Pneumatic Auto Body Hammer

By Vikram Mishra

The Problem

Auto Body Workshops Need a Tool to Repair Vehicle Dents in Hard to Reach Spaces

How Big?

The U.S. automotive collision repair market size, measured by revenue, is $56.4bn in 2022

Existing Solutions?

Traditional tools are not suitable for small dents or new cars with alluminum body panels

Why a Power Tool?

Auto body hammers require space to swing and do not fit in tight spaces

The Process of Fixing Dents

Inspecting Damage

Identifying the different panels that are damaged

Estimate the amount of time it will take to repair

Removing panels that are easy to remove to check for damage underneath or other panels

Preparing Damage Site

Identifying the lowest spot of the dent

All damaged sites along the body panel are identified

Removing old paint to expose the metal part underneath

Sanding down the surrounding area and feathering out the area

Fixing Dents

Identifying the amount of pressure or number of hits required for restoring the original shape of the body

Using a unispotter with a slide hammer where needed to pull out dents from the outside

Making the body shape closer to the original shape using a combination of hammers and metal or wooden dollys

Masking Imperfections

Observing the shape of the body and matching it closely to the original shape of the vehicle

Finding minor imperfections of the body

Filling in imperfections with autobody filler

Tapping down high spots with a pick hammer

Painting

Identifying the orange peel that exists on the paint on the other panels

Finding the paint code of the vehicle

Mixing the paint to the manufacturer specification

Painting entire panels with thick coats of paint and clear coat

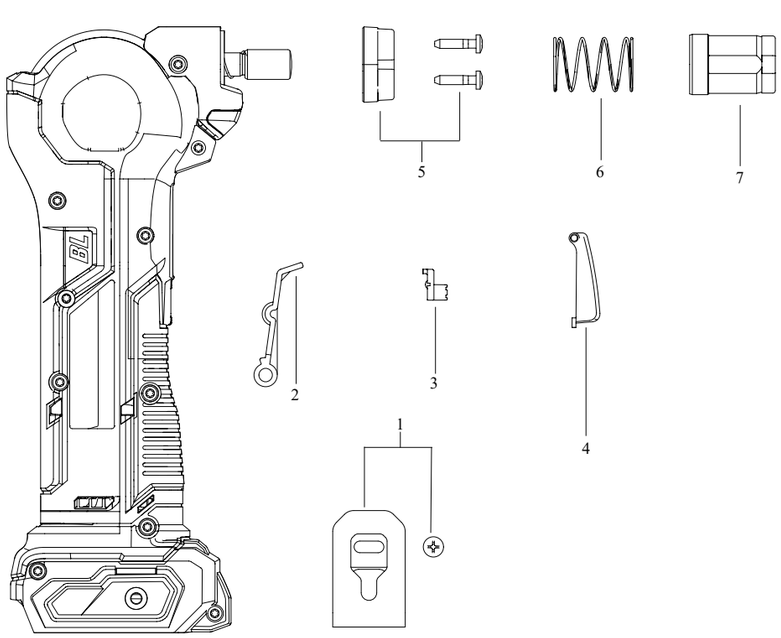
Research

Interview with Kenneth, an auto body mechanic to understanding his work challenges

Disecting a broken power tool to understand the construction methods

Understanding the dimensions of spaces where the power tool needs to fit and fix dents

Tool Disection



SKIL Auto Hammer exploded view

DeWalt 20V Hammer Drill disassembled

Electric Jackhammer disection

Benchmarking

Compact

Desired Prod-
uct

Ineffective

Effective

Bulky

Brand Analysis

Graphic pattern on grip for visual appeal and textured grip

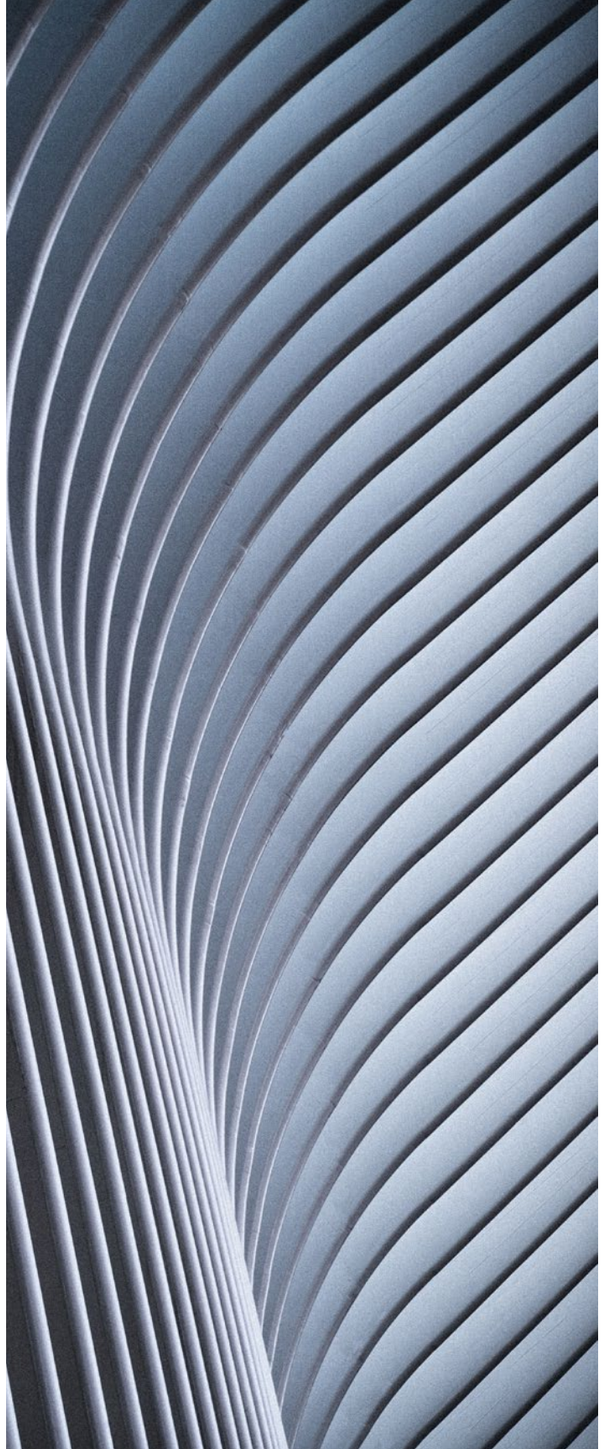
Mix of hard and soft edges exhibits rugged but nonhazardous look

