INDUSTRIAL DESIGN PROCESS

CONCEPTUAL

A concept is the core foundation of a product. From it, the identity of a brand is defined and pursued. Every decision taken for either product or brand has to follow the concept, which in turn has to be well defined, justified and above all honest.

A quality product is not only made of great materials with well-executed manufacturing processes, but it is also a message carrying device, and that message is the core of the concept.

What is this and how can it improve my life? Was it made with care? Did the people involved in this product thought about my use case? All these questions (and more) are to be answered by the concept.

Process:

Design proposals generation. Phase in which the main ideas of a product start to be explored. It starts with a brainstorm session and it ends with the initial form of the concept, which is then to be refined through the exploration phase.

Brainstorm: Creative activity in which "everything goes" and no idea is dismissed. Each idea has the same weight as any other.

Idea selection: The main ideas are selected in base to well thought deliberation, ideas that do not help the product reach its main purpose or conflict directly to the ones that do, are rejecter.

Consolidation and Refinement.

Unique ideas start to converge in a whole, as a way to generate a coherent concept according to the client's requirements.

This idea culminates in a conceptual concept proposal, in general and without a final formal design, meaning that the main functions, systems and parts are being considered as they inform the esthetic part of the design but as they are not totally defined, the final shape of the product cannot yet be visualized.

Deliverables:

- List of the product's main systems, functions and parts.
- Brief written explanation of what said elements do within the product.
- Sketches, cad models and sometimes small physical models illustrating said elements and some possible aesthetic inclinations.

EXPLORATION

Once the initial conceptual idea is defined, exploration is started.
Possible variants, what traits are to be dominant and which will be complementary are to be defined. During exploration, the core message of the concept is developed. The client has to be involved in key decision making, which makes communication an integral part of the process.

Process:
Exploration is usually developed with many sketches, basic CAD models and sometimes scale models to help visualize the product in a clearer fashion.

It is also the stage in which materials, manufacturing and finishing processes start to get defined. Also, each piece of each system starts to get more detail so it's overall influence, size and proportions become more apparent within the whole product.

The client's input is encouraged in this phase, to make sure the product being developed one that fulfills their vision.

Deliberables:

- Written explanation of the design characteristics, now in detail. Materials, manufacturing and finishing processes that are being considered for the product's fabrication.
- Sketches and digital images of a finalized proposal, including specific sketches and notes of each system and of the general proposal.
- In some cases, scale models of some parts of the concept.

CONCEPTUAL CAD

CAD (Computer Assisted Design) is the first step in product development where the real proportions of a product start to surface. The free rein previously allowed by sketching and hand modeling takes a step back to precision and to basic manufacturing considerations. Materials' physical properties guide decision making at this stage and may influence the aesthetic of the product.

The objective in this phase is to acquire a closer-to-reality physical proportion of the product. This takes into account the main systems' size requirements, rough number of sections and required space for components such as fasteners (nuts, bolts, latches) as well as electronic (PCB, switches, connectors) or mechanical components (Motors, hinges, gears).

Process:

Once a final concept is defined, then we proceed to create a first computer model for the pieces and systems. Taking into account the physical properties of the materials as well as the manufacturing processes to use. Pieces are modeled and dimensioned as precise as possible.

Some variations of the 3D model might be created incorporating some elements in a different way. A couple of small changes can be made by the client at this stage.

Should standard pieces would be used, the 3D CAD models of said pieces as well as their tech specs can be obtained and added to the model. If said files are not available, basic placeholder models are to be developed in-house with the general dimensions to keep the general size and proportions as close to real as possible.

Deliverables:

- Bill of materials (List of parts).
- Materials and manufacturing processes for each piece.
- Renders (10 renders showing different color and material).
- Digital files of the designed pieces in a 3D printable file format (.STL).

*This CAD models allow for the creation of conceptual prototypes that can be sued for presentation purposes such as investors meetings and crowdsourcing campaigns.

MANUFACTURING AND CONSULTING MODIFICATIONS

Transforming a defined product concept into a working, finished product requires several stages of material and manufacturing tests, simulations and general manufacturing engineering tasks. It is not only verifying if a product can be manufactured and assembled, but finding the most environmentally friendly way of achieving it.

Mechanical studies, fabrication studies and all-around CAE (computer assisted engineering) are the main focus of this phase.

Process:

Once the first CAD draft is finished it is sent to manufacturing engineers for a manufacturability study of each part that has to be fabricated.

Usually, it is necessary to have several iterations of the models so that its manufacturability can be assured. This takes several back and forth sessions between the manufacturing engineering and design teams.

Deliverables:

- BOM.
- Digital models (.STL).
- Renders (10).
- Scale models of some parts, for study and proportion purposes.
- Materials samples may be included.

*Prototype development is strongly advised to take part during this stage to compliment the CAE process.

PHASE 4

DOCUMENTS, PRESENTATION IMAGES AND FINAL MODEL DELIVERY

A finalized product allows for the generation of production blueprints, editable 3D files and renders that show the product in its final form.

This documentation, along with the whole project's main milestones are archived and sent to the client for their free use.

Process:
Once the final 3D models are generated, digital presentation material (renders and 360 videos) are to be made. Mechanisms can be represented in motion.

Final documentation is also generated, including material for every stage of the project from concept to final CAD model.

Deliverables:

- Presentation material (Can be renders and 360 videos of the product).
- Physical (binder) and digital (USB) documentation.
- Scale model of the product (non-functioning).

COMPLIMENTARY SERVICES.

- Manufacturing.
- Corporate image and branding.
- Product advertisement material.