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Output/ Key Deliverable No. :	Project Summary	Period 1&2 (covers all the project)
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1 SUMMARY:

2 PROJECT OVERALL PRESENTATION:

VTAIL was dedicated to the design and the manufacturing of an 3 meters span model model representative of an innovative new fuel efficient business jet including innovative concepts. It is capable of different wind tunnel setups for both low and high speed tests to identify both air intake and handling qualities.

The model will be highly modular and highly instrumented including the following characteristics:

- Triplan (Canard-Wing-HTP) configuration
- Three engi,ne configuration
- A motorized Canard and horizontal tail plane to improve wind tunnel tests productivity
- Two instrumented nacelles (central and lateral ones) fitted with a pressure (steady and unsteady) air intake rake and mass controller

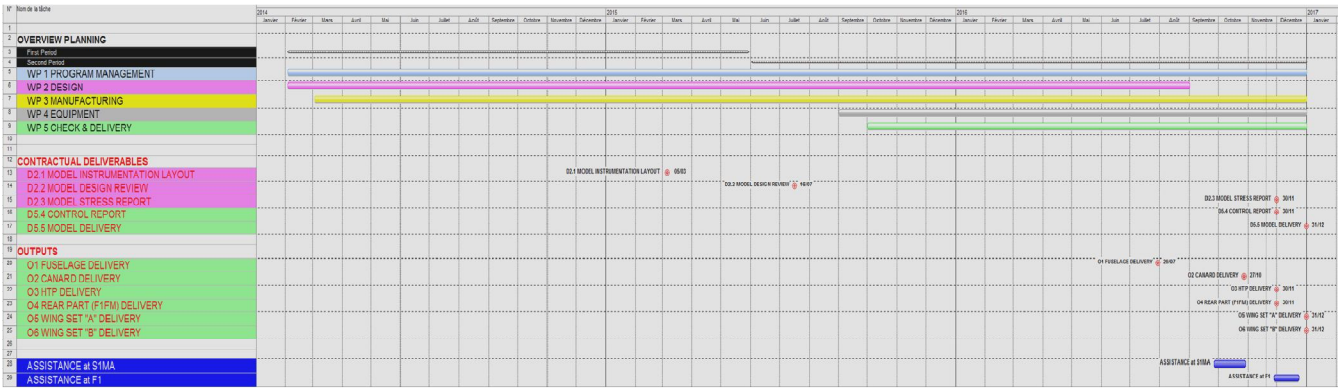
This ambitious project contributes to push forward the European aircraft industry by providing efficient and reliable model for extensive R&T testing program. Its configuration featured a new business jet generation driven by fuel efficiency and noise reduction while maintaining a high level of services for customers.

3 PLANNING

The complete VTAIL model project took place from beginning of 2014 to achieve at the end of 2016.

The first year have been dedicated to the design phase of the model, it was performed in close collaboration with the the topic manager DASSAULT AVIATION.

The overall design was frozen at the end of the first year. The second year was mostly dedicated to manufacture and during the third year we achieved the machining and proceed the control check and equipment of the model.