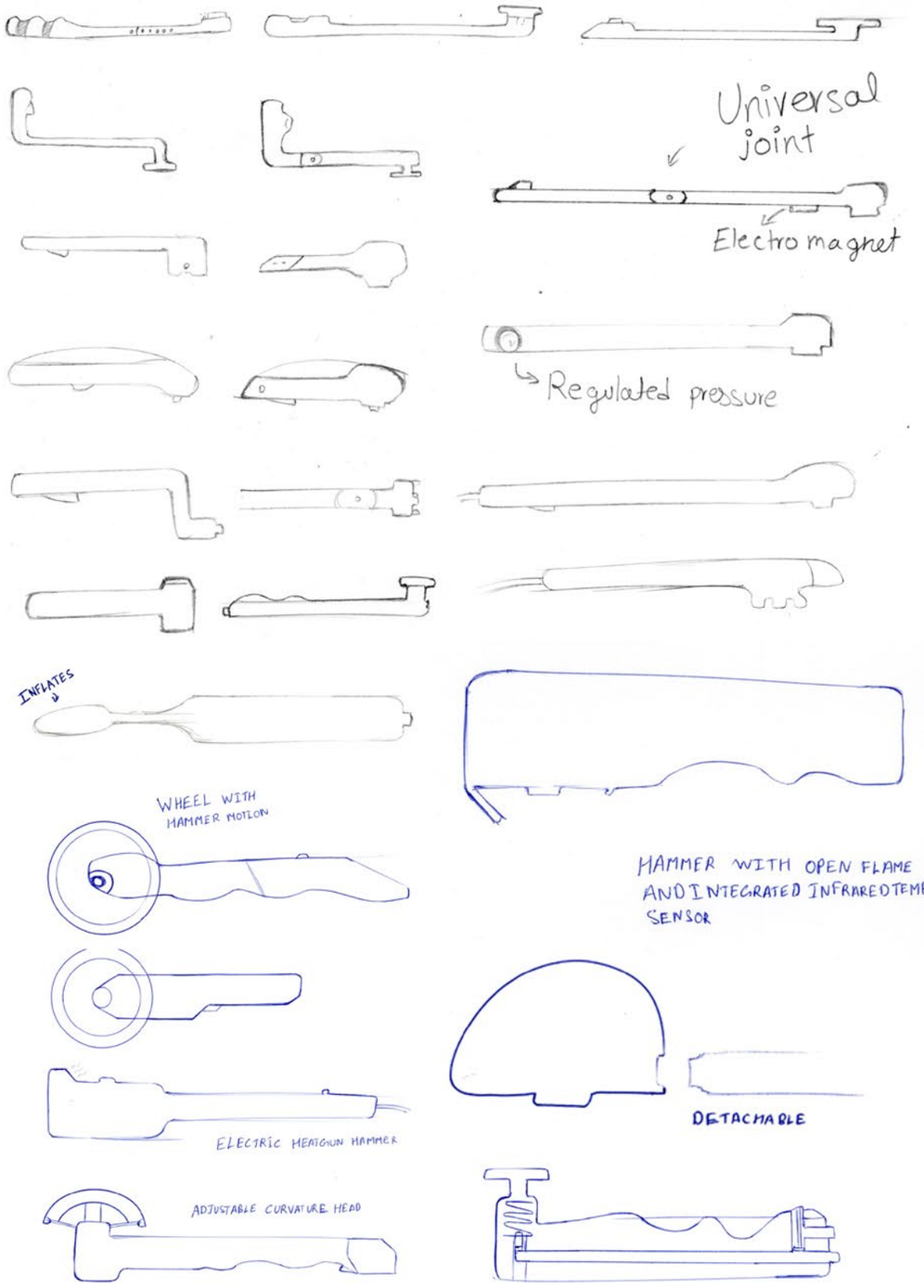
#485365
72,83,101

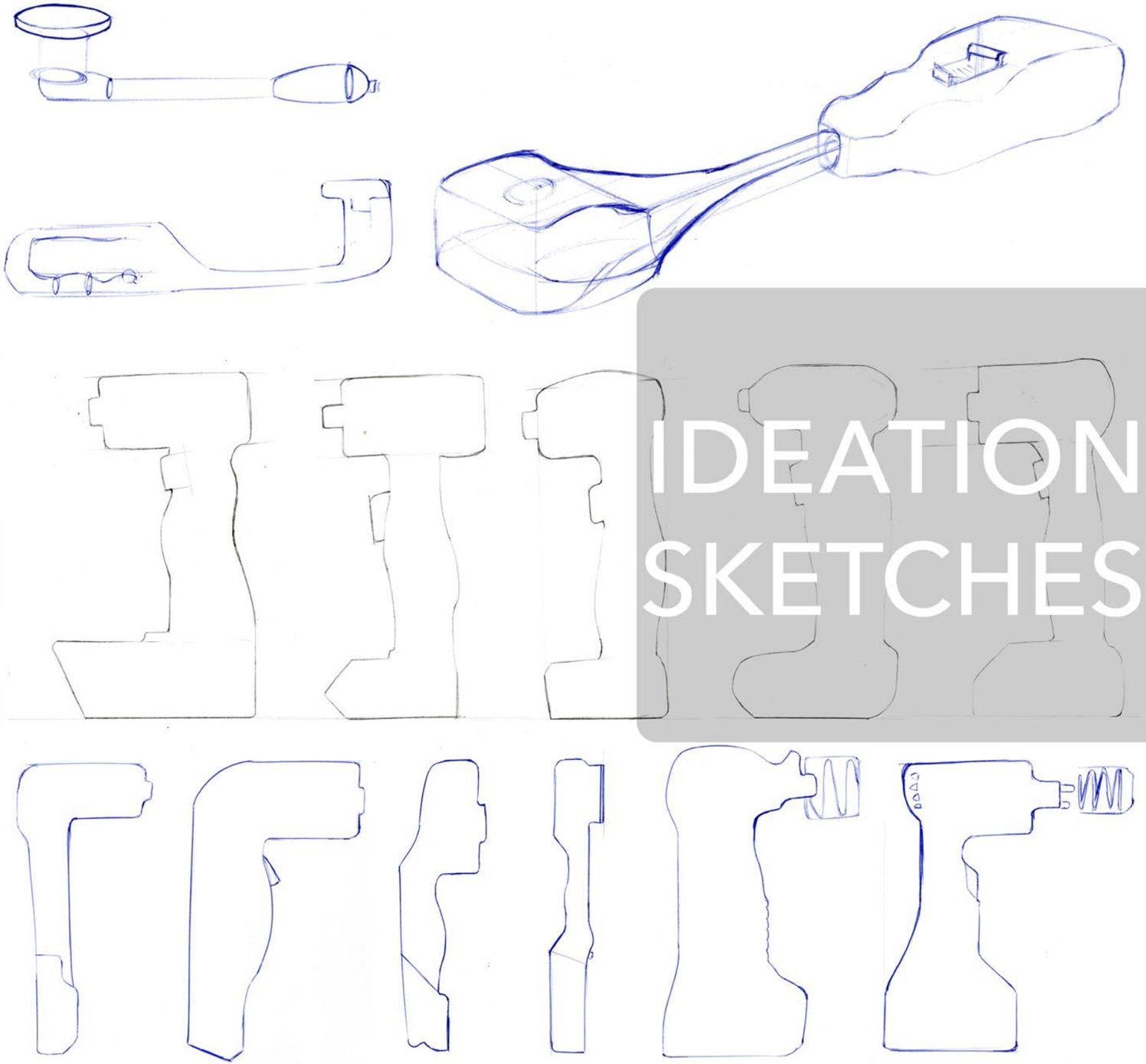
#dc4236
220,66,54

Form closely follows internal component silhouette, exhibits functional aesthetic

