Function Map

Designing Process Excellence

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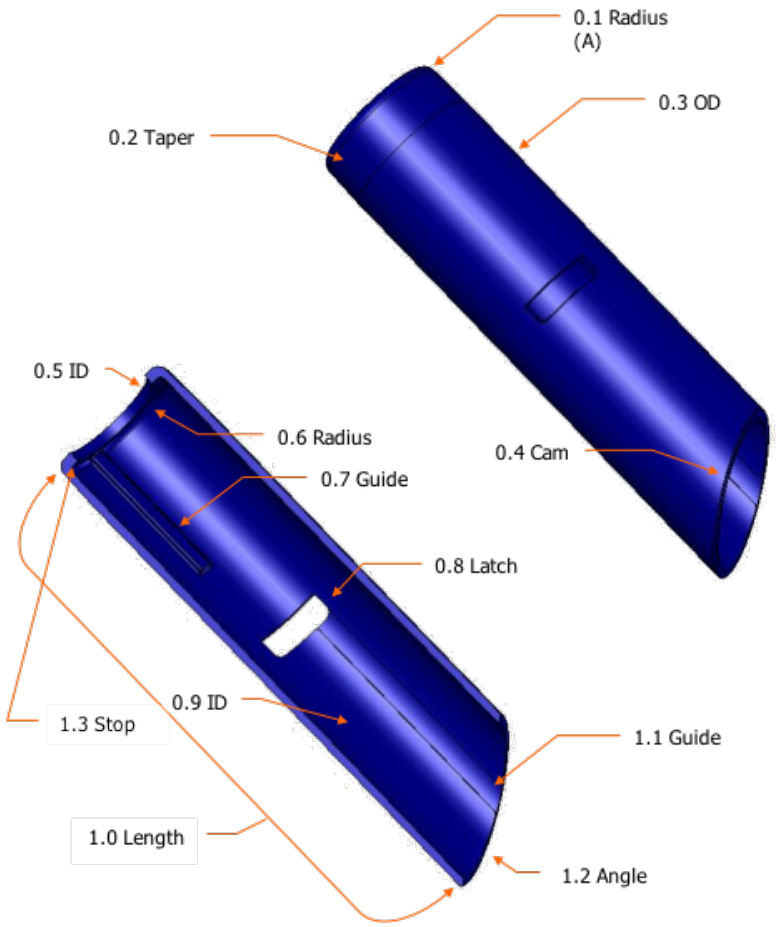
Function Map

A Function Map defines the functional requirements and all of the features of a part design and . Once these features are defined, they can be labeled based on the design intent. For example:

- Radius provides aesthetic appeal
- Cam provides disengagement of the safety lock
- Angle that matches the *Lower Assembly* for the deactivation of the safety

Function Map Example - Cap



Feature	Function
12010-0.1	Radius that provides aesthetic appeal
12010-0.2	Taper that provides aesthetic appeal
12010-0.3	Outer diameter that provides aesthetic appeal
12010-0.4	Cam provides disengagement of safety lockout
12010-0.5	Inner diameter allows the button to move axially within the *Cap*
12010-0.6	Inner radius that provides clearance for the button to rest against
12010-0.7	Button guide that maintains the button position during activation of the pen
12010-0.8	Assembly latch which provides a permanent assembly of the *Cap* to the *Mid Housing* and works as the rotation stops for the deactivation of the safety
12010-0.9	Inner diameter provides clearance for the rotation of the safety feature
12010-1.0	Overall length of the *Cap*
12010-1.1	Assembly guide orients the *Mid Housing* to the *Cap* during the assembly process
12010-1.2	Angle that matches the *Lower Assembly* for the deactivation of the safety
12010-1.3	Bearing stop for the *Button*

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Functional Requirements Example - Cap

The practice of stating the parts "Requirements" aids the design teams memory as to 'why' the part was designed. The Function Map, Requirements and Matrix reduces the chance of scope creep by making obvious the design intent. This type of DFM work improves the function of the part and its manufacturability by:

- Reducing costs as a result of 'real' tolerancing needs
- Reducing rework cycles as a result of a thorough understanding of part feature requirements