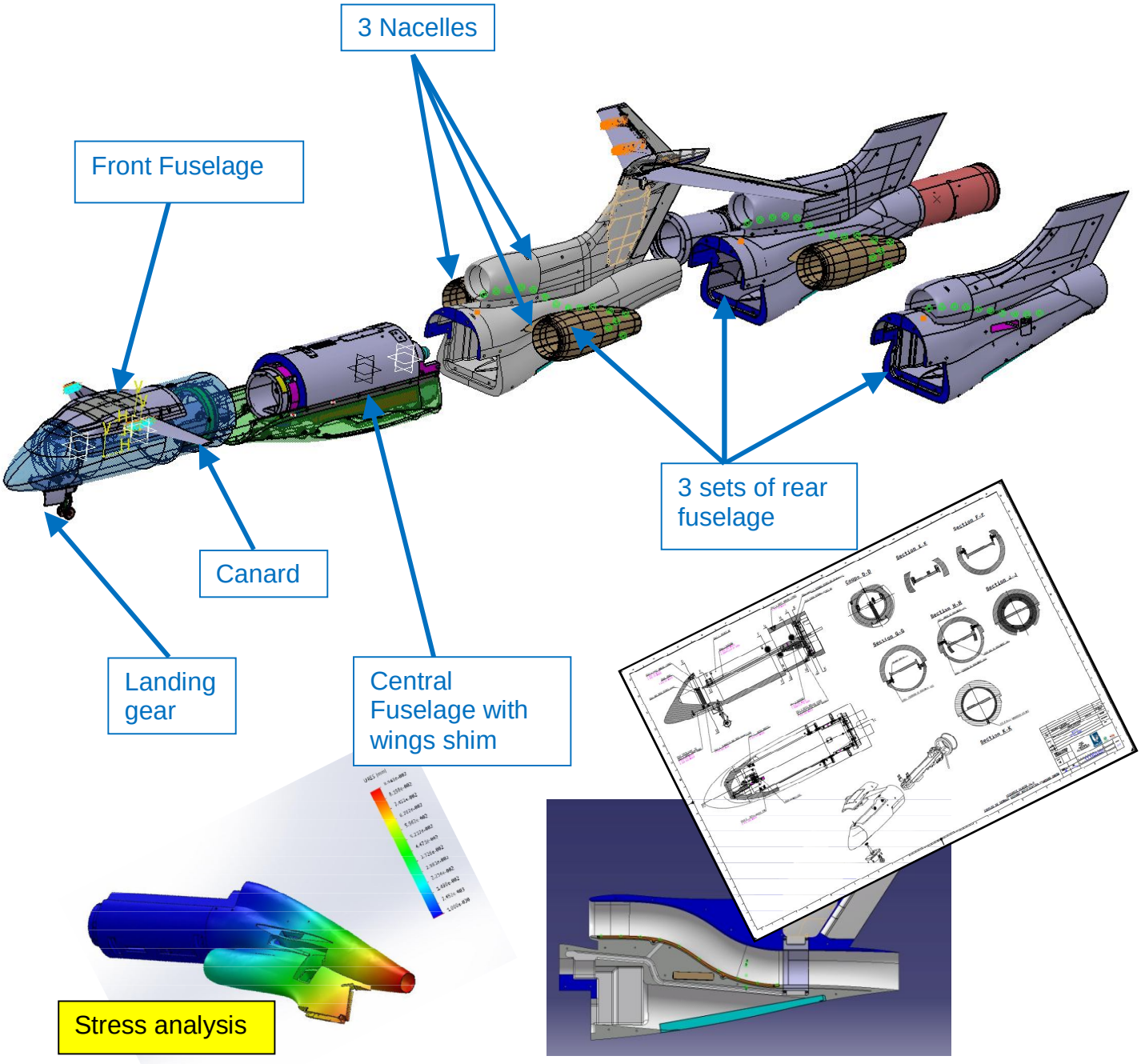


4 DESIGN:

The design of such a model is splitted by functionnal pieces. CMA-Vallet used the Catia V5 software to performe this task.
The material is mainly aluminium alloy along with hight strength steel for some highly stressed parts, 3 tons of raw material were purchased to manufacture the complete model.

The specifications and the skin shape was provided from Dassault Aviation (Catia files) and the big challenge has been the instrumentation and the motor integration.

The motorization is a stand alone equipment with an innovative character. Knowing that it necessitated several design adjustments and tests iterations it was designed at the beginning of the project and tested in parallel with the rest of the model.



5 MANUFACTURING

The machining by chip removal have been used to manufacture VTAIL model, it has been done exclusively at VALLET company.