Aesthetic Mood Board

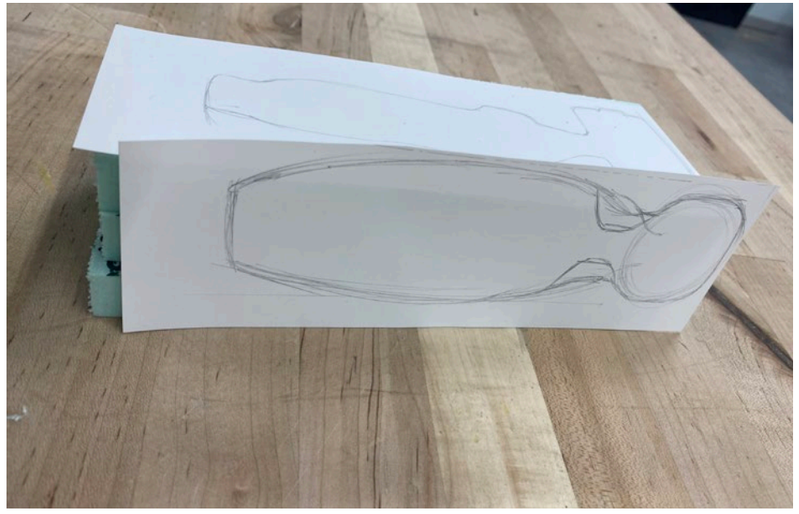


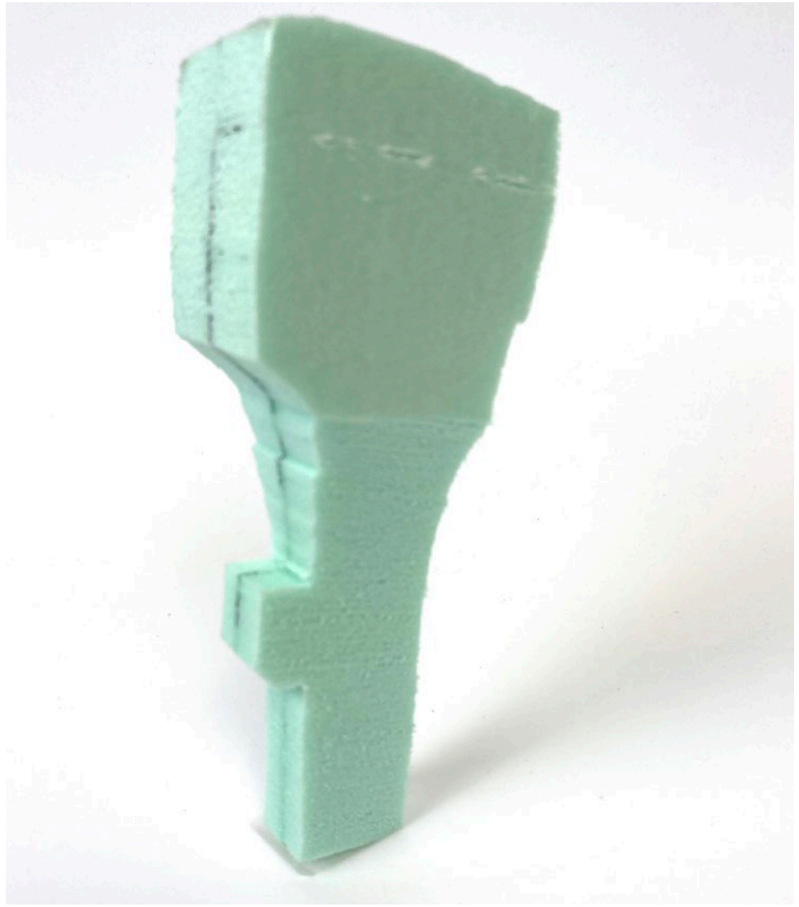




IDEATION SKETCHES

Model Making





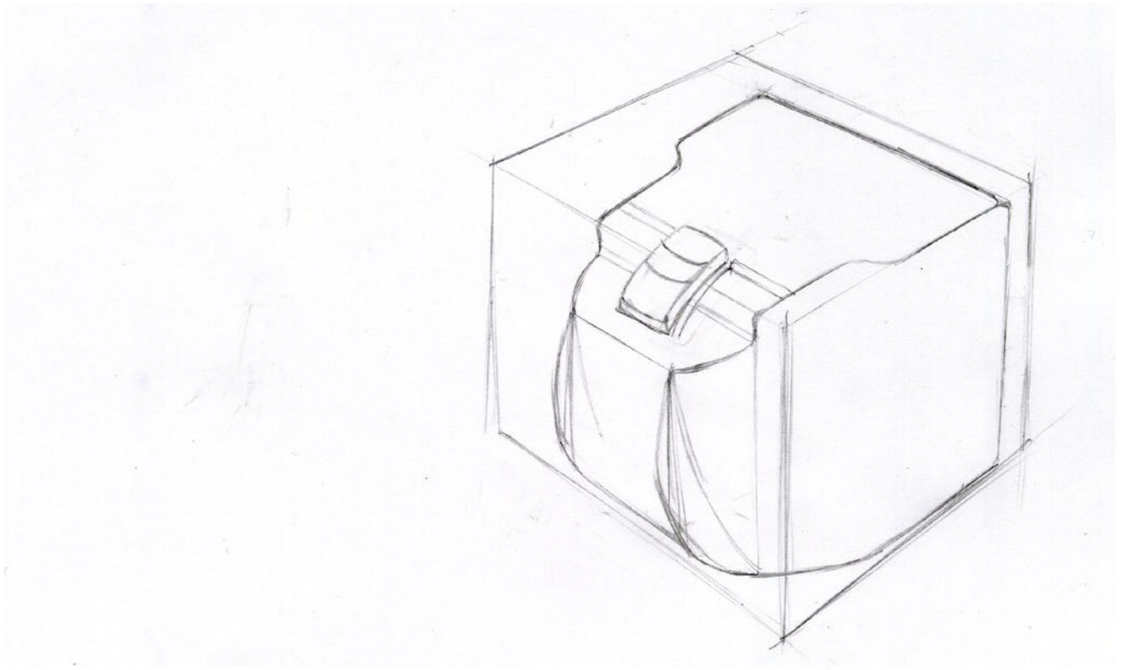
Form Exploration

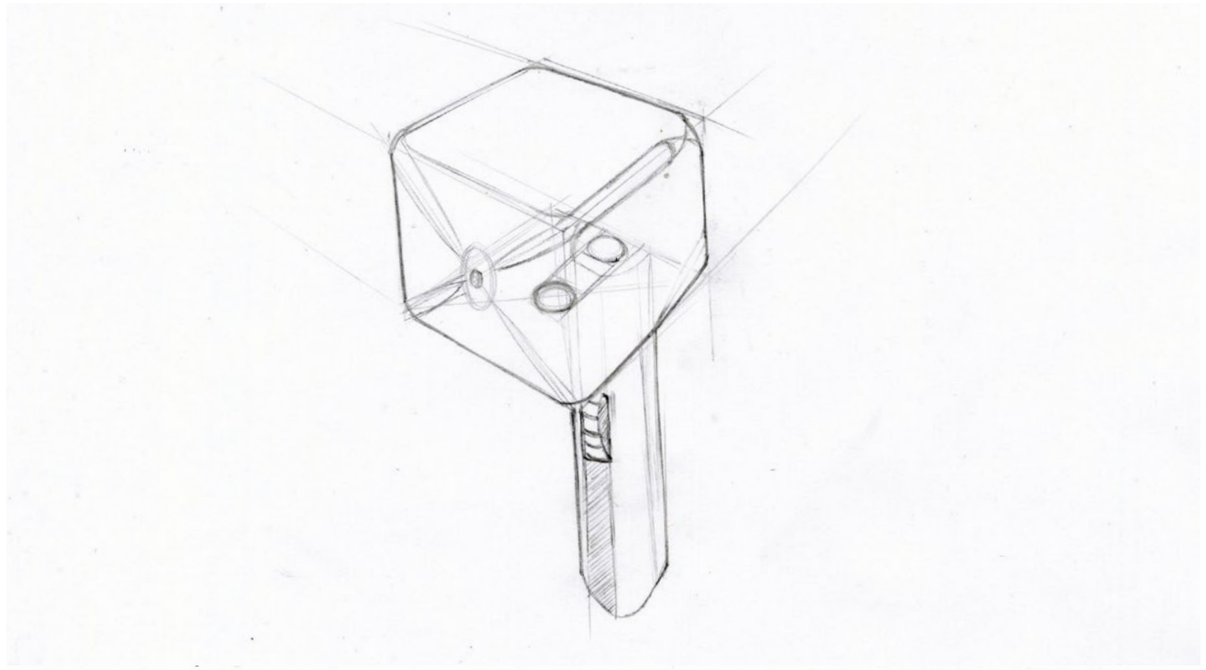
Orthographic Extrutions

