DOWNSTREAM STRATEGIES:

Reducing the cost of product development with sound CAD methodology

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Introduction

There are many factors that determine a product's success, but the most inescapable is the cost of product development. During its development phase, a product moves through several departments before it's released into the market, which means that in every step of the process lies potential for confusion and error. To save time and cost, it is pivotal that the team at the next stage is positioned for success by the last. This starts with using CAD tools in Design.

A key but often ignored aspect of the product development cycle is how to leverage the CAD process to reduce development costs in terms of time and quality. Because downstream departments such as manufacturing, quality assurance, and marketing will operate using CAD data generated during the Design phase, it's critical to practice sound CAD methodology that benefits the next team and the next.

Reducing the cost of product development with sound CAD methodology

Alten-Cresttek performs the following best practices that reduces the need for reiterations and increases the speed of product development.

1) Use the Boolean modeling approach rather than basic modeling methodology to create molding parts design.

Conventional CAD modeling uses a building block construction approach. Designers construct elementary features such as pads, cuts, and holes, placing them on top of another repeatedly until the desired final design is complete. While simple, this method creates a vertical tree of parametric features that is difficult and time-consuming to modify for change requests, including the ones coming from downstream departments. Instead, Alten-Cresttek takes advantage of Boolean modeling methodology where separate positive (material) and negative (cavity) features of design are all created as separate solid part bodies. These separate part bodies are then added or subtracted to each other to create a final shape. This creates a comparatively compressed and flexible CAD model tree structure, making design modifications easier.

In addition, tool manufacturers can directly use these sub part bodies to design and machine die components. For example, reinforcement ribs on plastic parts will have a separate part body of ribs, which the tool manufacturer can then use to create an electrode model, scale to include sparking allowance, and EDM the cavity of ribs in the mold. Another advantage of using the Boolean modeling approach is that it eliminates the potential for weak tool component conditions during the Design phase itself. Since design features requiring cores and sliders are created as positive part bodies, any weak tool conditions are apparent compared to designs done with conventional basic modeling techniques. Missing these flaws in Product Design leads to weak tool component condition, resulting in quick tool wear or breakage, which causes production delays and higher costs.

2) Use the Boolean modeling approach rather than basic modeling methodology to create machined features.

Like with molding parts, casting parts Design can also benefit from a Boolean modeling approach. Take an engine block, for example, where all the machined features can be created as separate solid part bodies and then subtracted from raw casting shapes to establish a final machined casting shape. When these machined feature part bodies are deactivated, it creates an un-machined raw casting shape. While foundries will use the raw casting shape for mold making, machine shops will use machined features to generate a cutter tool path for machining the casting. Not only does this approach make it easier in terms of data management, it nullifies the errors from replicated changes on multiple data sets during future design modifications.

3) Use Macros to save time and reduce errors

CAD modeling can be laborious, especially when several iterations need to be proposed. In such cases, saving time with automation is usually the biggest benefit. Alten-Cresttek uses Macros, a set of lines written in Visual Basic programming language to automate tasks based on inputs, to save time.

While working on different Design iterations, Alten-Cresttek's designers can be confident of their accuracy with the use of a Macro since it has been defined with a set of prerequisite parameters critical for function, manufacturing process, quality, or compliance.

Additionally, our designers can define Macros to extract and export critical 3D creation information into a spreadsheet or other formats. This output can serve as a decision-making matrix for cross-functional teams comparing various iterations as well as an information archive once a design choice is made.

4) Take advantage of available CAD libraries and use annotation tools to leave notes/info for downstream teams.

Designers don't need to reinvent the wheel. We download service tool CAD libraries, use them to assess the serviceability of a design, and modify the design accordingly. Then we share pertinent information with downstream teams. In CAD tools, designers can include information in the form of annotations and kinematic models of service steps assumed, which the service team can leverage within 3D CAD data to offer their feedback prior to manufacturing. This will reduce the number of Design iterations and prevent the release of an erroneous product, which is difficult or in some cases impossible to service.

5) Create detailed 3D assembly models.

Alten-Cresttek's 3D assembly models include an accurate, hierarchical structure of sub-assemblies and parts including small details such as fasteners and hardware. Marketing or illustration teams downstream can then easily create exploded views from 3D CAD data for technical illustrations and marketing documents. The Bill of Material (BOM) generated from the accurate assembly of CAD data helps identify commonly-used parts and hardware, reducing the number of different parts and thereby the cost of the product.

ABOUT ALTEN-CRESTTEK

Cresttek, an ALTEN Group company, is a technology consulting, system integration, and end-to-end automotive engineering services provider for OEM's and Tier I suppliers, leveraging ALTEN's over 26,500 engineers across 25 countries to provide a global range of engineering services on a local scale.

Thank You

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