

# CLAIRE MENG

Industrial Designer • Portfolio

# STANLEY

works

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Stanley Black & Decker, Inc.

Emerging Market Hand Tool & Storage

## **I. Wrench**

Vertical wrenches increase accessibility and usability.

## **II. Measuring tape**

A great tape that responds the needs of EM market.

## **III. Level**

Light and easy to grip, perfect for DIY users.

## **IV. Ratchet & Wrench**

A compact combination set with various functionality.

## **V. Screwdrivers**

Makes operation easier and quicker.

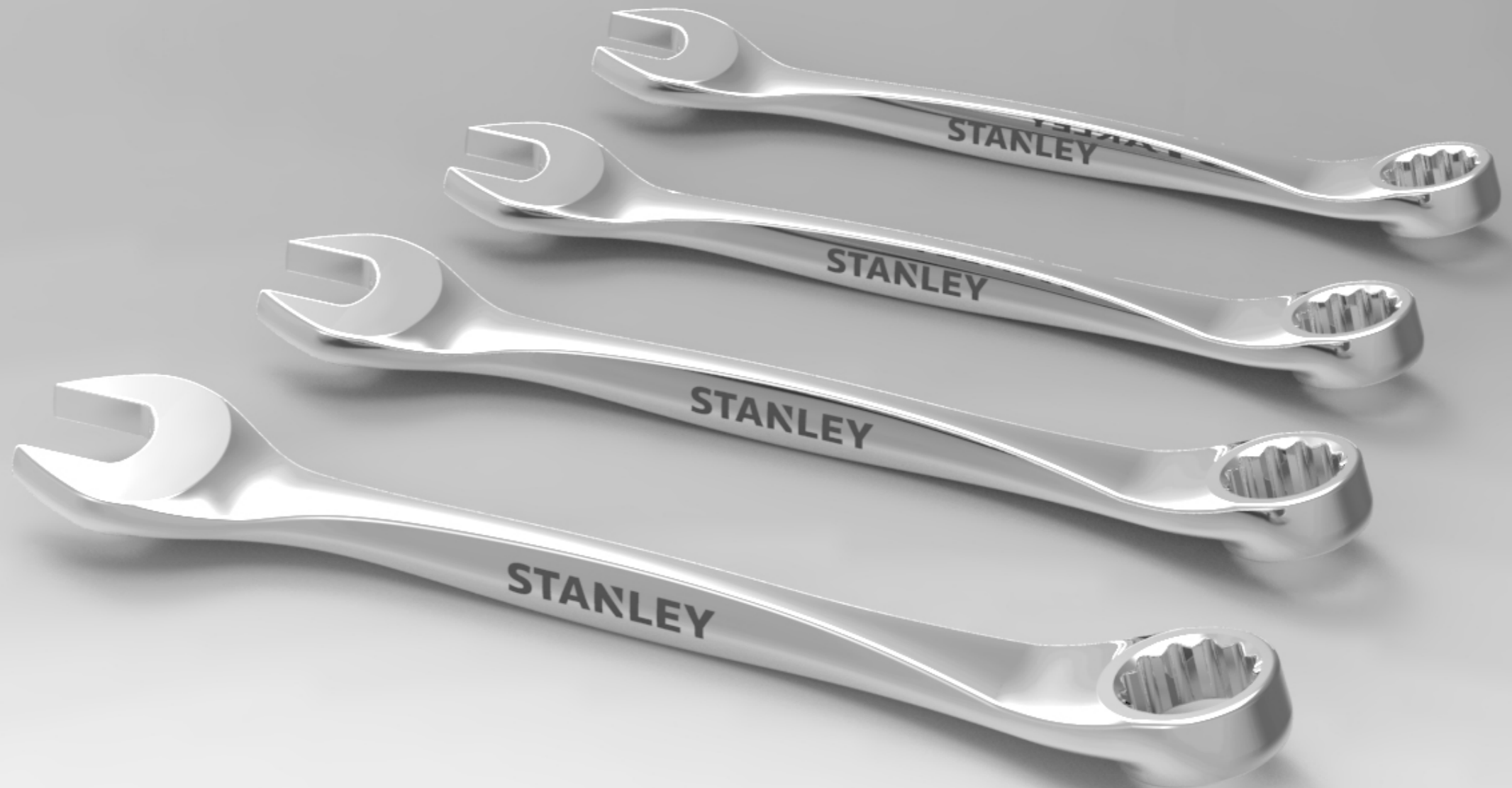
## **VI. Sketches/Renderings**

Automotive, pliers, power tool, storages...etc.

# [ Wrench ]

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Modern car designs are even more compact than in the past; therefore, mechanics are forced to work in very tight spaces. A tool that is highly versatile which can be used easily at difficult angles would help end users work easier and more efficiently.



## Combination Wrenches

Almost all the combination wrenches on the market have a similar design -- a flat handle with or without a concave marking on the top.

Does it really satisfy all the needs of end users?



## Details through Observations

Sharp Edges-

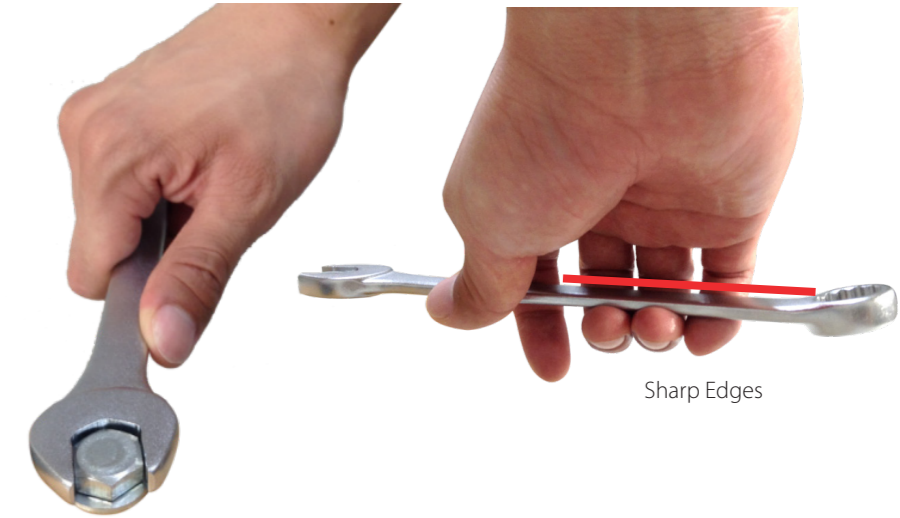
On current wrenches, contact surfaces for applying torque are quite narrow making a sharp edge for gripping during operation.