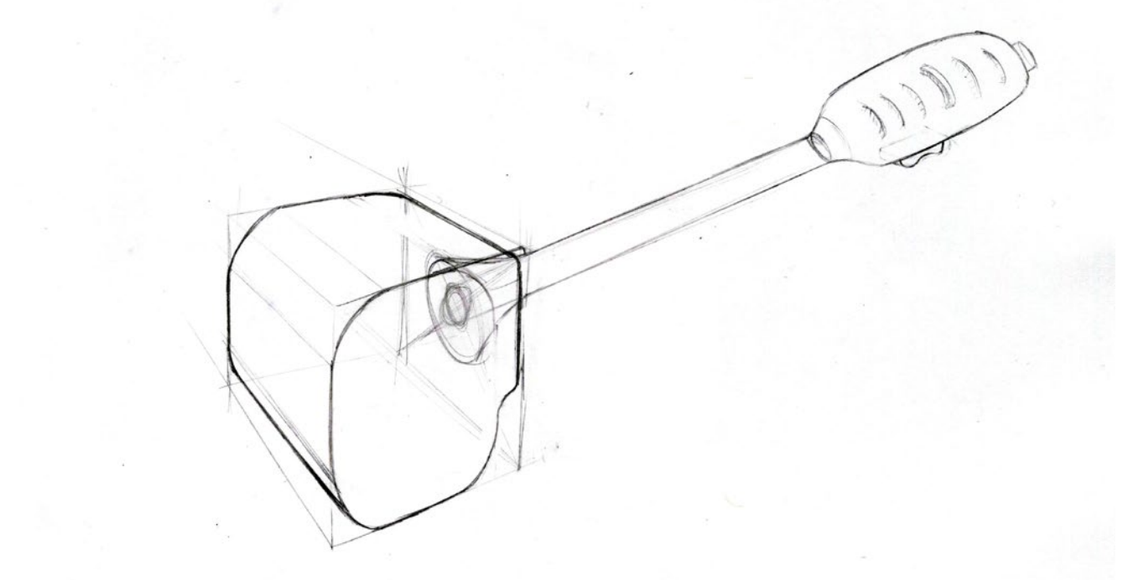
Cabriole Models

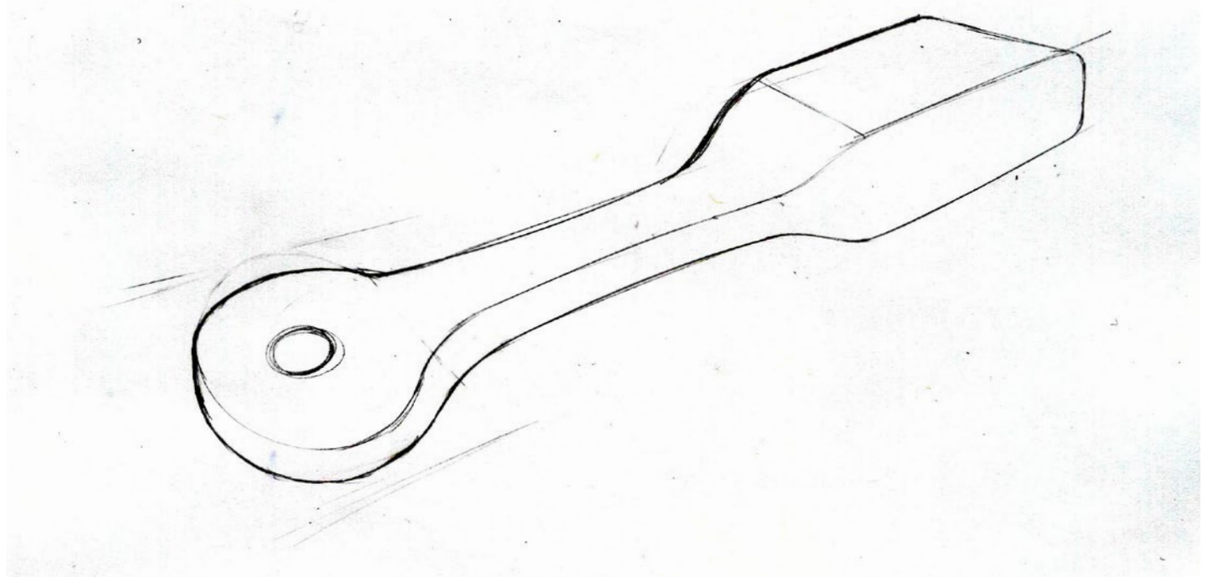
Fine Machined Models

Concept Sketches

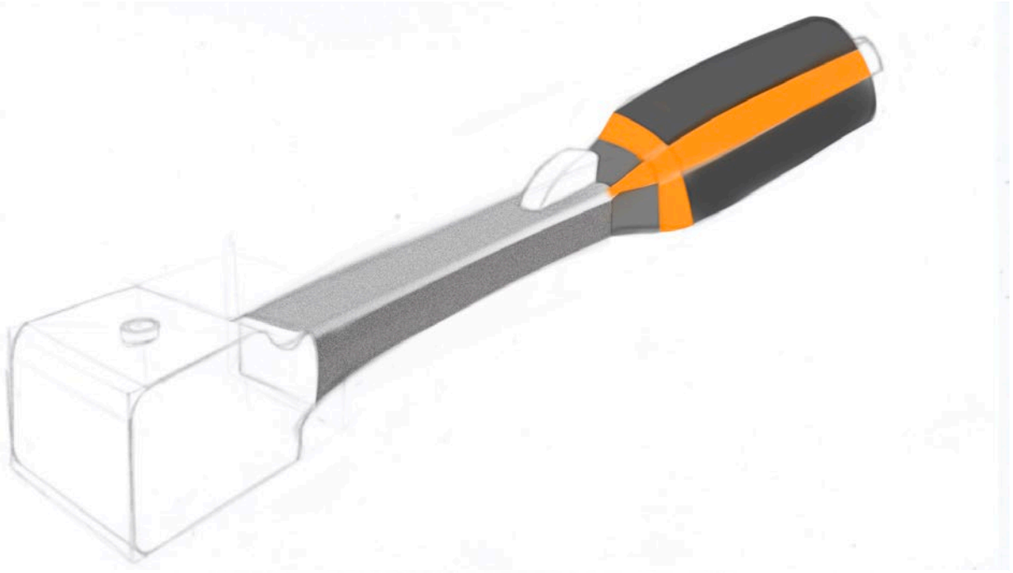


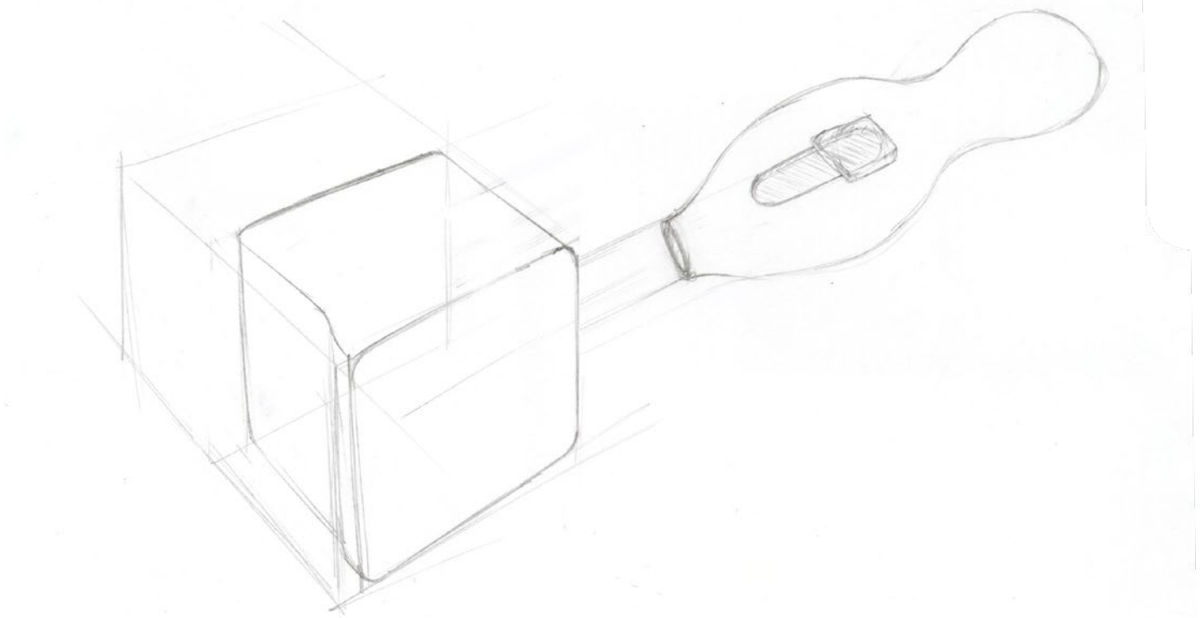






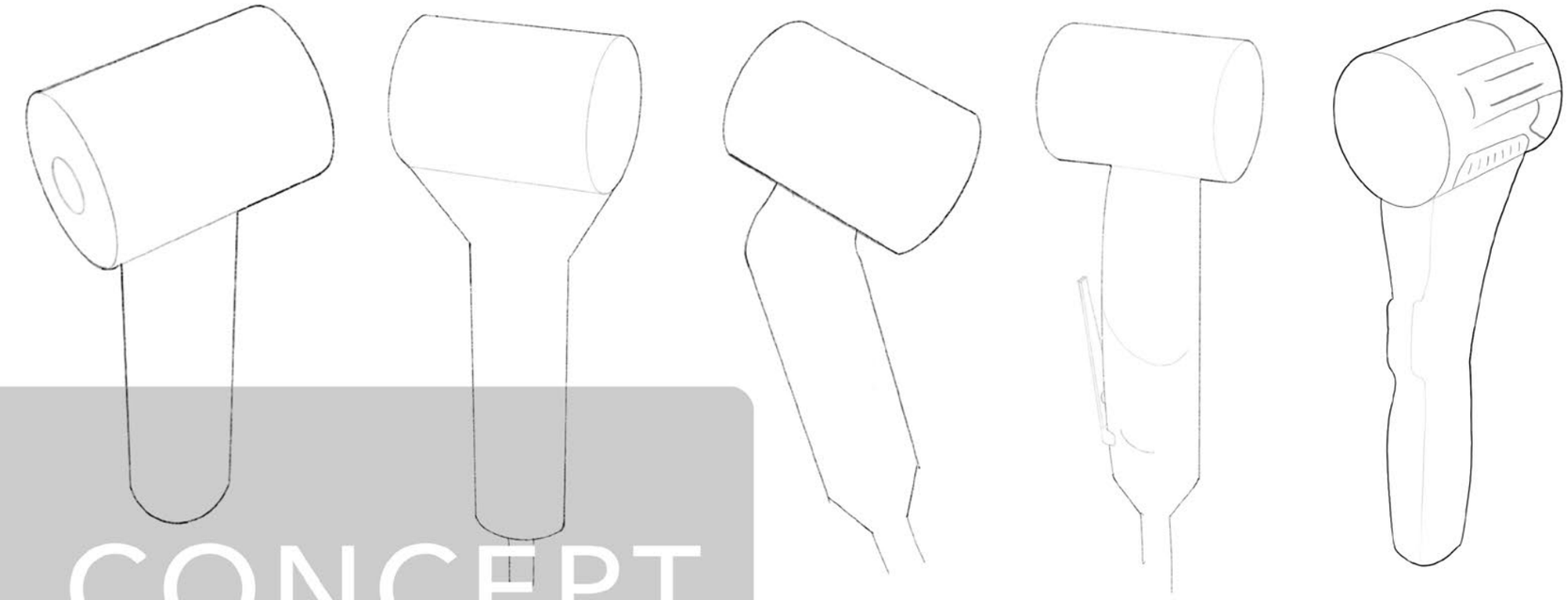
