

Morphometric Skull Analysis Using Jointed Chains of Rigid Bodies

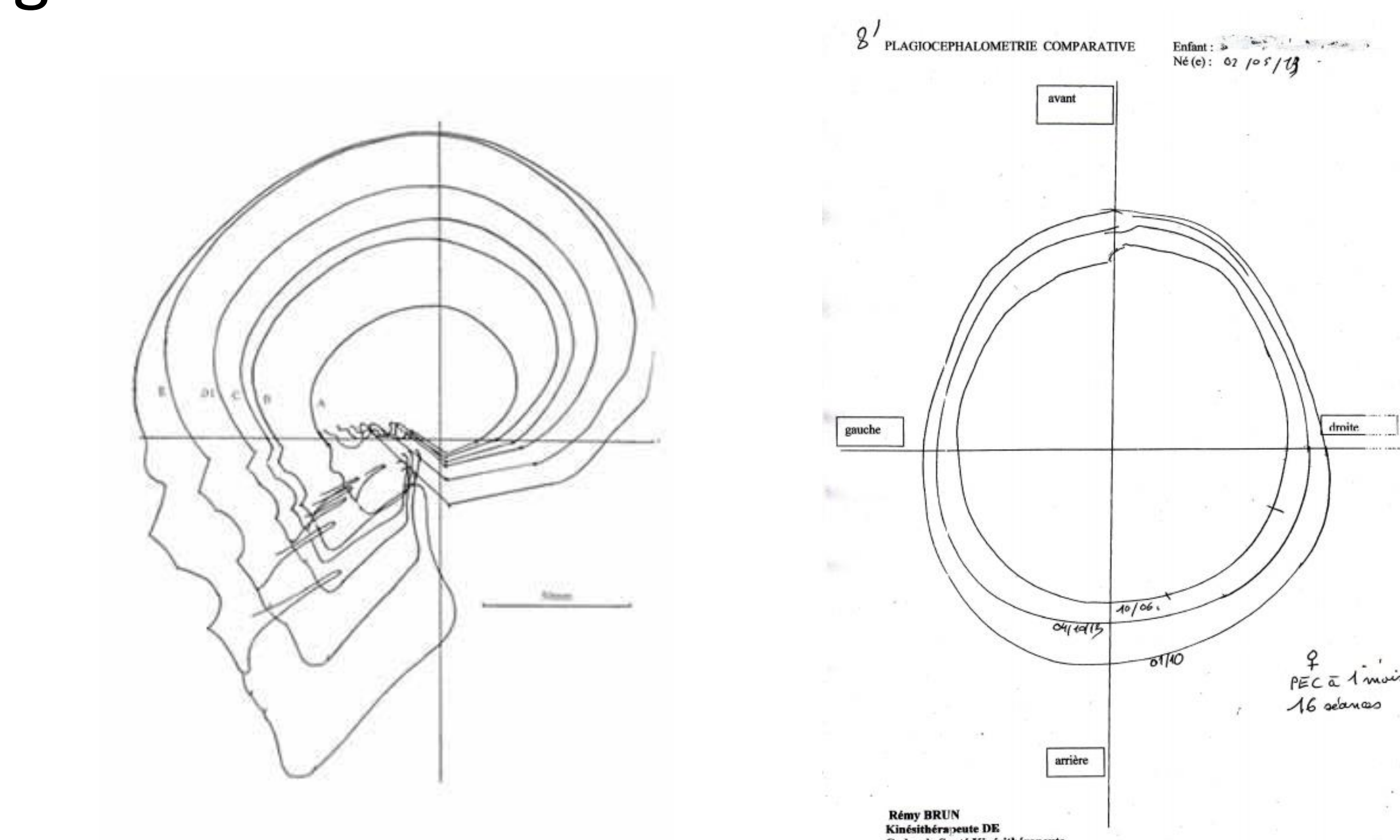
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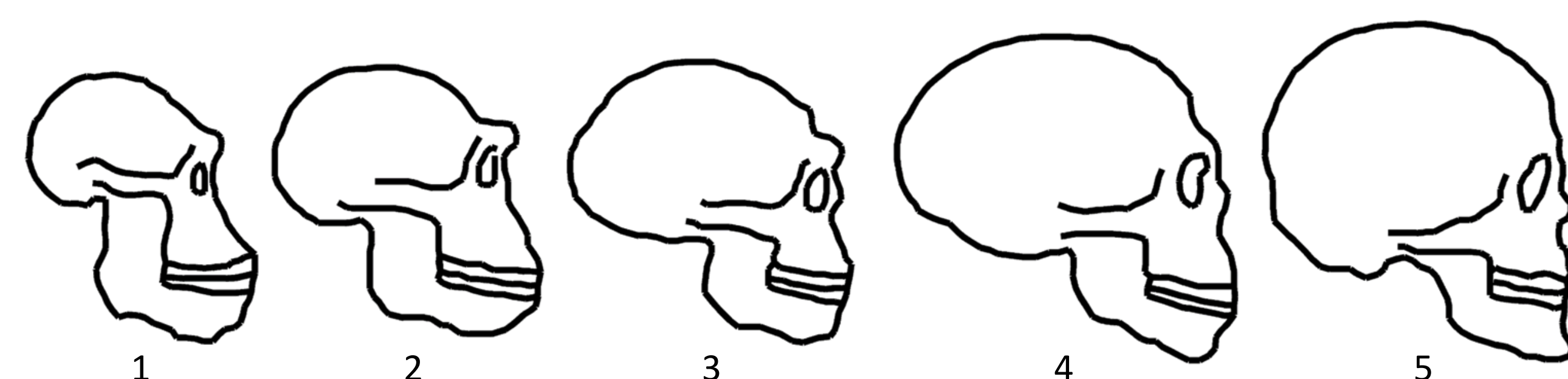
Research objectives: This work investigates two morphometric problems by applying the theory of shape-changing rigid-body mechanisms. The advantage of approaching morphometrics in this way is that a modest number of physical parameters describes the changes between the curves.

