

IRONCAD – MODELLING MODES

The common modelling approaches (paradigms) used for 3D modelling in CAD are:

Direct Face Modelling (also referred to as Explicit Modelling)

Feature Based Modelling (also referred to as History Based and Parametric Modelling)

Both approaches have their advantages and disadvantages, with each being more suitable than the other depending on the application or stage in the design process. IRONCAD has combined the advantages of both of these approaches within three different modelling modes; offering users varying degrees of Freedom and Functionality.

		IRONCAD Modelling Modes		
Modelling Approach	Characterised By	Innovative	Structured	Sheet Metal
Direct Face Modelling	Greater Freedom	Yes	Yes	-
Feature Based Modelling	Greater Functionality	Yes	Yes	Yes

The versatility provided with IRONCAD's modelling modes, allows users to be more versatile in what they can model, and how they go about constructing these models. Some parts might be modelled using **Innovative**, while others modelled using **Structured** or **Sheet Metal**.

Innovative Part Modelling: (freedom biased)	Offers similar freedom typically associated with Direct Face Modelling , in combination with some of the functionality typically associated with Feature Based Modelling . Innovative Part Modelling is best suited for simpler single bodied models ; as this mode is easier and faster for creating these. This is the default mode in IRONCAD, and for many users, this is the only mode that they will ever use.
Structured Part Modelling: (functionality biased)	Offers similar functionality typically associated with Feature Based Modelling , in combination with some of the freedom typically associated with Direct Face Modelling . Structured Part Modelling is best suited for more complex multi-bodied models ; as there are greater possibilities for advanced users. However, these are slower and harder to create, as there are more rules to understand and follow.
Sheet Metal Modelling: (sheet metal specific)	Similar to Innovative in that it includes greater freedom within its feature based approach. However, this mode includes sheet metal specific folding and unfolding functionality, without the possibility of mixing Direct Face Modelling operations. However, Direct Face Modelling operations can be used on imported sheet metal parts within Innovative and Structured modes, before converting to Sheet Metal mode.

DIRECT FACE MODELLING - GREATER FREEDOM

Direct Face Modelling is easier, faster and more flexible during the initial concept stages (where form is more important than function), as it allows greater freedom while creating different possibilities without being constrained. It allows users to easily make changes to geometry by either "directly" pulling or pushing or cutting and pasting operations.

The same is true regarding manufacturing, installation and commissioning stages; where modifications can be made quickly and easily, without having access to the original CAD software (and feature structure) that created it.

IRONCAD's **Innovative** Part Modelling mode is more **Freedom** biased.

FEATURE BASED MODELLING - GREATER FUNCTIONALITY

Feature Based Modelling is a structured modelling process that makes it easier to modify the dimensions of geometry at a later date, or to create different variations of the model. Thus, a good feature based model is very scalable, and better suited for the iterative design process associated with manufactured parts.

Feature Based Models maintain a feature structure (or history), that records the modelling steps (features and operations) used to create the model geometry (B-Rep). Each modelling step depends upon one or more of the previous modelling steps. For this reason, Feature Based Modelling is also referred to as 'History Based Modelling'.

The feature structure contains all the information related to features and their relationships. As the parameter of a feature is changed, the associated features that follow it, automatically update as well. This is the primary advantage of feature based modelling, allowing engineers and designers to explore (and toggle between) different design variations through changing feature parameters, without needing to make manual changes to the geometry directly.

Along with changing the dimensions of a feature via parameters, it's also possible to suppress and unsuppress features (and bodies) via parameters. This enhances the design variations possible with feature based models.

When creating and editing complex models, another benefit is being able to "Roll Back" the feature structure (or history) to an earlier simpler state. Also for displaying or exporting a model before secondary modifying features (such as draft angles and fillets) were added.

Constructing complex models is not always straightforward, and careful implementation of the various steps is required. As a result, Feature Based Modelling can lack ease of use, speed during creation, and modelling flexibility. It also requires a steeper learning curve and greater effort by the user during creation.

It's also important to be aware that when exporting a feature based model to a different file format (such as STP), the feature structure is not conveyed with the model (only the B-Rep).

IRONCAD's **Structured** Part Modelling mode is more **Functionality** biased.