Concept Sketches

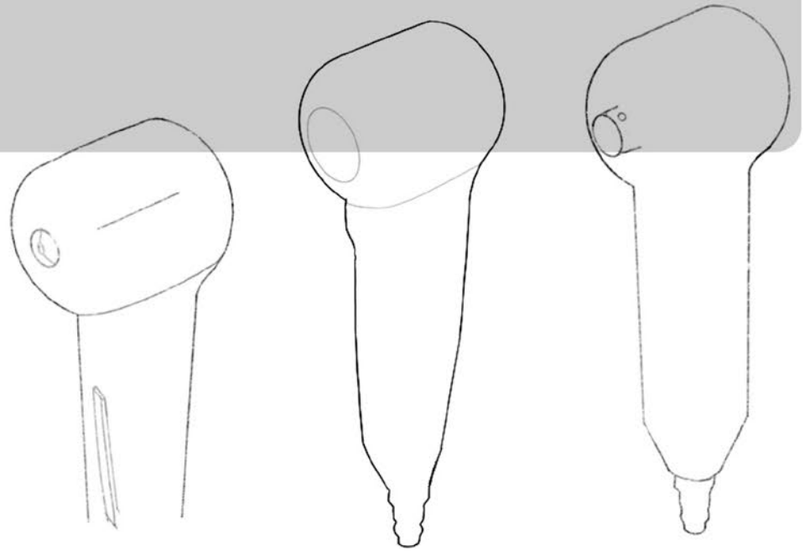


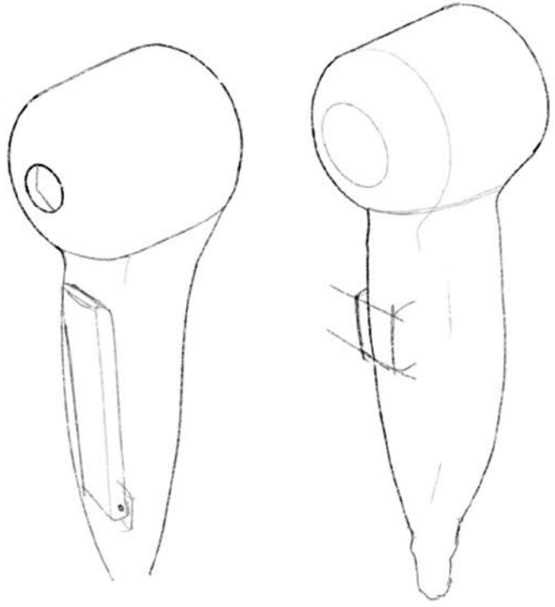


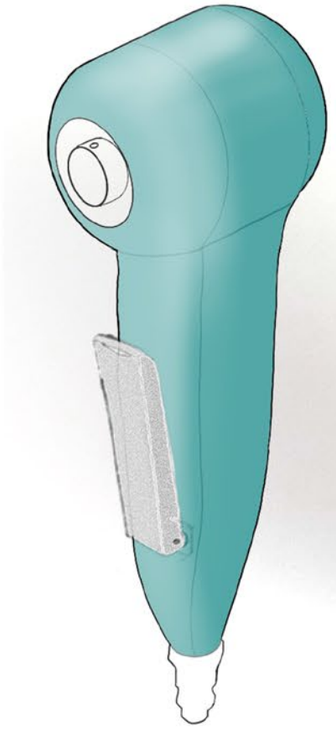
Concept Sketches

CONCEPT EVOLUTION

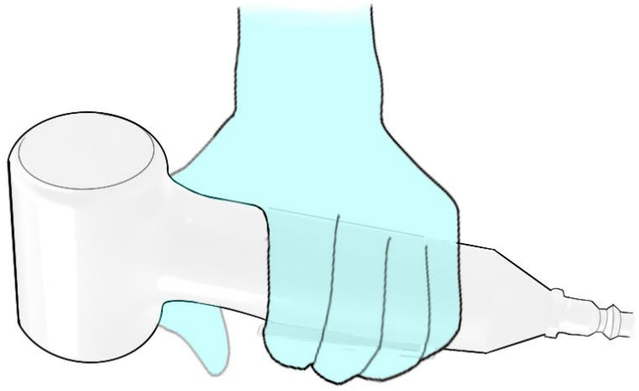


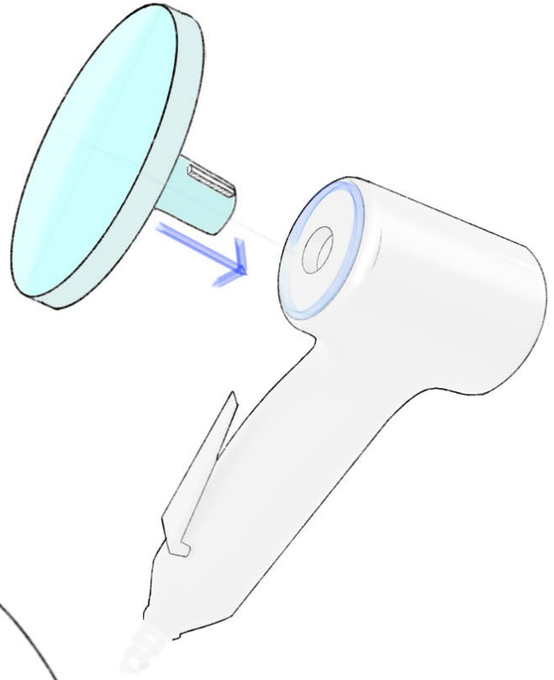