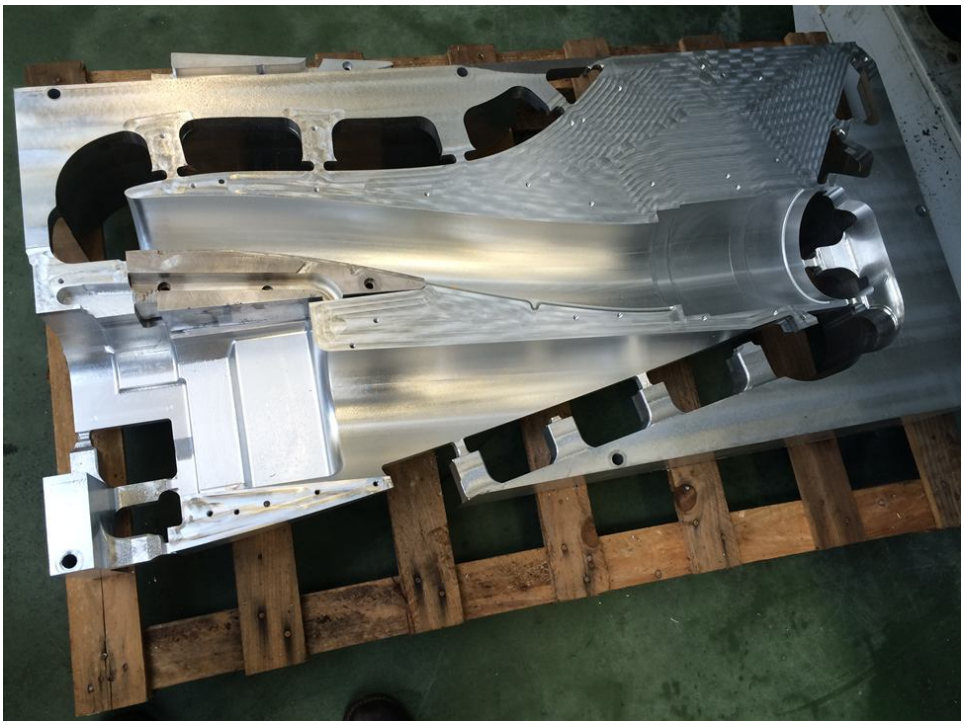
It consists in starting with a block af raw material which have the external dimensions of the part to be machined.
The pre-machining is accomplished at hight speed then the final machining is completed at low speed.and slow motion.

Choose the best machining strategy is also the goal of this WP to satisfy the very close shape tolerances resquested. Intermediate heat treatments for stress reasons was performed in some cases. All the surface finishing and mobile parts adjustment was be performed.

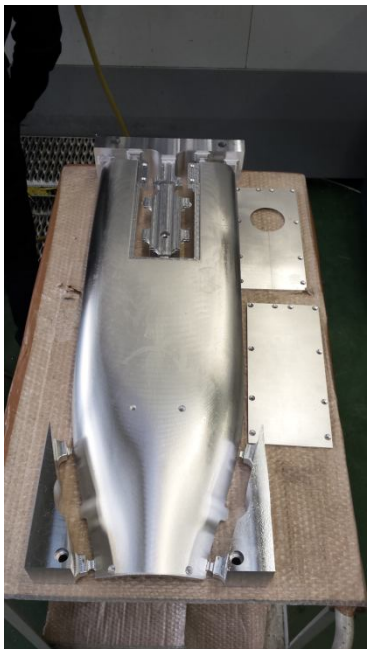
Please note that we proceed some overlapping with the Design and Manufacturing Work packages in order to reduce planning.

Below it shown the differente stage of the manufacturing:

1) The part remain attached to a frame during machining (photo herafter)