Morphometric skull analysis

Morphometrics seeks to quantify shapes for the purposes of comparison. Two morphometric problems are investigated. The first problem is the analysis of a head growth in children. The second problem is the spatiotemporal evolution of the longitudinal human skull shape. These problems are specified with a set of curves that represent the cranium shapes as they change over time, in the child's head as it grows and in the skull as it evolves.



Cranium growth of a child

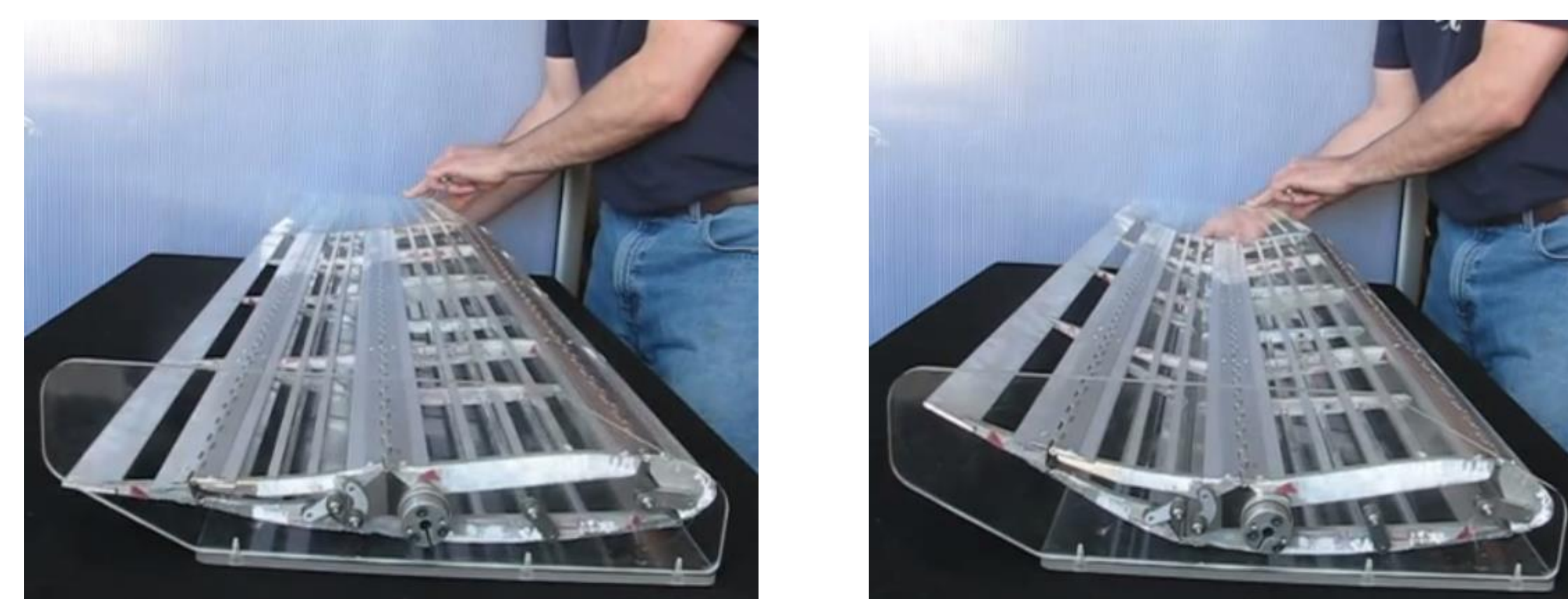


Skulls of

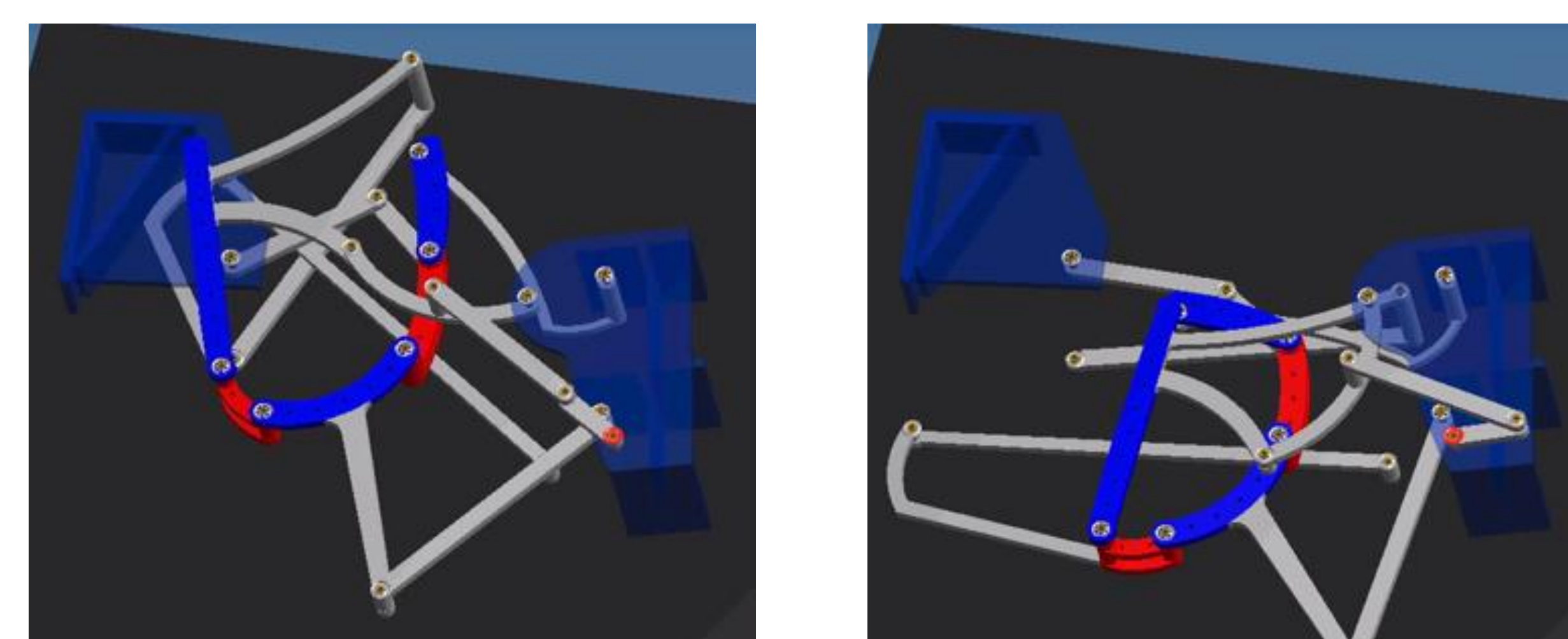
1. Australopithecus
2. Homo habilis
3. Homo erectus
4. Neanderthal
5. Sapiens

