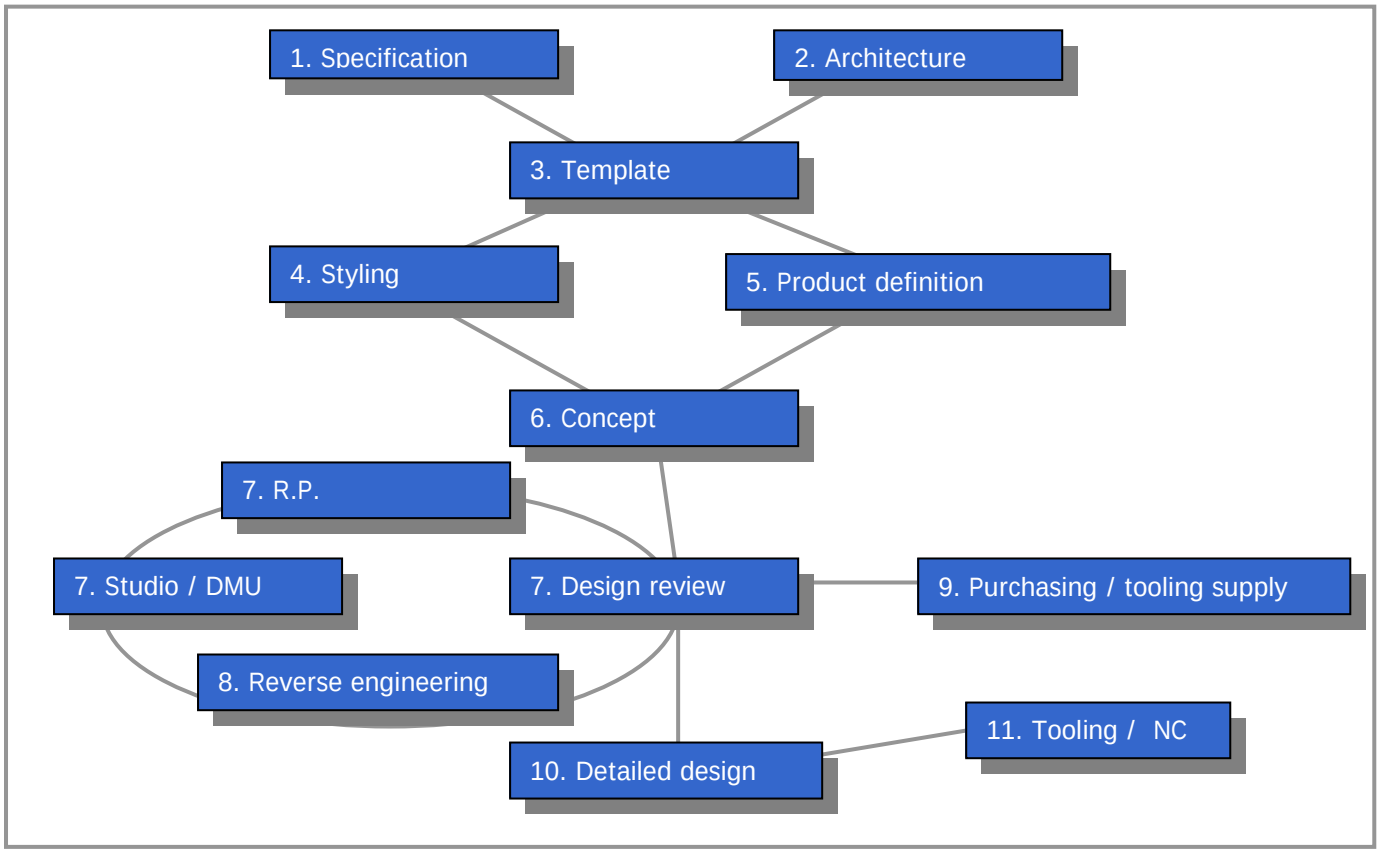
Automated Intelligent Design (AID)

- A Knowledge-based approach to design

Are your engineering processes defined within your company? Do you have a method for capturing knowledge within you organisation? Are you aware of the benefits that AID can offer?

Automated Intelligent Design (AID)
Intrinsys have pioneered a design process in CATIA V5 based around a parametric, knowledge-driven 'template model' of a component. Once created, the template contains the building blocks for a variety of design iterations. By working through a structured series of questions, the driving dimensions and information for the template model are extracted from reference documents (standards, company records, parts database, etc.). The resulting model meets all specified requirements and forms a repeatable basis of a rapid design process.