Low accessibility-

On box-end, most wrenches have difficulty reaching the screw in tight or concave spaces.

Difficult to grab from the floor-

Current wrenches lay flat on the floor and cause extra difficulty for end user to grab, reducing work efficiency.



Low accessibility

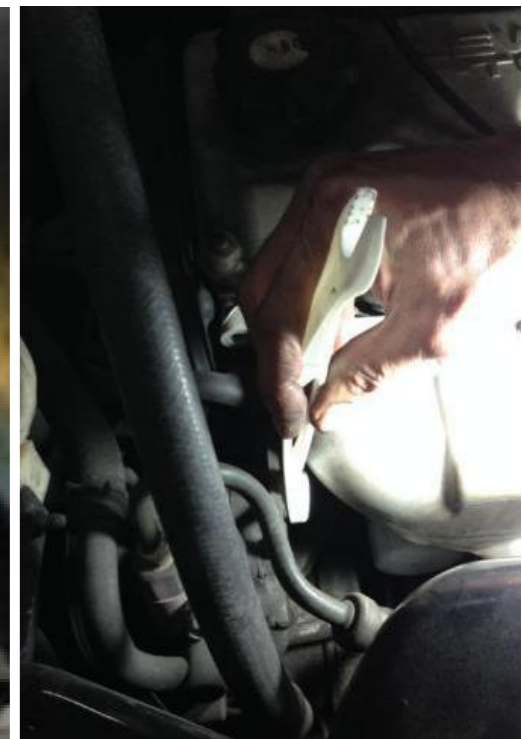


Difficult to grab from the floor

Various applications, versatile usability (good to use in different holding positions) and high accessibility are the essential key points that end users are looking for.



Therefore we have developed several options and consulted with end users to refine the details step by step.



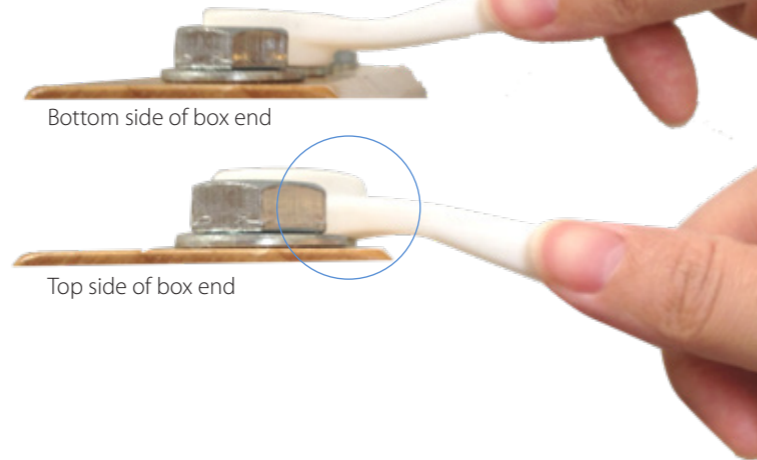
### 3 Prototypes

We narrowed it down to three design directions. Concept C was the favorite because users thought it was the most versatile for different uses.

It combines a vertical handle with tilted open/box ends creating maximum usability even in the tight spaces.

#### High flexibility

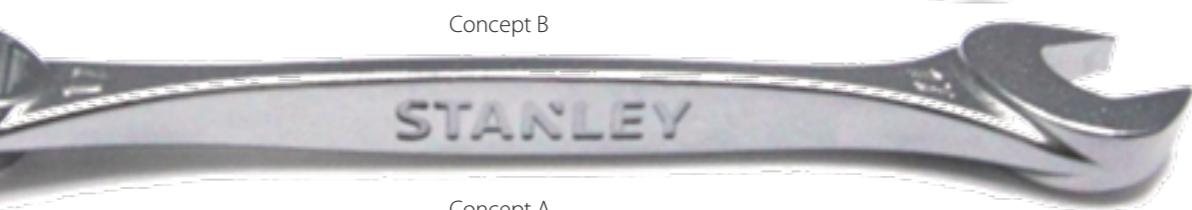
In concept C, both sides of box ends can be used.



