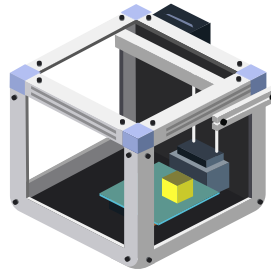**Handbook of
Prototyping
V1.0**

Purpose of prototype:

Validate Idea: *Any product development starts with an idea. The idea can only be pursued if it fits the needs and parameters to be fulfilled. To validate the idea against these parameters prototypes are used*

An idea is a thought and the product is its physical implementation, hence to evaluate that vimplementation prototypes are needed. To turn the idea into a concept it needs to be refined. This refinement is done to align the product with the needs it should fulfill . To test this, prototypes are used as they are the more efficient way of doing it
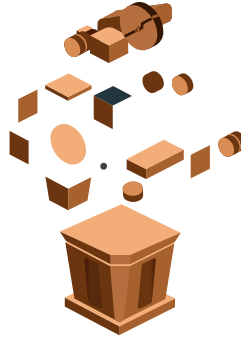
A prototype can be anything from a sketch to quick and dirty cardboard prototypes to the full beta versions. A physical interpretation which helps in taking the product idea forward can be considered to be a prototype.

It is approximation along a single dimension: prototypes approximately represent or demonstrate one of the attributes/function of the final product. In the initial stages it can be a single attribute but as the process progresses it can be a group of closely allied properties like subsystems.

A prototype can also be considered the first model on which subsequent ones are built on. A prototype is used to get all the knowledge together to continue the design/development process
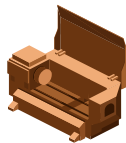
IDEA

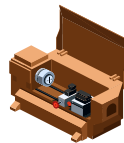**PROTOTYPE**

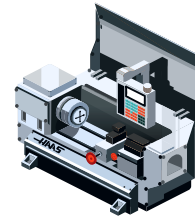**PRODUCT**

Sketch   Mock-up   Functional   Alpha   Beta

All the phases between the idea and the final product can be considered to be a prototype.

Product Architecture : *A product is made up of different components, sub systems and modules. All of these interact with each other to fulfill the different requirements and perform the different functions of the product. A prototype can be used to test these interactions or the individual components themselves. The prototype should be developed with the key functions in mind. The supporting elements can be approximated in ways such that they don't affect the key functionality being tested.*

Feasibility: *A good product is developed in such a way that it can be manufactured efficiently. Any product is made from certain materials and will also contain one or more different technologies. It is necessary to figure out, if the resources available are competent enough to make the product to match the desired specification within the stipulated time and cost. The resources include not only the materials but also the technologies available and the manufacturing process involved. This process can be a stage of compromise between the resources available and the specifications to be achived.*

Communication: *Most products are made by teams spread across different domains and disciplines. This requires that all the people involved have the same general understanding of what is being done. Sketches/illustrations like engineering drawings need some training and imagination to understand. A physical thing has an overall, uniform understanding. To test the user experience it is critical that the concept is well understood. This is necessary to get the feeback that helps in aligning the process with the consumer.*

Prototypes can be roughly devided into two categories

Engineering:

These are the ones that handle the technical aspects of the product. As for now we are limiting our focus to manufactured products. This category normally covers the mechanical and electronics aspects of the product. The logic and guiding principles behind both are the same but the process differs quite a lot.

Mechanical :

This prototype can be as simple as a sketch with rough dimensions . These prototypes normally follow an evolving, iterative process. The iterative process gives a security against total failure as there is always the earlier version to track up to the point where things worked. Testing these require quite a bit of imagination on part of the tester. As things can be approximated to concentrate on the key function, the feedback needs to be carefully analysed. This also helps in determining the feasibility and viability of manufacturing

Electronics:

These are sort of straight to make and test but constrained by the technical feasibility and viability to match the needs. Instead of being an evolving iteration, each iteration can be a new prototype.

Design Prototypes:

These are the prototypes that explore the aesthetics as well as the user interaction and the experience of the product. They can range from product renderings to mock-ups that deliver the experience. Like other prototypes they are also defined by the key function or the experience to be delivered. They are often non-functional mock-ups so as to not influence user behaviour by unnecessary details.

WHY Function	HOW Type/Cateogry	WHAT Data Outcome
Architectural Interface	**Design** **Engineering**	**Appearence / Schematic** **Product atribute** **Objective Yes/no**
Feasibility	**Engineering**	**Objectives Yes/No** **Feature refinement**
Comunication	**Design**	**Customer Feedback** **Non Functional Mock up** **Appearance/ Schematic**

JUST DO IT ! *Fail early to succed faster...*
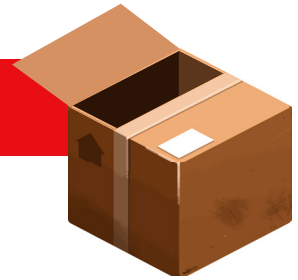
Guiding Principles of Prototyping.

•**Build for testing,** *build according to how to test the objective at hand rather than how to fulfill the function.*
•**Build to think** *and think to build. Use Prototype as a thinking tool.*
•**Validating the idea** *is important , refining and adding details is easy and can be done later.*
•**Build the idea first** *, optimization and details to be added as iterations progress.*
•**Keep It simple***: Boil down the idea to the very basic essence and build accordingly.*
•*Start with as few components as possible and add gradually as idea builds.*
•**Always iterate***, the balance between time, resources and refinement needed determines the number of iterations to be done.*
•*When testing the experience keep the things abstract.*
•*Increase the precision of the test as the resolutions of prototype goes higher.*
• **Analyse** *the feedback, do not take it literally.*

Testing

•*Make a test Plan for the prototype*
•*Who is going to test and who is going to use the data.*
•*What is it that you are trying to find or validate.*
•*State the assumptions made to run the test.*
•*Document extensively. Documentation should cover all the aspects and variables, so as to give a result that takes process ahead in right direction.*
•*Analyse the data carefully.*

JUST DO IT!

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