Requirement	Notes
Function	• Provides an attractive form and cosmetic exterior • Provides the user a surface to grasp to rotate and deactivate the safety • Protects the *Inner Housing* subassembly • Provides alignment of internal components
Manufacturing	Injection molded part, parting line along length of part and stripped from the core
Assembly	*Inner Housing* sub-assembly is pressed into the *Cap*
Joining	Snap Fit
Material Requirements	Injection molded plastic that provides good surface finish for cosmetic appeal, good mold-ability, high impact strength, stiffness, and dimensional stability
Material Choice	Polycarbonate (clear), Bayer Makrolon 2558 **OR** Polycarbonate (clear), RTP 300
Secondary Operations	None
Inspection	Verification of critical features

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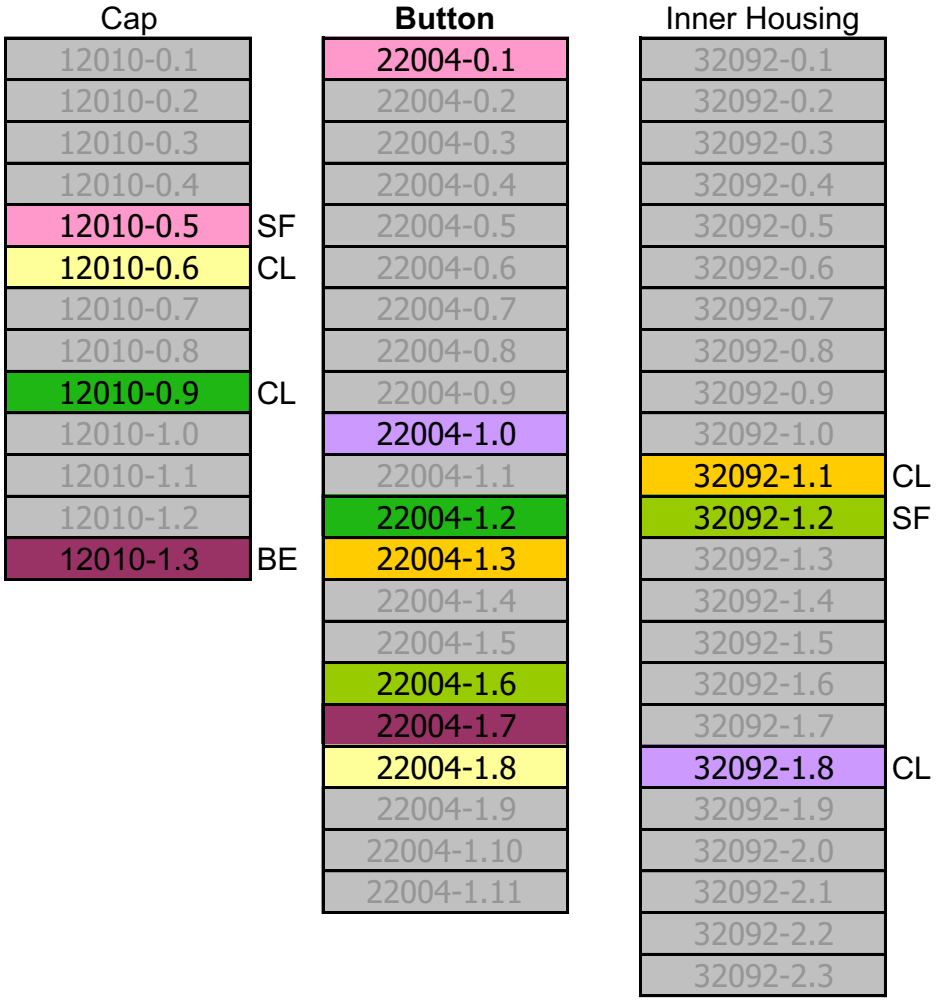
Functional Matrix

The Functional Matrix is used to show the relationship between features across multiple parts of an assembly. For example, the ***Buttons*** 'pink' feature 22004-0.1 interacts with the *Caps* 'pink' feature 12010-0.5 with the interaction being a 'Slip Fit'. Likewise, the ***Buttons*** 'purple' feature 22004-1.0 interacts with the *Inner Housings* 'purple' feature 32092-1.8 with the interaction being a 'Clearance Fit'. Knowing this information, the designer can apply the appropriate tolerancing to the components to ensure the proper interactions occur across the parts tolerances.



SF = Slip Fit
CL = Clearance
IF = Interference Fit
BE = Bearing
Performance
Interaction

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