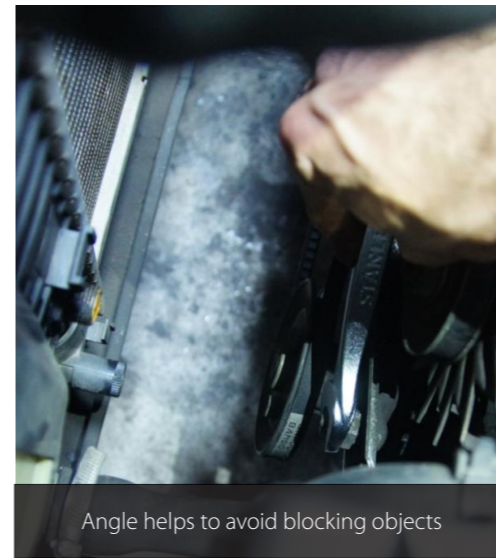
Concept C



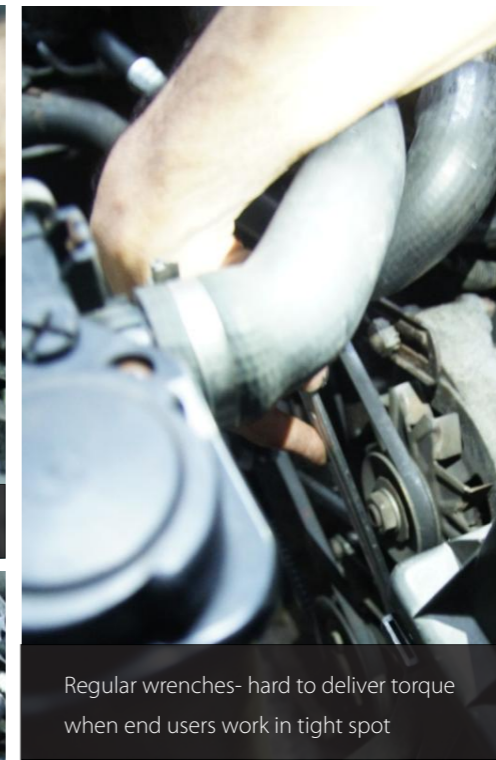
Concept B



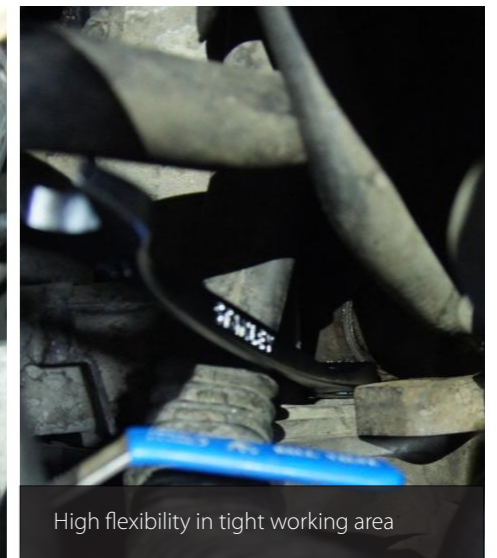
Concept A



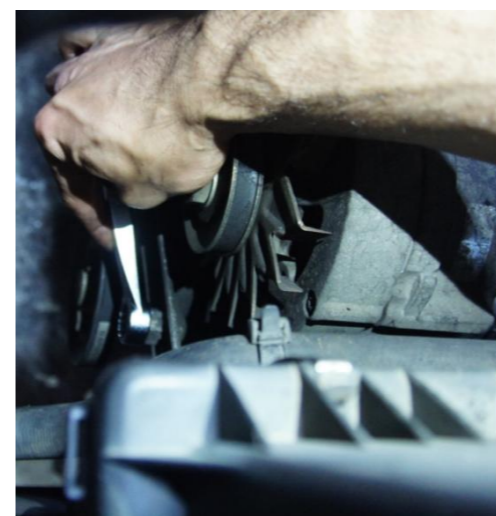
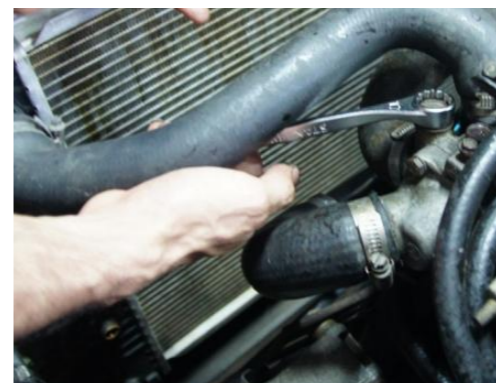
Angle helps to avoid blocking objects



