UNIVERSITY OF Southampton

Engineering and the Environment

Aeronautics, Astronautics and Computational Engineering

Integrating simulation and geometry to determine cost

UTC for Computational Engineering

Stuart Jinks, Jim Scanlan, Faculty of Engineering and the Environment

Philippa Reed, Faculty of Engineering and the Environment

Steve Wiseall, Rolls-Royce plc

Introduction

Conventional cost modelling approaches are unable to fully represent dynamic aspects of unit cost. A framework has been developed to integrating dynamic supply chain simulations with design geometry to assist in design decision making.

Framework

The framework consists of five steps as shown in Figure 1.

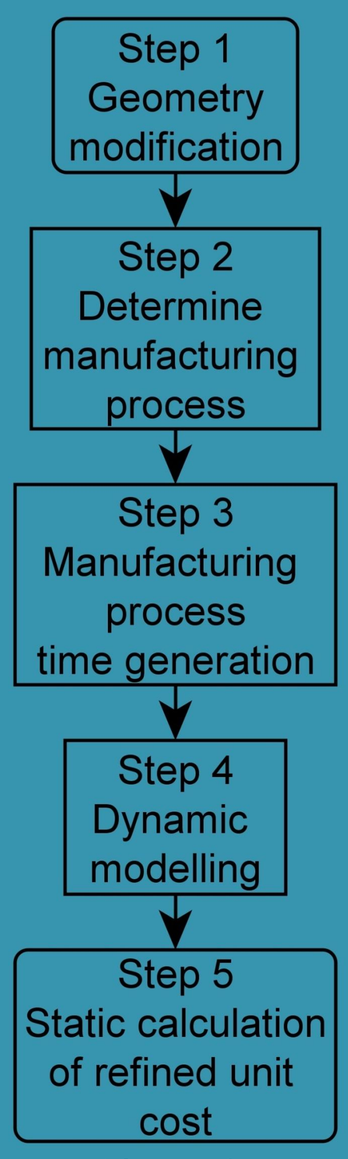

Figure 1: Framework steps

Step 1 – Geometry modification.

The framework has been designed to work within Siemens Uni-graphics. The user can modify component geometry via a comprehensive set of design parameters. Figure 2 shows how the component geometry is parametrically linked to multiple manufacturing method condition of supply geometries that update depending on rules.

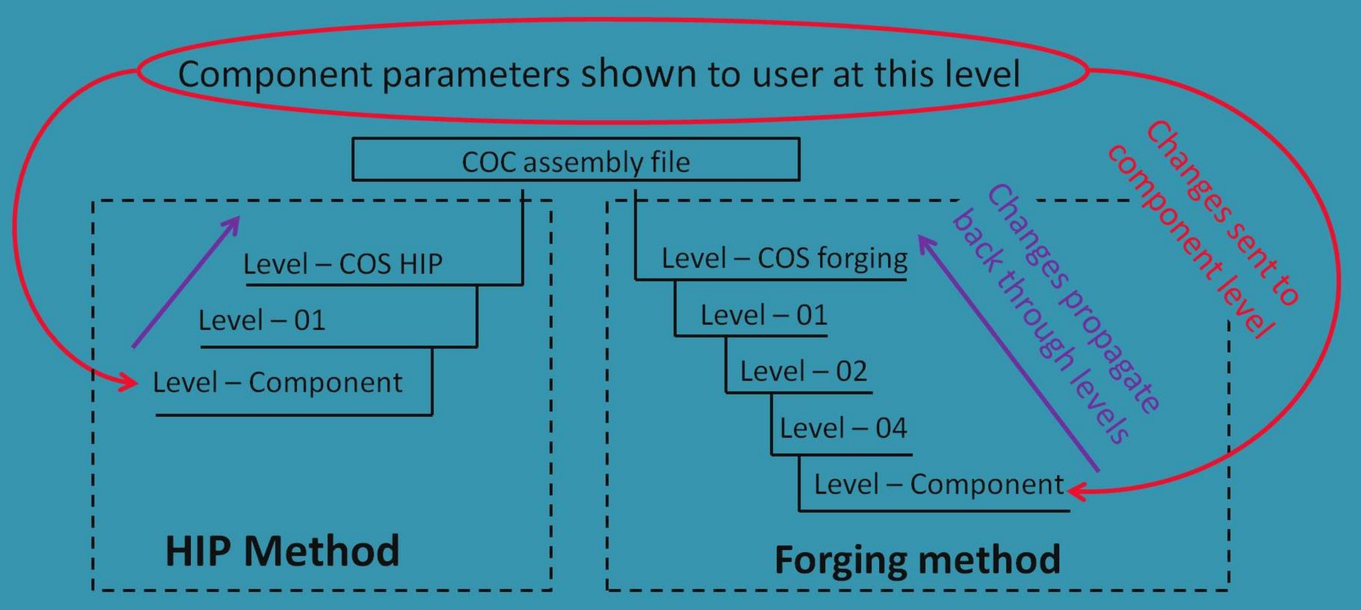

Figure 2: Schematic of how component and multiple condition of supply geometry is linked within the CAD tool

Step 2 – Determine manufacturing process.

The framework collects component data from the geometry, and manufacturing process data from the user, via a GUI. Then possible supply chain options are determined and presented to the user for selection.

Step 3 – Time generation.

All collected data and knowledge is utilised to calculate operation times for each selected supply option.

Step 4 – Dynamic modelling.

All collected and calculated data is utilised to populate a generic data driven discrete event model (Figure 3) of a particular supply chain for the manufacture of the component.