The Design Process

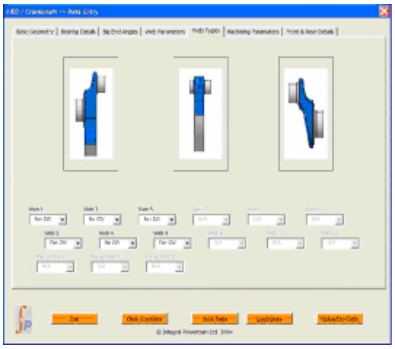


1. SPECIFICATION

The first step is to define the 'template model'. The user is asked to select the range of specifications that apply to the new component. These may be international or company standards. A 'front end' (set of custom forms and menus) accessed from within CATIA V5 is used to lead the user through the approved process of deriving the basic geometry for the new design.

Selections may be made based on:

- Package limitations
- Technical specification
- Applicable regulations



2. ARCHITECTURE

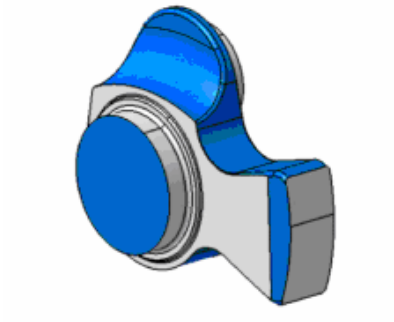
The 'architecture' requires the user to make fundamental decisions concerning the component's construction. Decisions are based on the specific requirements of the new design and the need to follow particular engineering requirements.

Selections may be made based on:

- Component construction
- Tooling considerations
- Manufacturing process

3. TEMPLATE

The parametric template model satisfies all the selections and has built in checks and design rules incorporated into the model. At this stage the outputs are solid models and outline drawings for downstream activities e.g. purchasing and manufacturing.

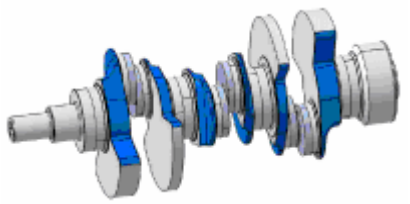


4. STYLING

For many components, styling is critical and by using the template drawings, the stylist can sketch within the boundaries defined by the design requirements and from the resulting sketches, styling surfaces can be quickly constructed. Catia V5 has extensive surfacing tools, including a 'sketch tracer'.

5. PRODUCT DEFINITION

While the stylist works on the look of the product, design and manufacturing engineers begin to investigate the practicalities of making it. The feasibility of manufacturing different components using various techniques is assessed using information extracted from the template model. To allow rapid assessment of ideas, features are extracted from existing models and put into a catalogue. SMARTEAM is used throughout to manage product data and support concurrent engineering.



6. CONCEPT

The concept stage brings together all previously considered elements to produce a near production ready virtual prototype. This may include features incorporated from component catalogues, features adjusted to suit the new styling surfaces and adjustments made to respect the requirements of the product definition stage. At this stage it is possible to estimate product cost based on material volume, piece part cost, features etc, whilst outline drawings and a bill of materials are produced. Checks are incorporated to verify the final geometry still meets the template requirements and a report is produced automatically, listing key design decisions, standards followed, dimensions, re-used features etc.

7. DESIGN REVIEW

The design review serves as a marketing and engineering review where the design is validated at the electronic stage via digital mock-up software, including kinematic and fitting simulation. A digital mock-up of the component can be shown being fitted into its surroundings using fitting simulation. Rendered images of the concept model can show accurate surface finish, close-ups of key details and the product 'in context' or on display with other components. Analysis may be carried out and rapid prototypes may be produced to allow further validation.

8. REVERSE ENGINEERING

If manual modifications are made to the physical prototype in the design review, then point data is scanned from the prototype. Changes are quickly incorporated into the virtual prototype with minimum impact on project timing and concurrent processes.

9. PURCHASING/TOOLING SUPPLY

Following concept design freeze, a set of models and outline drawings are produced for the purchasing department to use in sourcing parts. SmarTeam's collaborative commerce tools, enable real-time interaction with the supply chain. Tooling suppliers are able to quote machining costs based on the mass of material removed from a billet, the surface area of the tool face, etc. Similarly, other internal departments can commence preparatory work, ordering parts, material etc.

10. DETAILED DESIGN

Production standard models of the component are produced, using the concept models as master, adding production features and detail where required.

11. TOOLING

Tooling models are produced from the detail design models, with complete mould tools created including allowance for shrinkage, feeder requirements and ejector pins.

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