Regular wrenches- hard to deliver torque when end users work in tight spot



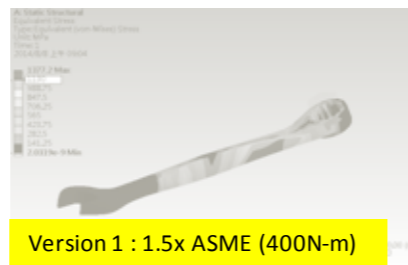
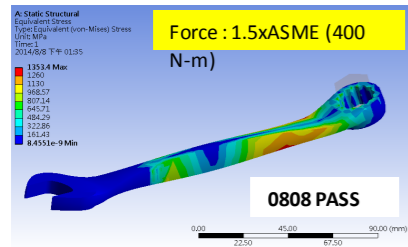
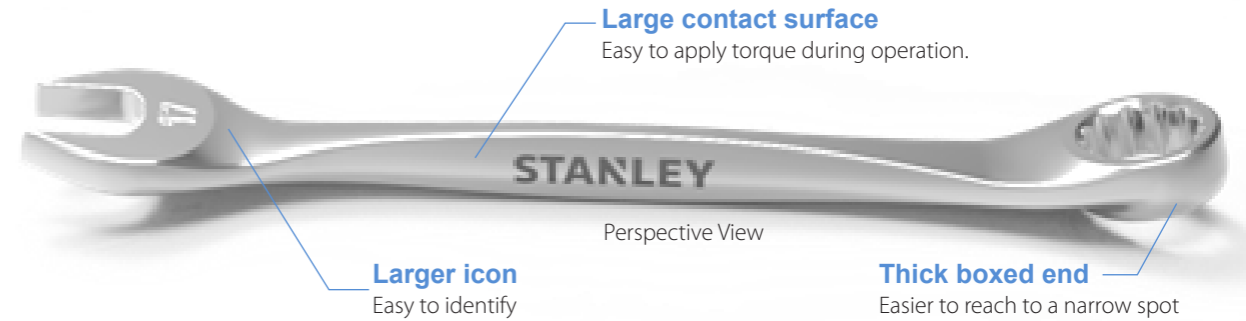
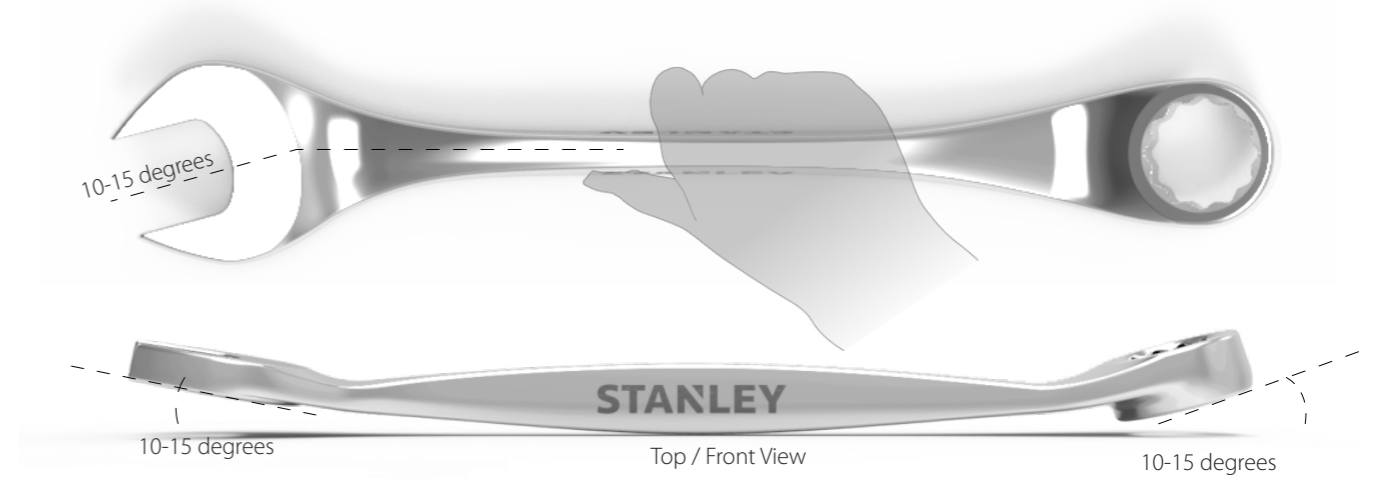
High flexibility in tight working area



Easy to apply torque



## Final Design



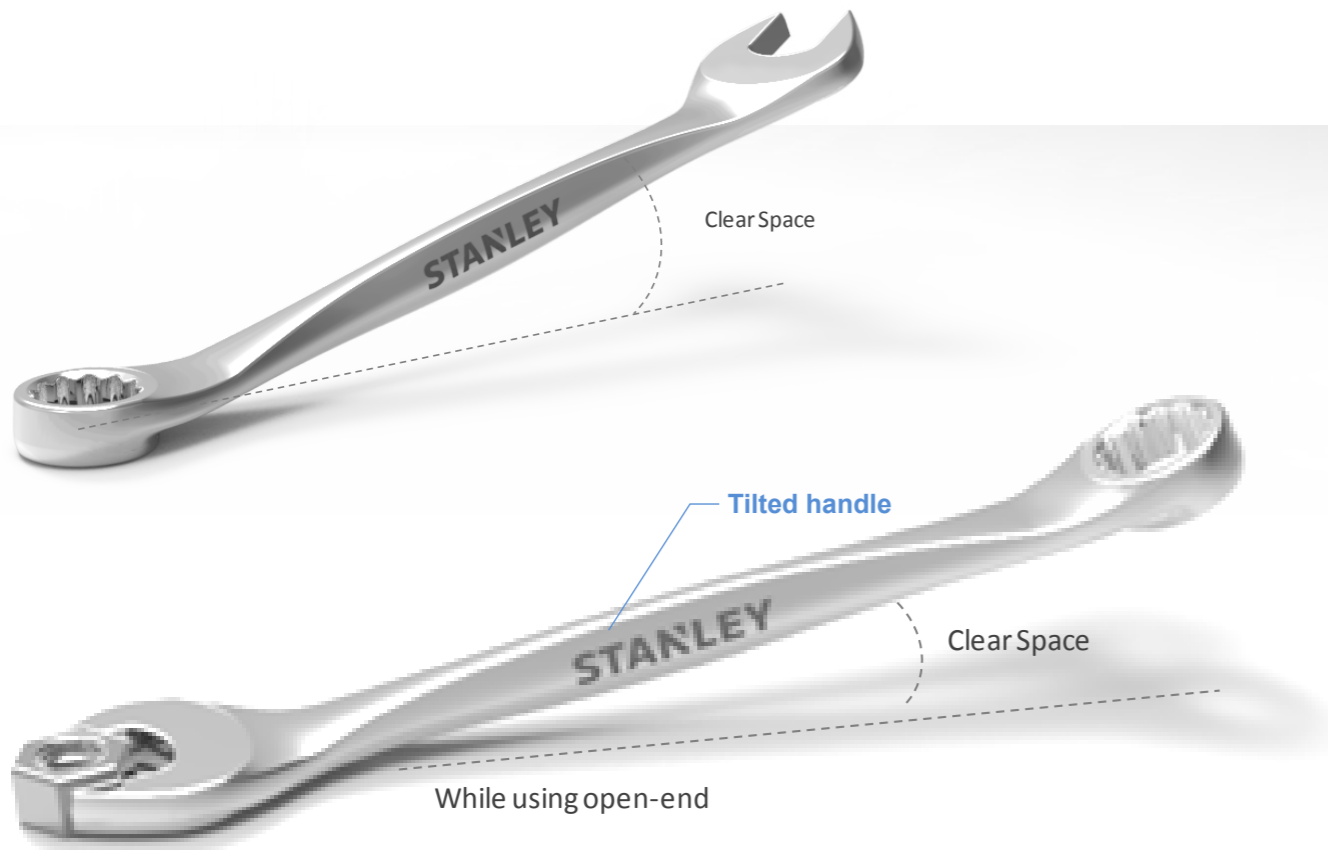
## Torque Analysis

One of the criteria for new wrench design is to make sure end users can use it safely in all circumstances. Which means it has to pass the torque request 400N-m for internal exam. And with the help of software analysis, I refined the details carefully and completed the test in the lab.