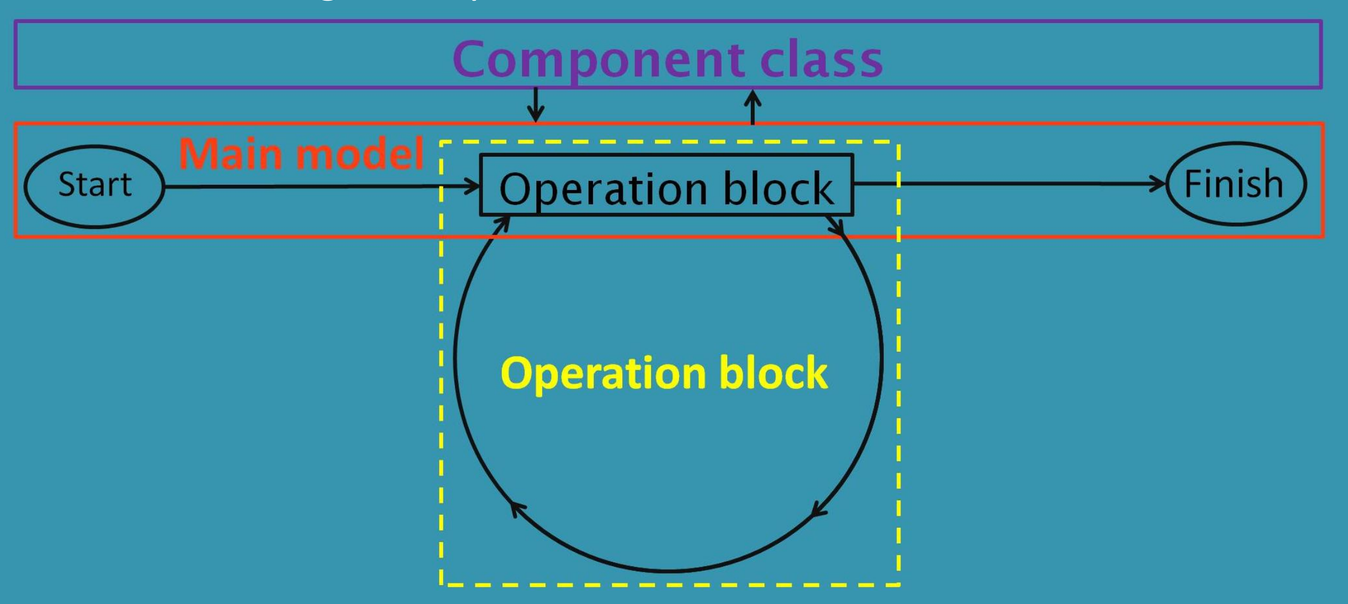

Figure 3: Schematic of the generic data driven discrete event model

Step 5 – Static calculation of refined unit cost.

Output results from the dynamic model are used within a generic data driven cost model (Figure 4) to calculate unit cost.

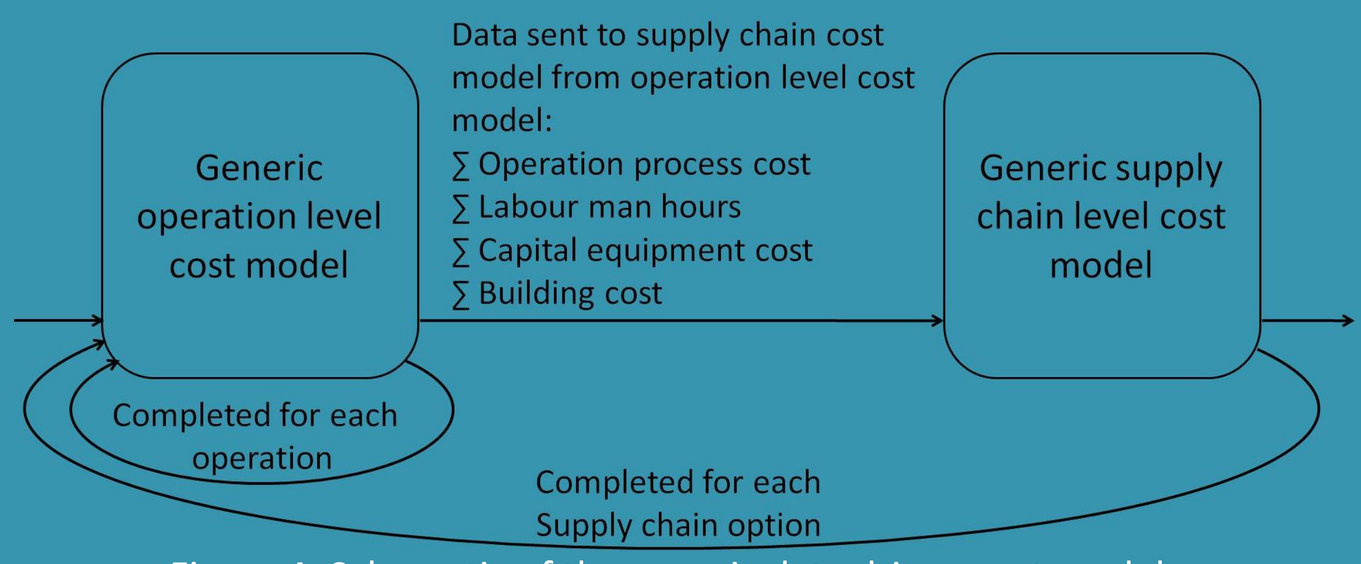

Figure 4: Schematic of the generic data driven cost model

Benefits

There are three benefits from the framework:

- A refined unit cost estimate is calculated
- Manufacturing production data is generated
- Comparisons between manufacturing supply chain options can be made

www.soton.ac.uk/engineering/research/groups/CED/posters.page | email: sj1103@soton.ac.uk

Computational Engineering & Design Group, University of Southampton, SO17 1BJ, U.K.