

Automating model plane design

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Imperial Models, Dunedin produces kitset model planes. The design of these planes is through measurement of plans and the conversion of these plans to card and moulded components. This can be a lengthy process. The requirements were this capstone project in the Bachelor of Information Technology was to create an easy to use automated system in order to create fine scale model aircrafts components and parts.



Figure 1: Hand drawn parts slow to produce and difficult to modify and not integrated with production equipment.

Using the Agile Development Methodology, the group developed the protocols and tools to automate the drawing of fine scale aircraft models to be printed out, cut and finally assembled.

We created a system that takes measurement inputs for the aircraft component and parts from the users. The system then uses the inputs to draw the scaled parts in Rhino CAD. The system will also give curves a surface and unwrap the 3D shape so that it can be printed.

To produce the wing, for example, the Aircraft Component Generator needs measurements for the chord, thickness, percent chord, camber, angle of attack, half span, tip ratio, and

dihedral ratio to automatically generate the 3D model. Scripts then unwrap the model (including generating formers) and convert it to files for the cutter. The fuselage is generated the same way. Templates are used for the aircraft parts that can't be automated (canopy, wheels, propeller and tail).

The client is very pleased with the outcome: "They have delivered a system that is capable of automatically generating all the major parts, and that has also been demonstrated to be a good basis for further development. The integration of these sub-processes into a system whereby we can automatically design kitsets, and produce the required range of part types in our workshop...we estimate that our productivity in preparing kitsets for production will increase threefold".

Mann, S. and Smith, L.G. (2006). Arriving at an agile framework for teaching software engineering. *19th Annual Conference of the National Advisory Committee on Computing Qualifications*, Wellington, New Zealand, NACCO in cooperation with ACM SIGCSE. 183-190