## Screw under surfaces

Taller box-end helps users reach the screw even under surfaces.

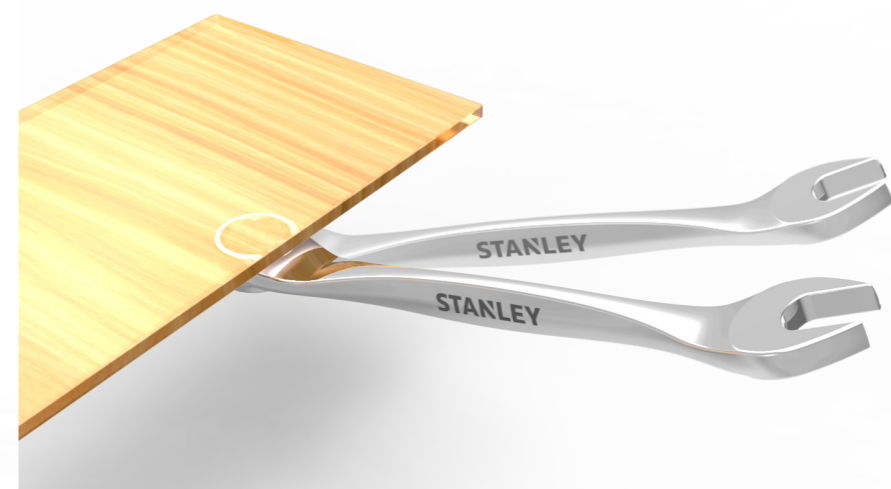
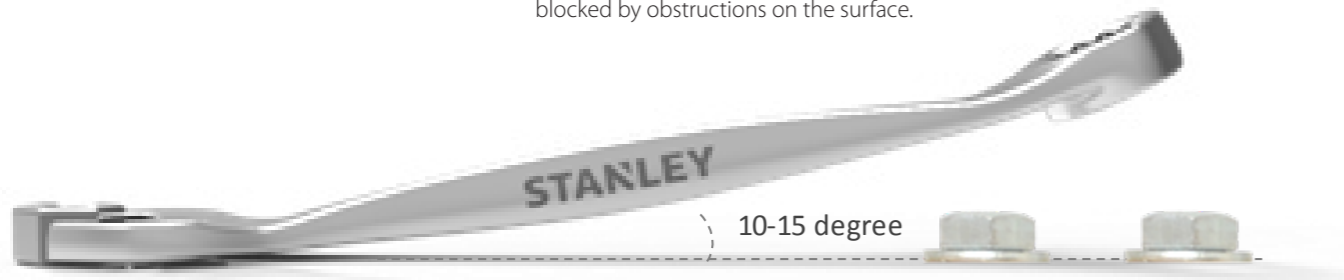




While using open-end

**No interrupted**

It helps user apply force more easily without being blocked by obstructions on the surface.



**Further Challenges**

For wrenches, the price of raw materials makes up almost half of the overall production cost.

Under the current manufacturing process, a new wrench design would use a similar amount of raw material, but increase end user benefit and create a better working experience.

However, due to the vertical orientation of handle, reducing the defect rate will be the next challenge.





## [ Bulldog ]

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Measuring tape is one of the most common tools in all construction. Strong, durable and bold looking tape is the language of Stanley. Due to the fact that users in emerging market generally have smaller hands, it is difficult for EM users to operate a measuring tape from the US. Therefore, designing a compact tape that stands out would help the brand to earn market share.



Muscle stretch



Bend wrist



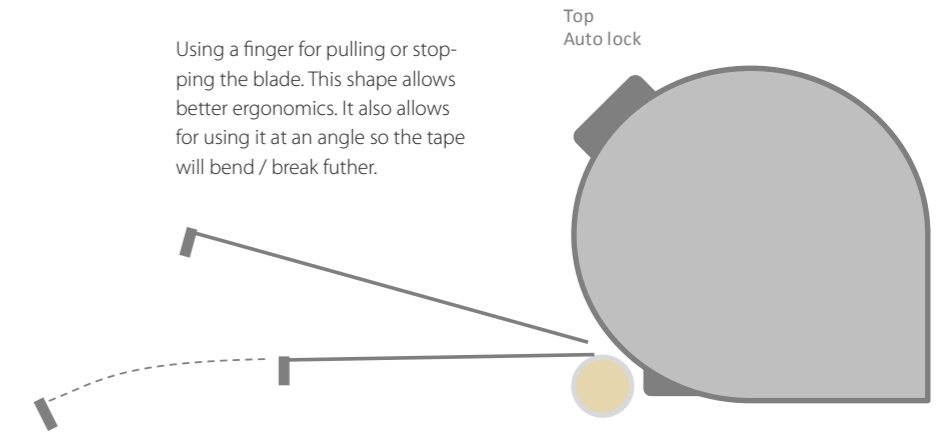
Easier for small hands to hold and operate



### Tapes for Emerging Market

Stanley is a well-known brand that produces strong, durable and bold looking tapes which speak to its brands. However, for emerging market end users, standard sized tapes are actually hard to hold based on the difference of physical structures compared to Caucasians.