2) The parts a pre-polished in the frame if needed



3) The parts are manually cutted-off from the frame and finished

4) The parts are assembled and fitted all together

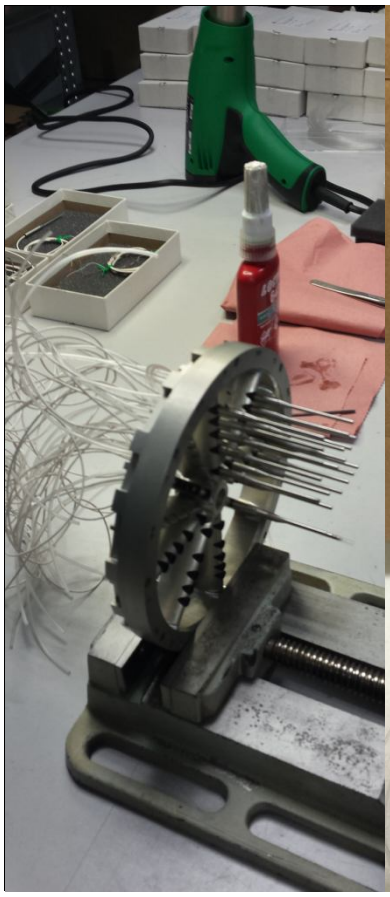
6 EQUIPMENT

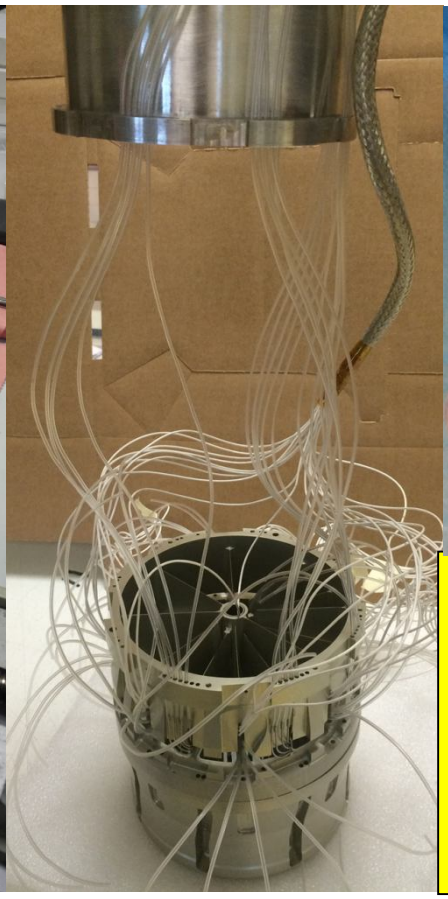
Model equipment activities include the following items:

- Install and adjust the screws and attachment parts
- Same for the landing gear and the HTP
- Drilling of the pressure probes holes and pressure probes plumbing (see below the first stage of the equipment of the canrds)
- Install the Kulites and associated electrical wiring
- Assemble and install the motors
- Assemble and install the nacelles and air intake rakes
- Proceed to the surface finishing in coherence with the requirements
- Plug and pre-check the electrical and pneumatic connectors

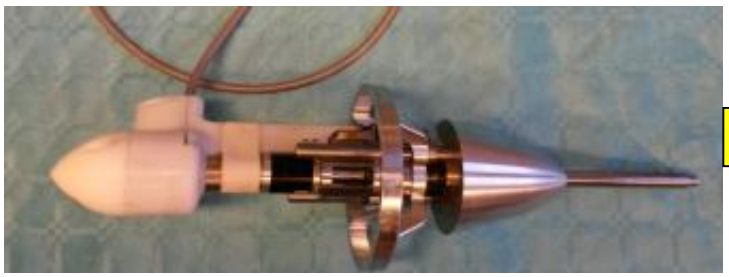
Instrumentation of the canards with pressure ports:

- Installation of the transducers and the pitots in the air intake rakes :



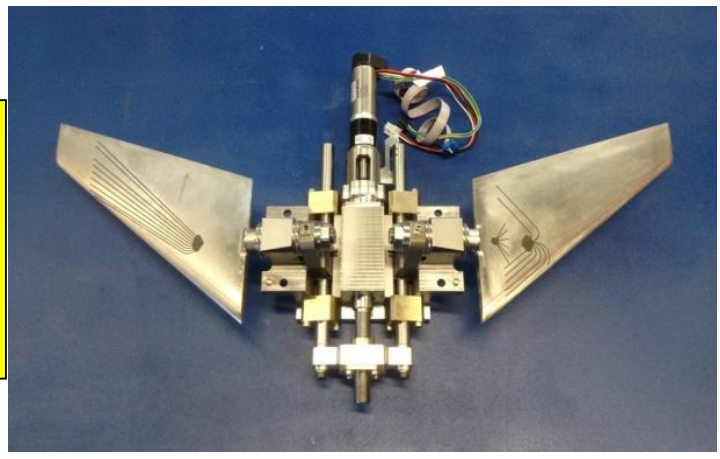


Air intake rake equipped with its 40 Kulites and 20 static pressure ports, individually tested.
Two rakes have been produced



Mass flow controller

Canards equipped with its motorization including the drive with planetary gear and the encoder.
Also the mechanical coupling with the carard.shafts.