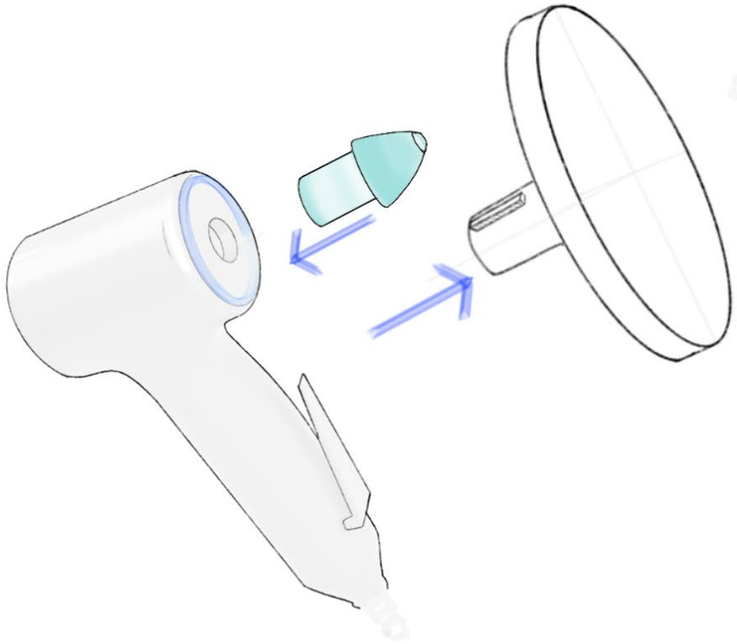


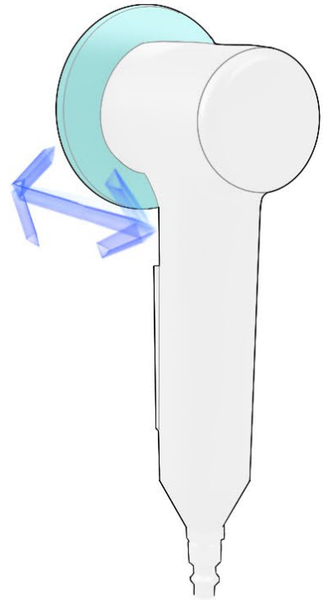


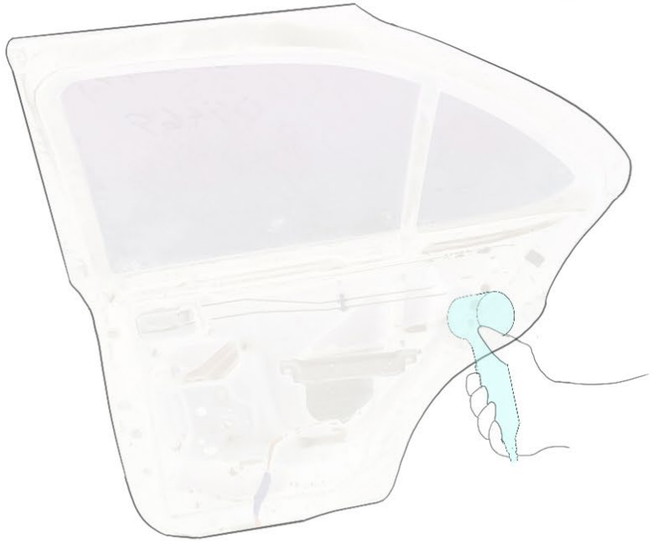
Storyboard





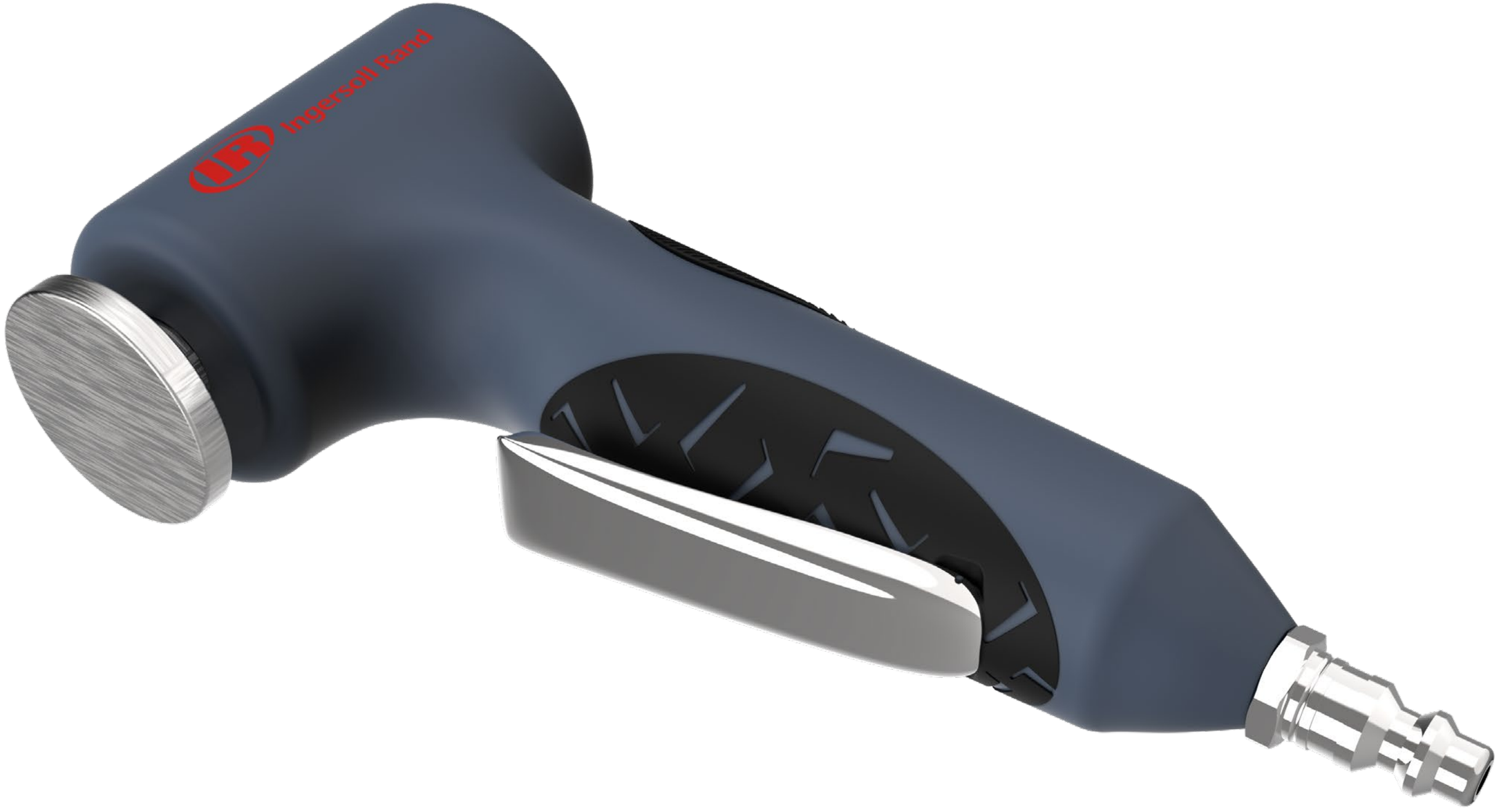




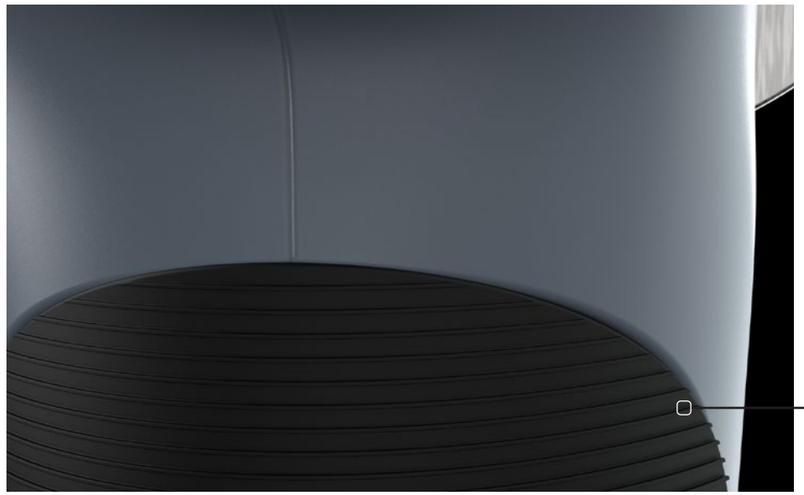


CAD Evolution

Final Design



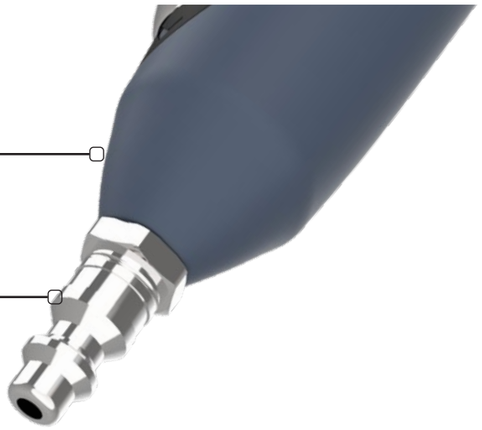