Current tapes in emerging market generally have 3 basic shapes; however, are they really the only response to the needs of users in this market?



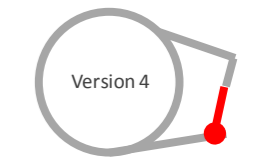
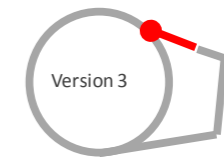
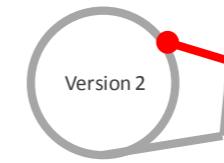
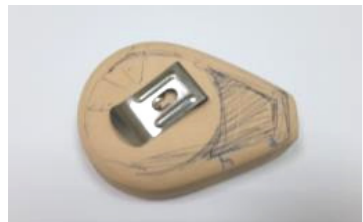
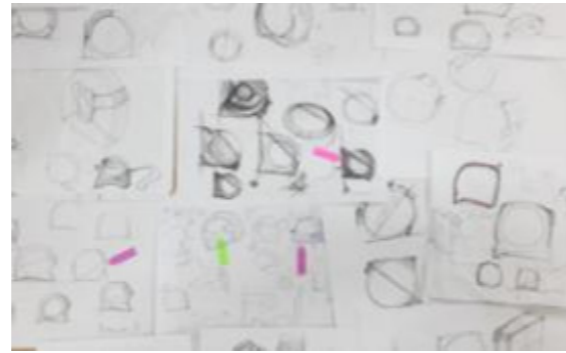
### Ergonomics for emerging market

After consulting with end users and stakeholders, we found that most end users put their index finger in front of blade entrance to simply pause the blade for quick use. Taking this common working behavior into consideration, we found a unique shape which not only firmly supports the palm but also goes along with operation.

### Design Based on The Needs

Based on previous studies, we decided to have a pause button near the blade entrance so users can operate the tape fast but don't have to worry being cut by the edge of blades.

We also noticed that current belt clips are not very helpful and slow down the working process. Therefore we started a series of developments in tape storage.



Easy to use without changing holding position

### Multi-Purpose in Details

Through observation, we know some renovation /construction projects require users to work on rooftops and require precision and efficiency. By combining a measuring tape with a carabiner, it enhances functionality and also saves cost by reducing the material used.



## Design Features

- Intuitive metal carabineer

Strong and durable allowing user to use little finger to open for hanging or storage.

- Detachable magnet

Strong magnet holds securely onto metal surfaces.

- Big font with double sided print
- Wider slide button

Larger touch platform provides easier control in various holding positions.

- Stop/Pause button

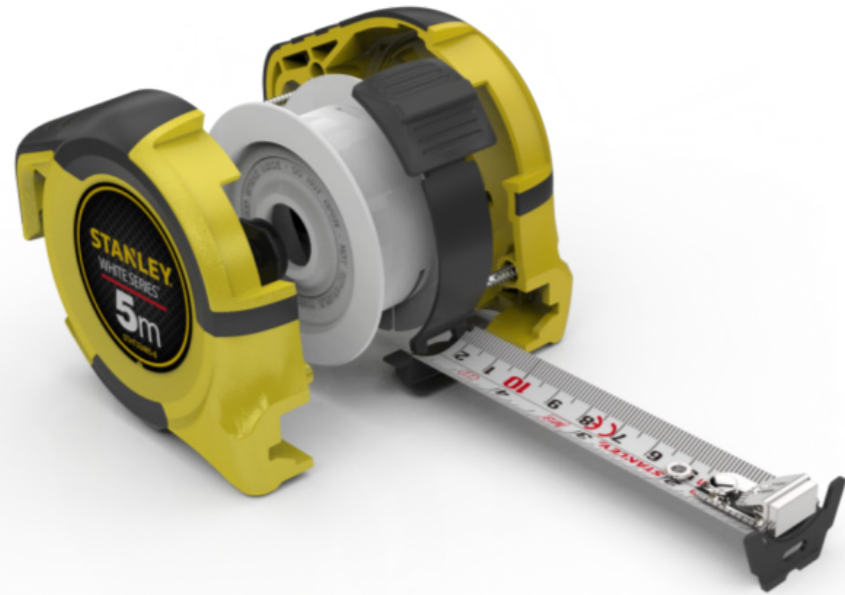
Pause button reduces the impact of retraction force and allows end users to apply gentle control for a safer working environment.

- Multi-catch hook

Can be hooked on the material from any side with ease.

- Left / right-handed operation

If carabineer can replace belt clip in the back, then our bulldog can be used in both left and right hands.



