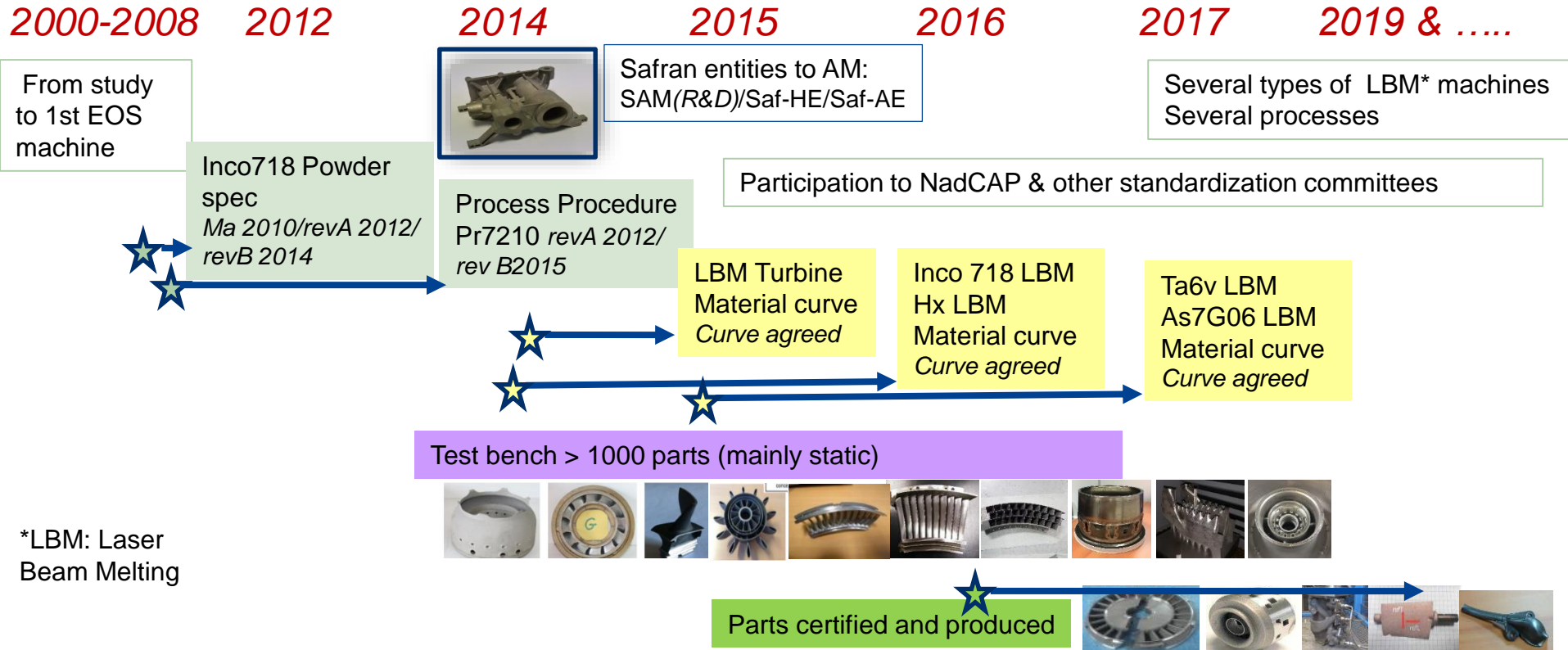


# **A FIRST EXPERIENCE OF INTERCHANGEABILITY BETWEEN MACHINE BRANDS- NOT THAT EASY IN METAL ADDITIVE MANUFACTURING !**

*Cologne, November 5*



# Safran background in Metal Additive Manufacturing : a step by step process shared within Safran companies.....



## Our need: to produce the same part on the available machines that are not of same brand

- The parts in Ni based superalloy were produced formerly at Safran Helicopter Engines on « brand A » machine.
- The only available equipment in Safran is a « brand B » machine in Safran Aircraft Engines

- The part produced on « brand A » machine



- The result on « brand B » machine



- Nota: The 2 teams have been working together for years and sharing lot of skills.

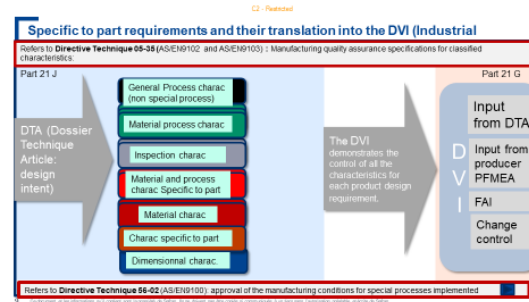


## 3 examples of differences preventing a transfer

- The parameter labelling is not the same  
This not a big issue to deal with, just a additional opportunity for failures....
- The parametry for details like interfaces with supports does not follow the same rules.  
Some supports transfers may « work » or ..... not
- Laser strategy: « Skywriting » , « Upskin/Downskin »  
They are complex strategies managing laser characteristics (speed, power, waist,, trajectory,...) to control the material melting.  
The detail of the parameter strategies remain unknown for the user.

# How do we manage the quality/conformance of the part?

- We work on the result of AM manufacturing process: material, geometry
- AM is a special process → we apply the « Industrial Validation Process »



- So through our Industrial Validation process, in the PFMEA, the change of equipment between A and B is highlighted as a change to master.  
→ the full standard engineering process ensures part conformance for both material and geometry.

# Conclusion

- The change of machine brands is not only a major change in the industrial validation process. It is also a major change in the Process Engineering process that requires a full study, similar in workload to an initial one.  
There is no result that can be easily obtained through the first industrialisation.
- This is obviously not a safety issue, as the standard validation process works but this requires specific training for the process engineer to accomodate with the new machine and get to the right results
- These costs are to be taken into account in the decision to go to additive or may low down AM.
- The change of machine brands leads today to perform additionnal industrialization activity on the part. Having more standardized equipment and/or key parameters definition would improve significantly the transfer of a part from one machine brand to another.



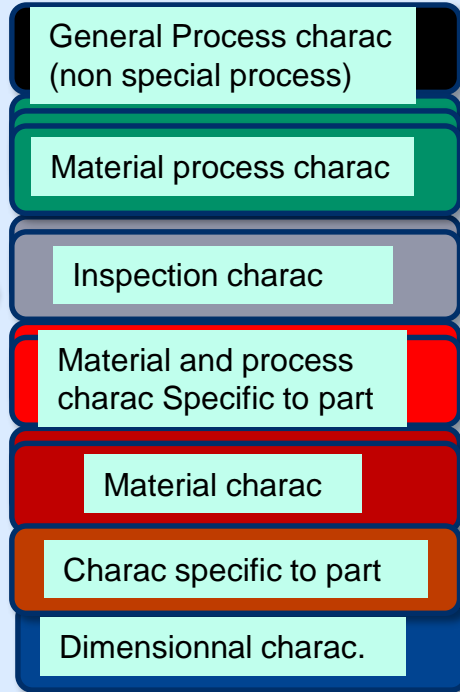
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## Specific to part requirements and their translation into the DVI (Industrial

Refers to **Directive Technique 05-35** (AS/EN9102 and AS/EN9103) : Manufacturing quality assurance specifications for classified characteristics:

Part 21 J

DTA (Dossier  
Technique  
Article:  
design  
intent)



The DVI  
demonstrates the  
control of all the  
characteristics for  
each product design  
requirement.

Part 21 G

Input  
from DTA

D  
V  
I

Input from  
producer  
PFMEA

FAI

Change  
control

Refers to **Directive Technique 56-02** (AS/EN9100): approval of the manufacturing conditions for special processes implemented