Rigid-body shape-changing mechanisms

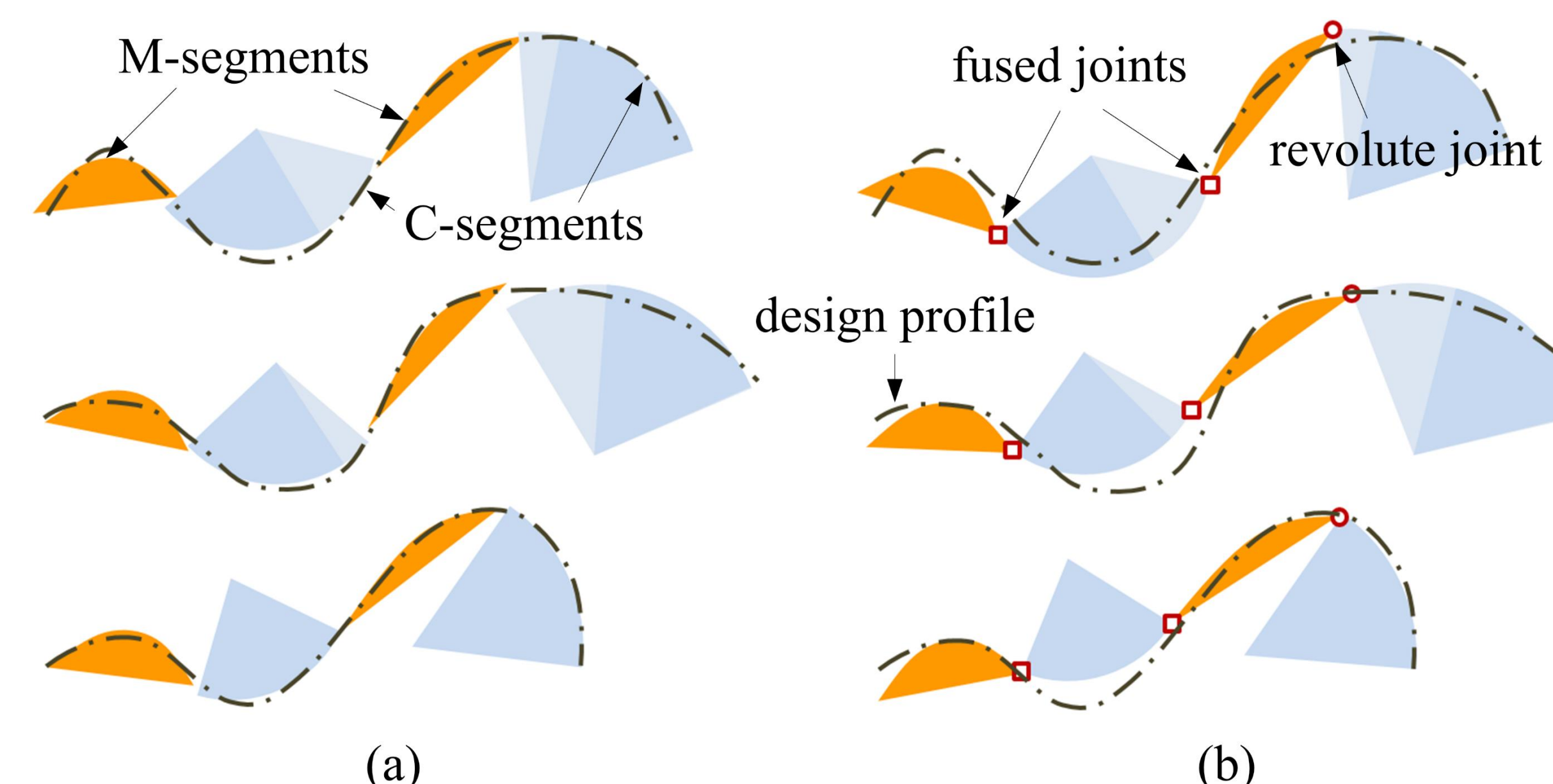
A typical shape-change problem seeks a device that approximates a set of specified shapes with the edge geometries of some of its components.