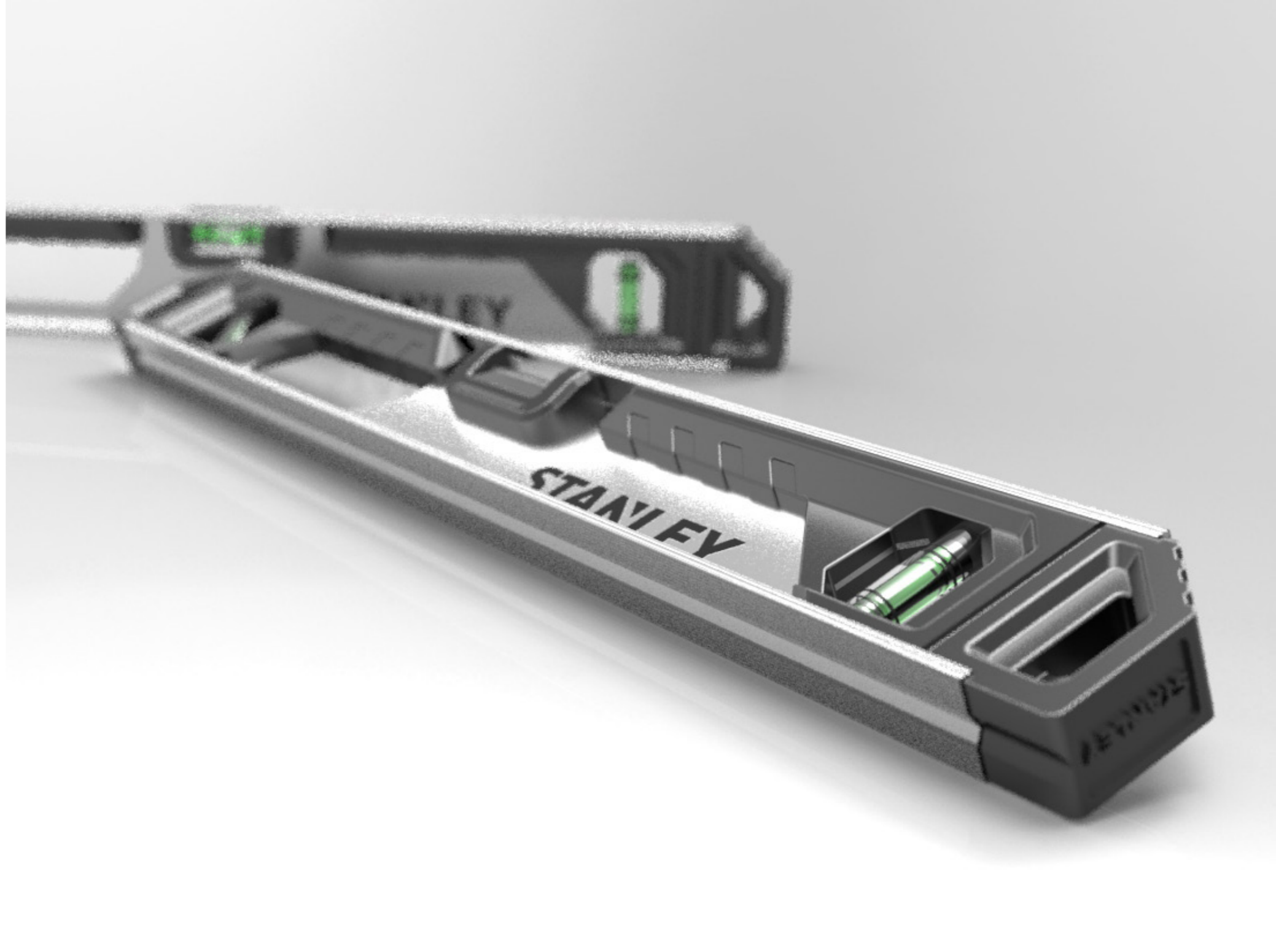


# [ Level ]

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Have you ever tried to hang artwork straight on a wall? Heavy box levels are hard to hold vertically. Smooth edges make them difficult to grip for long.

What if we lightened the level but increased the accessibility. It could be an ideal product for DIY users.



**Opportunities (MPP)**  
 Something looks strong but light weight



I beam

Box beam



2 Aluminum extrusion bars



Z section for easy carry

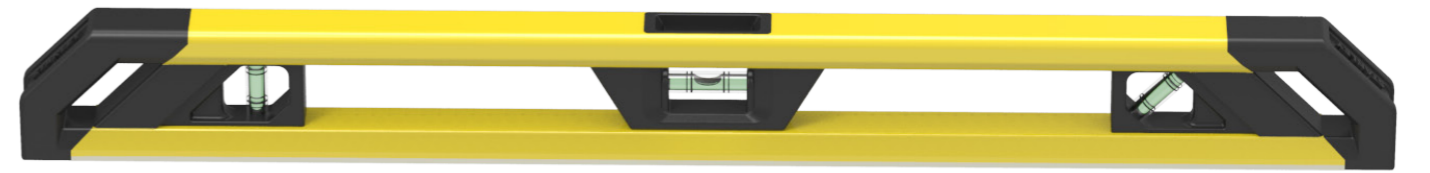


Minimum of Aluminum used.

**Opportunities Explored**

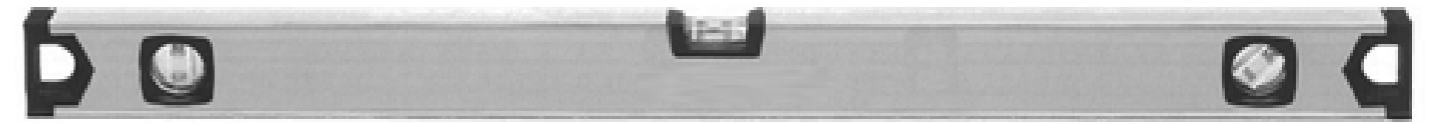
The box beam level is strong, durable and the most common level in the world. However, for emerging market, we are seeking a design which is more cost competitive.

