer needed.**



# SAA New Generation, Main Results



**Corrosion Resistance : Comparison between current requirements and SAA NG Results on 2024 –T3 Test Coupons.**

	in accordance with AMS 2471 & 2472 and MIL-A-8625F (Type II)	In accordance with DMP12-531 OAS NG RESULTS
Test coupon	2024-T3 (AMS 4037)	2024-T3 (AMS 4037)
ASTM B 117 angle	6 degree from vertical (specificity)	20 +/- 5 degree from vertical (equivalency with ISO 9227)
Number of pit per dm <sup>2</sup>	Average 1,5 at 336 hours	Results on a 3 month period 0 pit at 500 hours
Sealing	With Hexavalent Chromium	With Zirconium - Chromium III Impregnation and hot water sealing
		<b>Our standard for REACH SAA</b>

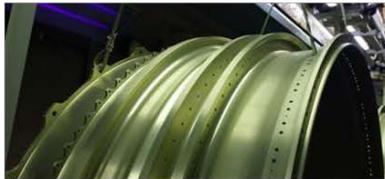
No down grade observed and proposed for qualification and process control compared with SAA Hexavalent Chromium sealed process !

Our proposed criteria are more critical than international ones.

No downgrade observed on all tested alloys... with potential specific adjustment to be carried out (surface preparation...)

**Fatigue Behavior : No impact on the value generated by treatment evolution.**

**Cosmetic : Color Change due to Hexavalent Chromium removal in Sealing. Communication to customer needed.**



Actual



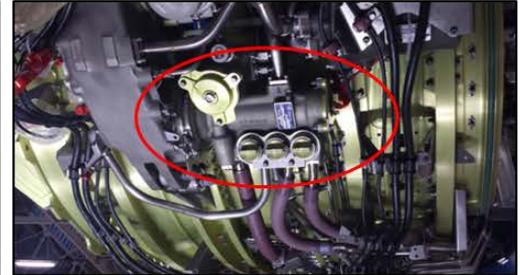
REACH Impact





***SAFRAN has its own dedicated Production Unit...***

***And It's now one year of Return of Experience on Production of New Component Engine with all requested agreements !***

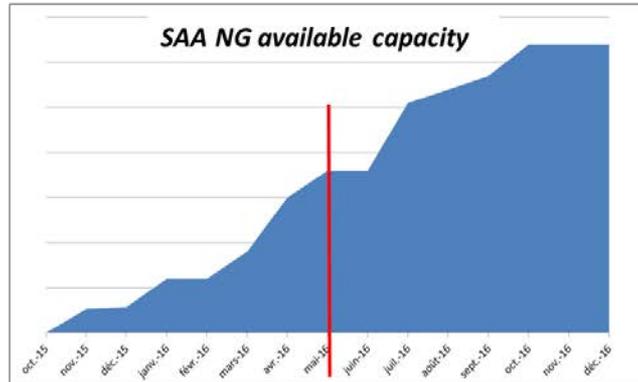


*Production started on CFM56 Assy Housing since May 2015 (SAFRAN – TECHSPACE AERO Production Unit)*

# For SAFRAN, It's time for Deployment of REACH substitutes....

## For SAFRAN, It's time for Deployment of REACH substitutes...

- REACH is a Major industrial and Technical Stake !
- REACH in a global point of view could be summarize with :
  - 85 000 Impacted References,
  - 1300 Sub-Contractors concerned qualifications (more than 50 % in France),
  - 350 Specialized and Integrated Sub-Contractors (35 % in France),
- **QUALIFICATION PROCESS IN ONGOING,**
  - Dedicated Teams are on place every day to perform REACH Qualification...



## Deployment of REACH substitutes means....

- **ONE QUALIFICATION PER IMPACTED PROCESS UNDER SAFRAN SPECIFICATION (Pr) RECOGNIZED BY ALL SAFRAN COMPANIES :**
  - Reduction of the number of Qualification,
  - Globalization of SAFRAN needs,
  - Saving Time for our Subcontractors,
- **QUALIFICATION OF PRODUCTION UNITS ANSWERING TECHNICAL AND ECONOMICAL CRITERIA :**
  - NADCAP Accreditation,
  - Modern and Automatic Production Units,
  - Contractualization with Tier two Subcontractors under SAFRAN General Terms Agreements and Application Contract between Specialized Subcontractors and Integrated ones.
- **SUBSTANTIATION (INDUSTRIAL VALIDATION) OF PRODUCTS BY GROUPING ALLOYS FAMILIES :**
  - Reduction of the number of Industrial Validation Documents,
  - Dedicated Package in accordance with Special Process Evolution.
- **A COMMON DEPLOYMENT OF THE SUPPLY CHAIN WITH AIRBUS HELICOPTERS SHARED AS MUCH AS IS NEEDFUL**



**THANK YOU FOR YOUR ATTENTION.  
ANY QUESTIONS???**

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