7 CONTROL & CHECKS

When the parts have been provided by the Equipment work package, we performed all check and control activities

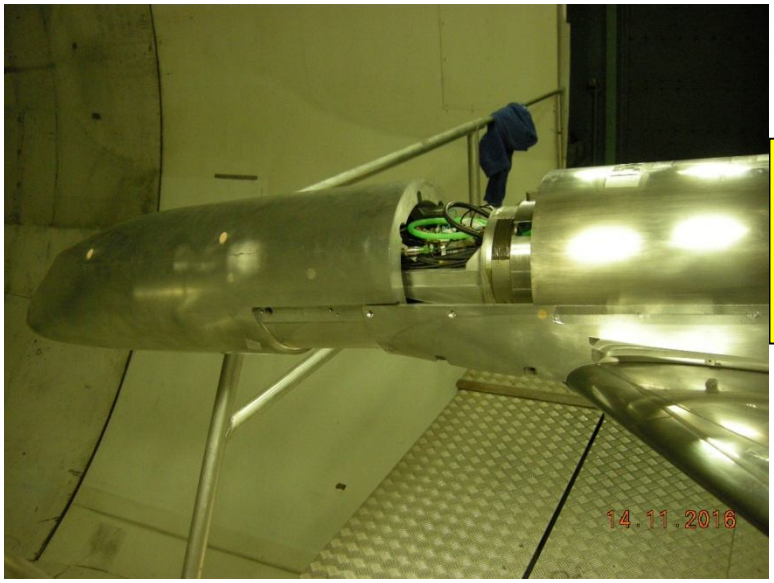
The aim of the CHECK Work Package was to execute all control activities from machining of the stand alone parts up to the complete model assembly after equipment. It also included functional checks (motors, pressure sensors…).

Some intermediate controls were performed under manufacturing activities and didn't appear in the planning.

The CHECK WP is also responsible for the Functional Check of the model (electric, pneumatic,…) These control outputs were the main of the control report.

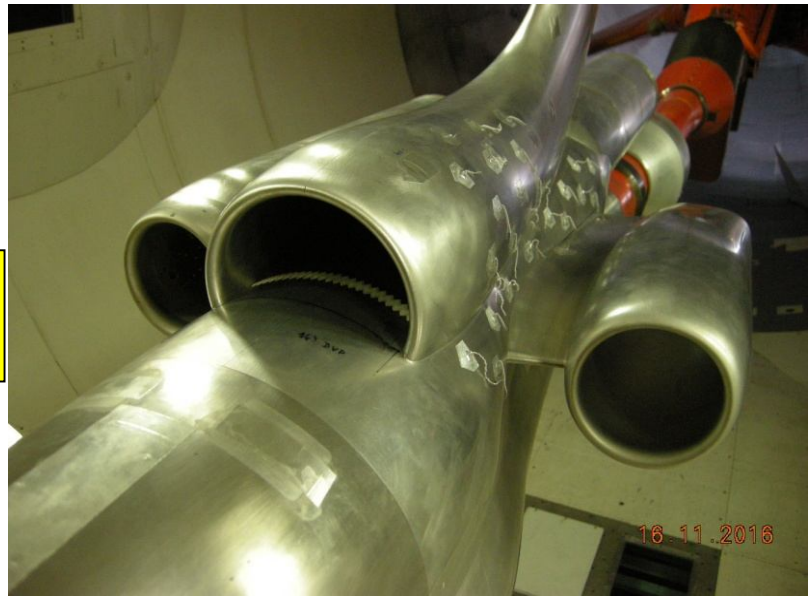
8 FINAL ASSEMBLY

After having perfectly finished all the parts and dimensionally controlled. The final assembly is performed before the delivery in the wind tunnel ready for the preparation of the wind tunnel tests.



Nose and front fuselage during adjustment process on sliding surfaces

Central air intake and and lateral nacelles adjusted on rear fuselage



9 CONCLUSION

The VTAIL model Design & Manufacturing had been performed by CMA-VALLET in close collaboration with DASSAULT AVIATION via a Call for Partner, won by CMA VALLET in 2014.

The entire fuselage with all its modularities were fully instrumented. The fuselage is compatible with the different wind tunnel tests setups and ready to be performed in the ONERA wind tunnels defore end of 2016.

The acceptance of the fuselage took place from September to December 2016 in the Vallet work shop in Rugles in the presence DASSAULT AVIATION and ONERA colleagues.