AIRBUS
AN EADS COMPANY

A Digital Manufacturing engineering experience

Introduction

Airbus Manufacturing engineering organization, Pre-final Assembly Line, receives the different components of the aircraft from different locations in Europe to assemble up for customer delivery.

In order to optimize this assembly process, 3D digital mock-ups coming from Engineering Design teams are accessed through the Delmia Assembly environment by Manufacturing Engineers to carry out a wide range of process checks by simulation.

A critical point is to resolve integration issues for components like work packages, center fuselage, nose fuselage and other elementary parts (stringers, splices) very early in the design process.

Typically, the nose fuselage assembly of electrical system of the A350 program is one of the key checks undertaken.

Technical Issues and Challenges

Validating the integration feasibility for nose fuselage is a key task of the Manufacturing engineering methodology so it is important to precisely assess potential clash issues during dynamic assembly checks.

Moreover, due to ongoing design development, it is often necessary to repeat Manufacturing engineering studies several times as the design evolves either at a component level or around items with close proximity to the component.
With design offices spread out across various locations the ability to document the results with high quality simulations for effective communication purposes is one of the challenges of a successful Manufacturing engineering study.
Before working with Kineo path planner, we used to manually move the nose fuselage along a desired assembly path within a 3D digital mock-up session. Due to the large size of the geometric data and the cluttered environment close to the nose fuselage, that would influence the integration process, creating a collision-free assembly path was really time-consuming.
Beyond the time required to complete the assembly study, a greater challenge in the process was to identify and communicate precise information (when mounting was not feasible) which would lead to the issue resolution.
If an assembly path had been found, there was no chance to easily and quickly analyse the path with different tolerance values.
Furthermore, with no possibility to re-use the path from the initial check, repeating the study (for instance after a design modification) was the only viable method of validating a design change and was just as time consuming as the initial check. Different results would be obtained by different users for the same study.

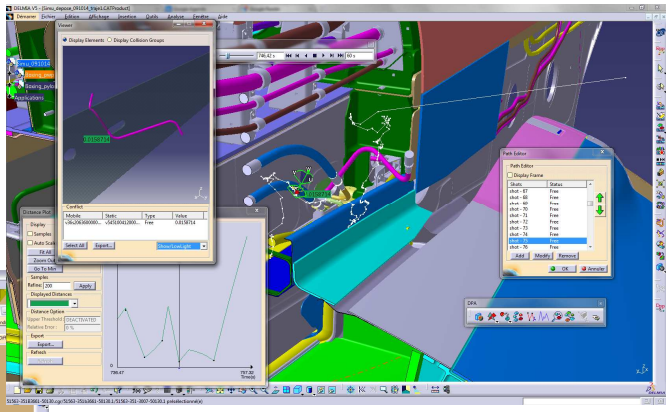
KINEO

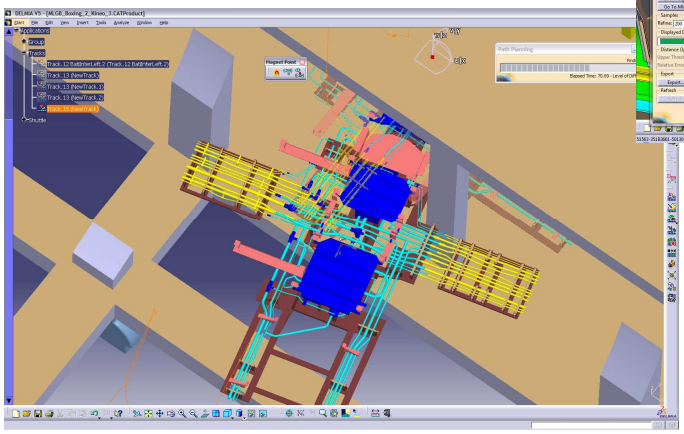
AIRBUS
AN EADS COMPANY

A Digital Manufacturing engineering experience

Solution

Today, with Kineo path planner, we directly select the geometry representing the nose fuselage, and then we simply specify the kinematic constraints and run the automatic Kineo path planner which assesses a collision-free assembly trajectory.





If no collision-free solution exists, we can easily identify and document the bottlenecks for precise communication with teams.

When the nose fuselage assembly process proves to be feasible for a design, we save the resulting path for future re-use on repeated changes to speed up the re-validation.
From a resulting path, we can also rapidly assess different scenarios with different tolerances/ obstacles and repeat the study to assess robustness of the output path.

Conclusion

Here are the main benefits of using Kineo path planner for our Manufacturing engineering studies:

- A safer global Manufacturing process: thanks to unmatched performance, computational times are so short that it is possible to increase the number of case studies resulting in an improved process validation
- Higher confidence in results due to the ease and speed with which it is possible to re-run the solution with different tolerances/obstacles allowing different scenarios to be assessed
- On a given case, different users achieve very similar results that are not dependent on user's skills

"Using Kineo path planner, we are quickly able to see where a design proposal prevented component assembly in Manufacturing. Being able to quickly identify potential bottlenecks is being able to shorten the communication loop with Engineering for a design modification and issue resolution." explains Jean-Philippe Brélivet, Manufacturing engineering A350XWB Mock-up Integrator. *"The ability to accurately assess and resolve Manufacturing issues early in the design phase is key to reducing global costs and time to market. The speed and accuracy of Kineo technology is enabling us to be more and more proactive to shorten development cycle times",* says Xavier Plassais, Manufacturing engineering Software Manager.