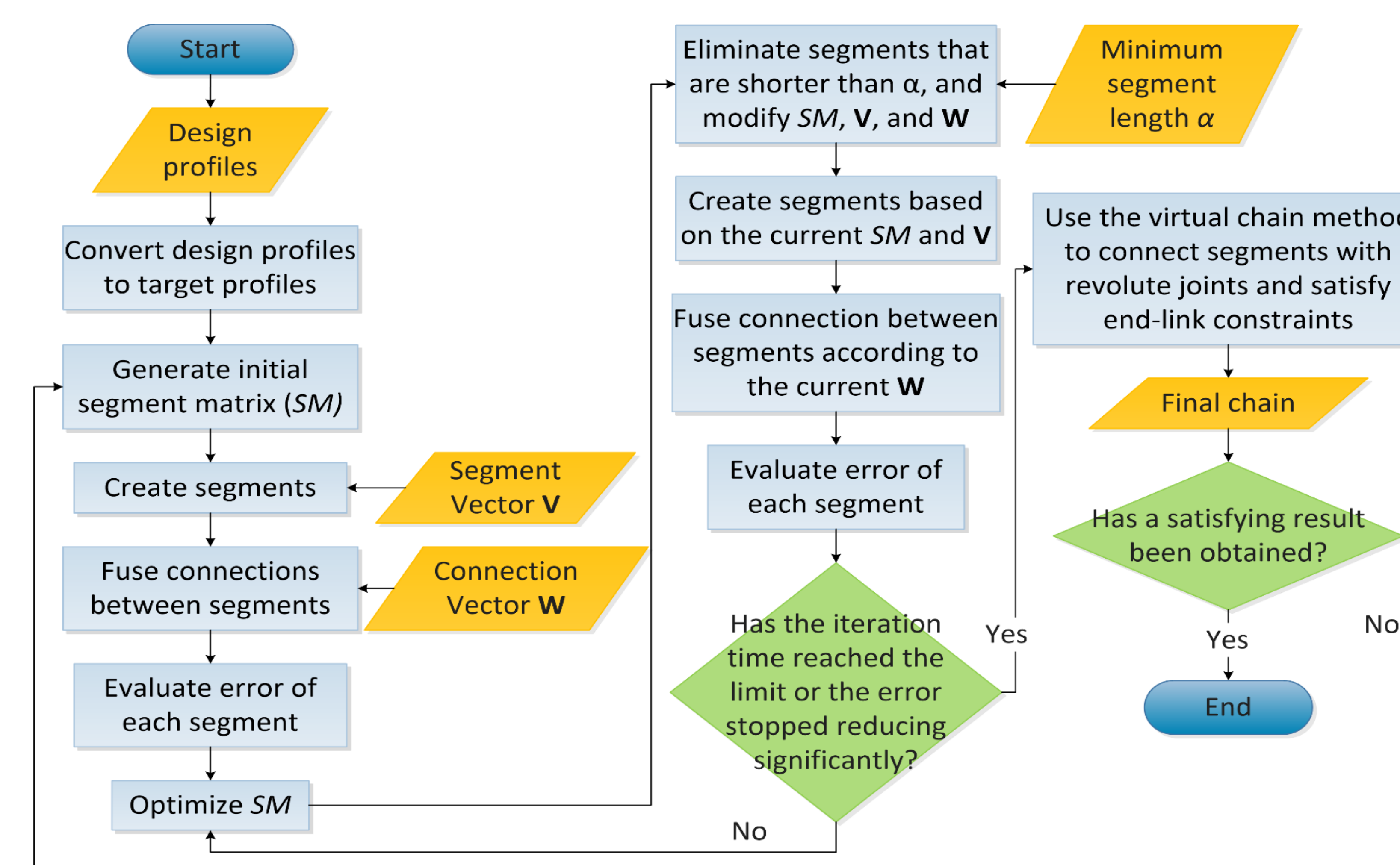
Shape-changing spoiler



Shape-changing mechanism showing "UD"



Design methodology



Results

