# Functional features

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## Introduction:

In the Engineering community there have been many published definitions of the term "feature" Salomons 1995,Shah & Mantyla 1995. This has produced ambiguity and has allowed the introduction of many different types of features.

A confusing proliferation of types of features have been identified, including:

- Form Features: related to the geometric form.
- Precision Features: concerning deviations from nominal dimensions.
- Technological Features: related to performance and operation.
- Material Features: material composition, treatment, conditions.
- Assembly Features: concerning the assembly process.
- Pattern Features: patterns of similar entities.
- Connection Features: geometric constraints.
- Property Features: properties not explicitly related to geometry.
- Application Features: related to process planning requirements.
- Manufacturing features: related to particular processes, such as machining.

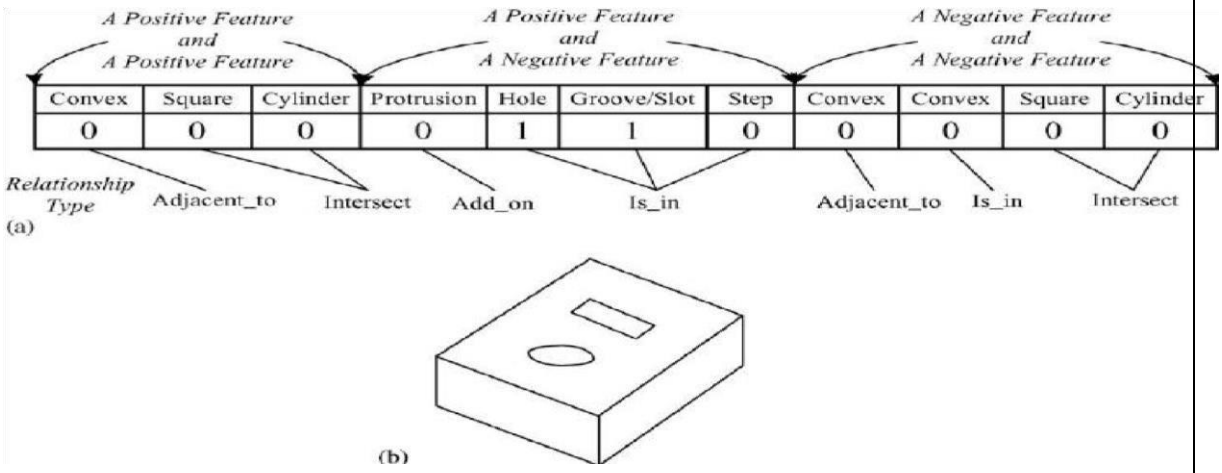
- Functional features are manufactured features which perform a particular function. Unlike rounds and drafted faces, functional features generally come later in the design process and thus do not affect the "form" of the model.
- There are several types of functional features available within Solid Edge, some of which are used extensively in the plastics industry. In this module, you will learn how to define these features

  - **Holes**
  - **Ribs**
  - **Vents**
  - **Lips**

- Also in this module, you will define *feature patterns* for repetitive use, as well as learn the organizational aspects of *feature libraries*.
- You will learn how to manage features using standard Windows operations *Cut, Copy and Paste*.
- You will also learn about the *Attach and Detach* functionality.
- The parametric driving carrier is divided for design produce, which can realize the connection between product design and design knowledge to complete parametric design.
- In the feature is as the carrier of design knowledge, which can establish association between the design process and relevant design knowledge.

## Similar publications

- The geometry of steam turbine generator rotor body is analyzed, and design knowledge carrier combines both the technology of feature modeling and parametric design technology




## Function:

Function is best thought of in terms of the way that the designed object interacts with an environment when placed in it. Chandrasekaran & Josephson [1996] define a function of an object in terms of the effect it has on its environment. The environment can use behaviors, structure or structural properties, and can provide 'inputs' or stimuli that trigger the function to enable, prevent or maintain the interaction [Keuneke 1991].

For example, a clock functions when placed in an environment that provides it with power and allows the time display to be visible. Note that in this example a subset of the object's behaviors is being used for a function: the 'ticking' sound is normally not used.

A chair functions, when placed in an environment that places a load on it, by resisting that load. Here the key behavior involves no gross movements and is completely in response to external stimuli.

A knife functions when placed in an environment which applies a force on the knife causing a particular portion of the structure (the 'sharp' edge) to be in contact with another material.

In this last case, the function is provided by a very specific piece of geometry, and by the material properties of the knife that prevent it from bending, breaking or changing its shape. In the clock case, the function is provided by a combination of behaviors and the structure that supports them. In these examples above we are considering the "intended function" of the designed object, i.e., the design intent. This intended function is concerned with the process we referred to above as "intended use". Designed objects can be used in other ways (i.e., analogical use) by taking advantage of other substructures, subsets of behaviors, or properties (e.g., using a shoe as a hammer, or using a ticking clock as a baby pacifier).

Refinements to SBF that can be found in the literature include:

- a goal state or control relation that the function is intended to achieve;
- a listing of the properties of the designed object that enable the function;
- a listing of the properties of the environment that enable the function (perhaps including sequences of inputs, or changes in the environment's state);
- the relationships between the properties that enable the function;
- the purpose of the function, described in terms of the environment

## What's a Feature

- The generic "anything of interest" definition above can be modified now that we know more about both "anything" and "interest". A portion of an SBF description represents "anything", while "interest" concerns a POV.
- A feature is described by any portion of an SBF description of the (partially) designed object that may affect the goal of a particular POV.
- Note that this clearly means that a feature is dependent on at least one process. Rosen et al [1991] argue, similarly, that a feature contains

"relevancy", where "relevancy identifies which CIM viewpoint a feature is defined in".

## For Example:

- This definition is consistent with the important notion that a feature is a "view" of the design and that features cannot be listed or "limited a priori"
- a structural property: color, size, finish, mass, reflectance, etc.;
- a portion of the surface;
- any portion of the components of the designed object;
- a configuration;
- a set of relationships; a behavior, or behaviors; or a function, or subfunction.