Features



Silicone ribbed rubber grip for comfort and avoid slip when used with gloves

Smooth taper to ensure tool does not get anchored on panel edges

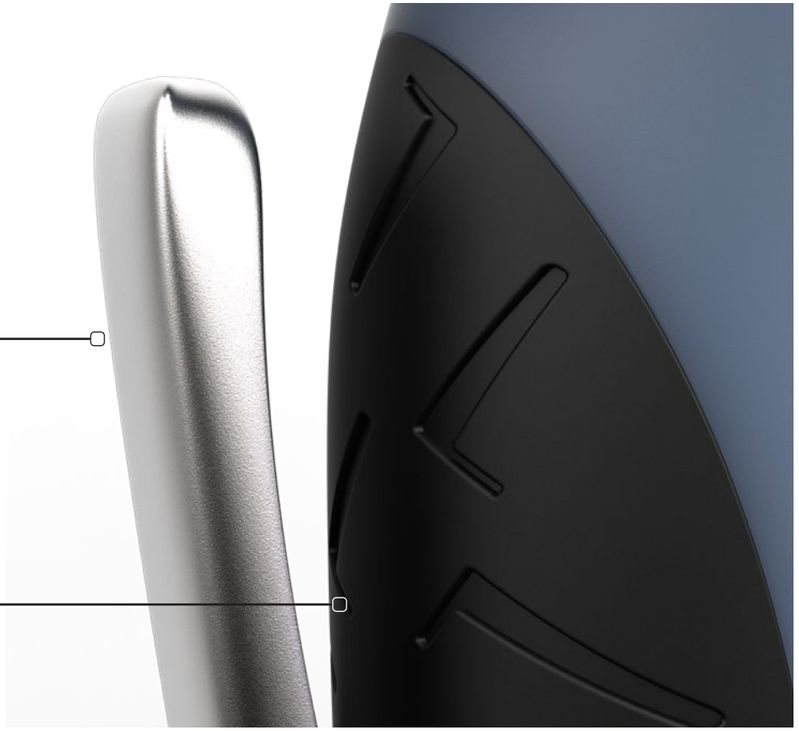
1/4” Quick disconnect air hose coupling



Air control valve based on paddle trigger position for variable power

Stainless steel paddle switch

Ingersoll Rand signature texture for front rubber grip for aesthetic and ergonomic value



Product Interior

Bayonet inspired fixture for hammer head attachment

Internal hammer mechanism