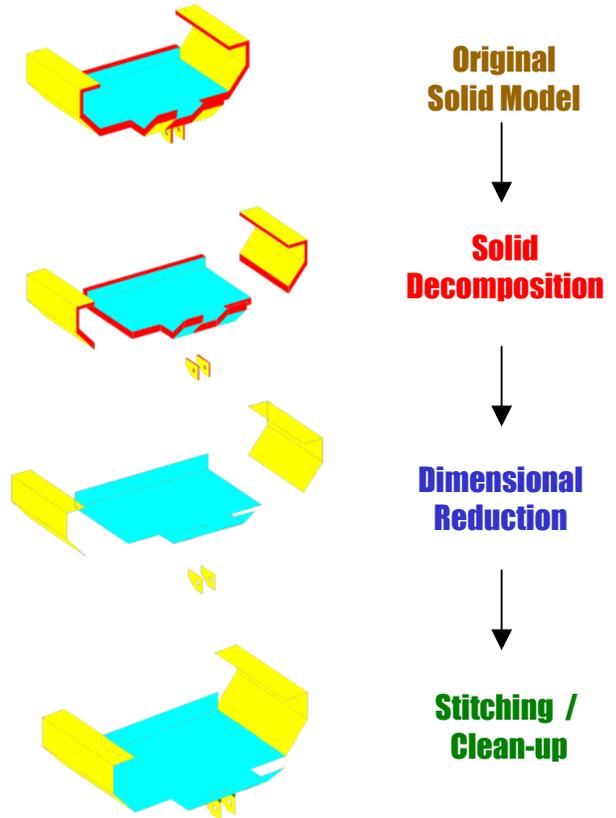# AUTOMATIC SOLID DECOMPOSITION AND REDUCTION FOR NON-MANIFOLD GEOMETRIC MODEL GENERATION

In many finite element modelling problems such as shell analysis, structural considerations require simplification of the solid model. The detailed geometry of large components or structures is often too complex to use with current computer technology. Even for not too complex models, there is usually a requirement for the rapid analysis of idealised models in initial design stages.

One generic technique for model idealisation is dimensional reduction. In dimensional reduction, the finite element model makes use of elements of reduced dimension, such as beams, plates and shells. This project describes some operations that have been defined and implemented which allow the user to reduce the dimensionality of geometric models automatically using a novel decomposition and reduction method.

Original Solid Model

Solid Decomposition

Dimensional Reduction

Stitching / Clean-up

The main stages in the decomposition and reduction method

START OF PROGRAM
(Unigraphics development software - UFUNC)

Creation of 3-D solid models or modification of existing CAD models

INPUT:
3-D models

Identication of geometric features - edge concavity, islands, medial structure... etc.

Determination of optimum splitting planes

Splitting of solid model into primitives

Creation of medial surfaces for primitives

Stitching of medial surfaces to form reduced model

END OF PROGRAM

Original Solid Model

Solid Decomposition

Dimensional Reduction

Stitching / Clean-up