Reverse Engineering of Aircraft seats

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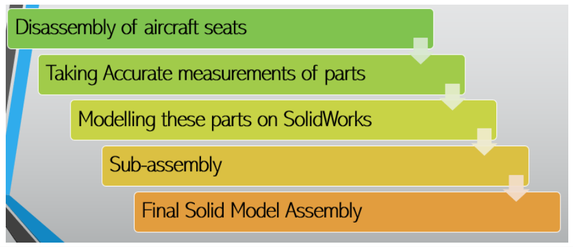
Aim of the Project



Background

Takumi Precision Engineering have acquired a row of three economy aircraft seats to be reverse engineered in SolidWorks to reveal their initial design.

BasicAircraft seats usually weigh around 15 to 20kg and carbon composites are used for the seat pans. The aircraft industry is constantly reducing weight in aircraft parts, which limits design opportunities. The top most renowned aircraft seats manufacturers are **Recaro** and **Aviointeriors**.

Many Regulations limit the design of aircraft seats. Some examples include:

- Minimum passenger aisle width is 64cm.
- Each seat design must complete dynamic tests, carried out in emergency conditions.
- Materials must me inflammable.
- On aeroplanes with only one passenger aisle, only a row of three seats on each side may be placed.

The seats and their parts

Figure 2: The seats

SolidWorks

Part No.	Part name	Name of part maker
1	Table underside	Nevena Cirkovic
2	Table upside	Nevena Cirkovic
3	Cupholder	Nevena Cirkovic
4	Bar for table supports	Nevena Cirkovic
5	Table supports X2	Nevena Cirkovic
6	Sliding bars to expand table	Nevena Cirkovic
7	Arm hinge	Andrew Ajie
8	Back of aircraft seat	Eamon Ambrose
9	Arm rest	Eamon Ambrose
10	Aircraft seat pan	Eamon Ambrose
11	Aircraft seat frame	Eamon Ambrose
12	Post for CMM Machine	Paul Bourke
13	Base leg link	Paul Bourke
14	Main seat support	Paul Bourke
15	front leg	Paul Bourke
16	back left joint	Paul Bourke
17	front right side leg support	Paul Bourke
18	fastener	Michael bourke
19	tongue	Michael bourke
20	claw	michael bourke
21	fastener	Michael bourke
22	retractor	Michael bourke
23	buckle	Michael bourke
24	buckle	Michael bourke
25	hook	Michael bourke
26	spring	Michael bourke
27	bar	Michael bourke
28	metal brace bar	Michael bourke

Figure 3 – Part numbers

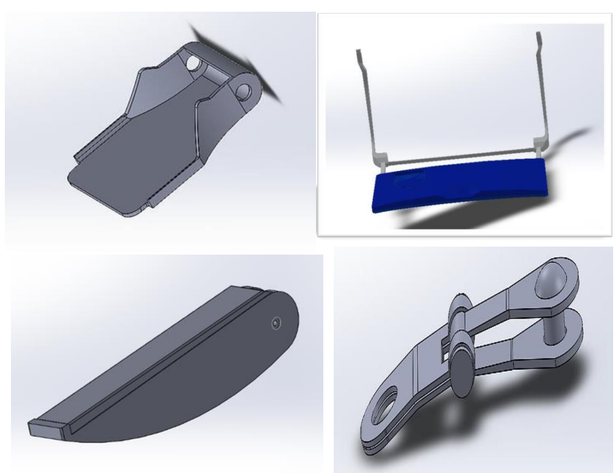


Figure 4 – Example of some solidworks and sub-assembly

Complex parts

The most complex parts of the seats were measured on the coordinate measuring machine.

Figure 5 – Most complex parts of seats

Using CMM Machine

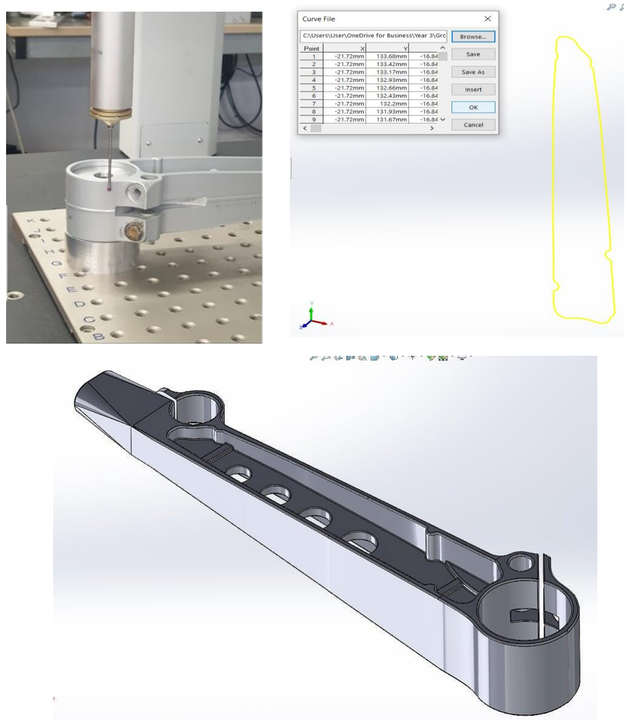


Figure 6: Complex part measuring using CMM

Conclusion

The picture above is the final solid model assembly of the aircraft seats. This proves that the objectives were met as the assembly reveals the initial design of the seats.

Some limitations to the project were the aircraft seat regulations. The regulations were very specific so change in design was very limited.

References

EASA . (2020). EASA. Retrieved from Aircraft Specifications: https://www.easa.europa.eu/document-library/certification-specifications

Acknowledgements

The Team would like to acknowledge the following for helping in the project:

Ciaran O'Loughlin: Team Supervisor

Dr. Emma Kelly: Project Lecturer

Jennifer Hennessy: Coordinate measuring machine instructor