**New design v.s. Current existing product**



End caps+ vial= one part

End caps+ vial= one part

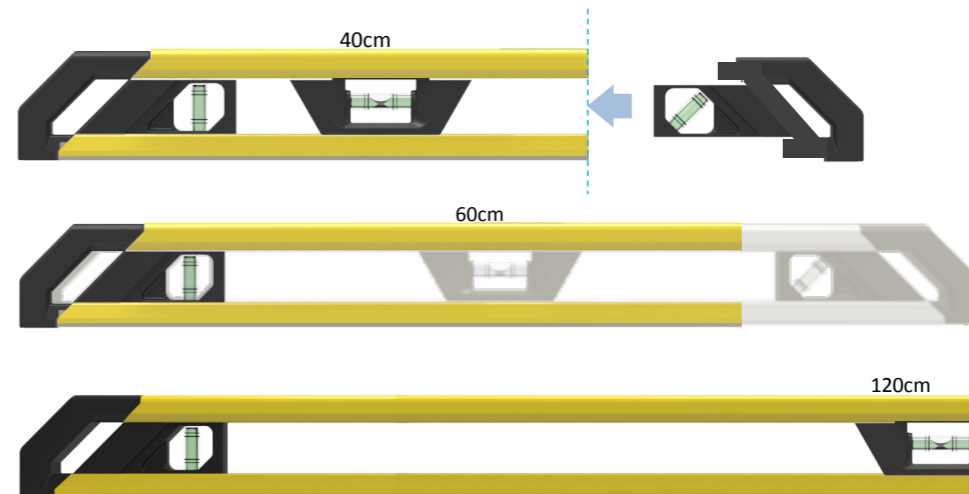


End caps Vial

Vial End caps

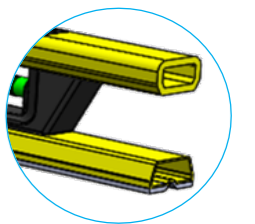
**Less plastic parts**

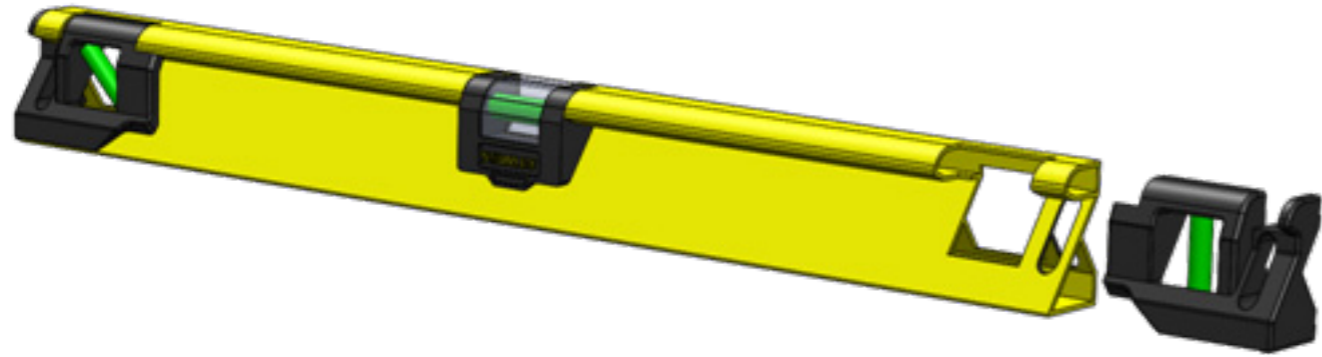
we reduce the numbers of plastic parts by combining end cap with vials together.



**Building Platform**

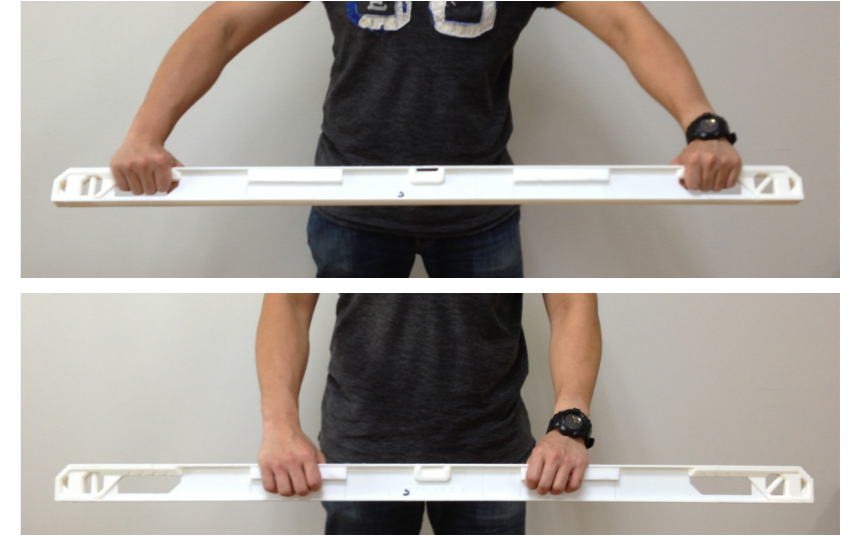
No matter how long of the level, it all can be completed under the same assembly process.





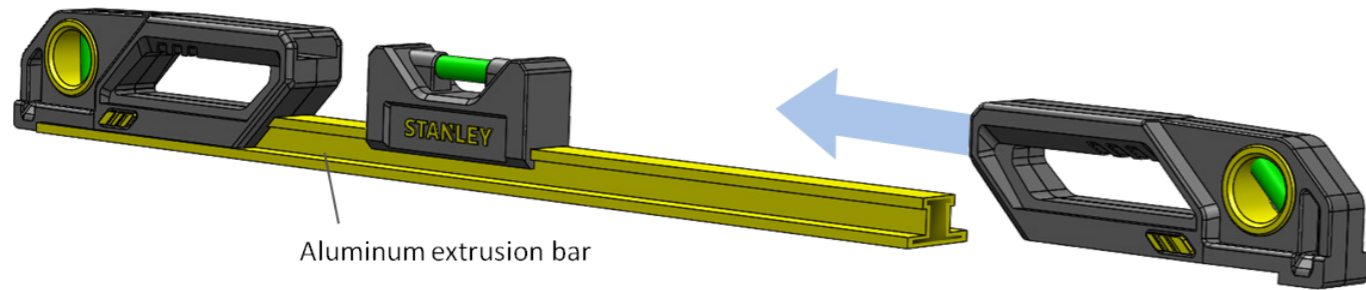
**Value added**

Doesn't like regular I-beam, this design utilized the shape of aluminum to be strong and durable in structure, but also formed as part of handle for easy carrying around.



**3 components are shared with all sizes**

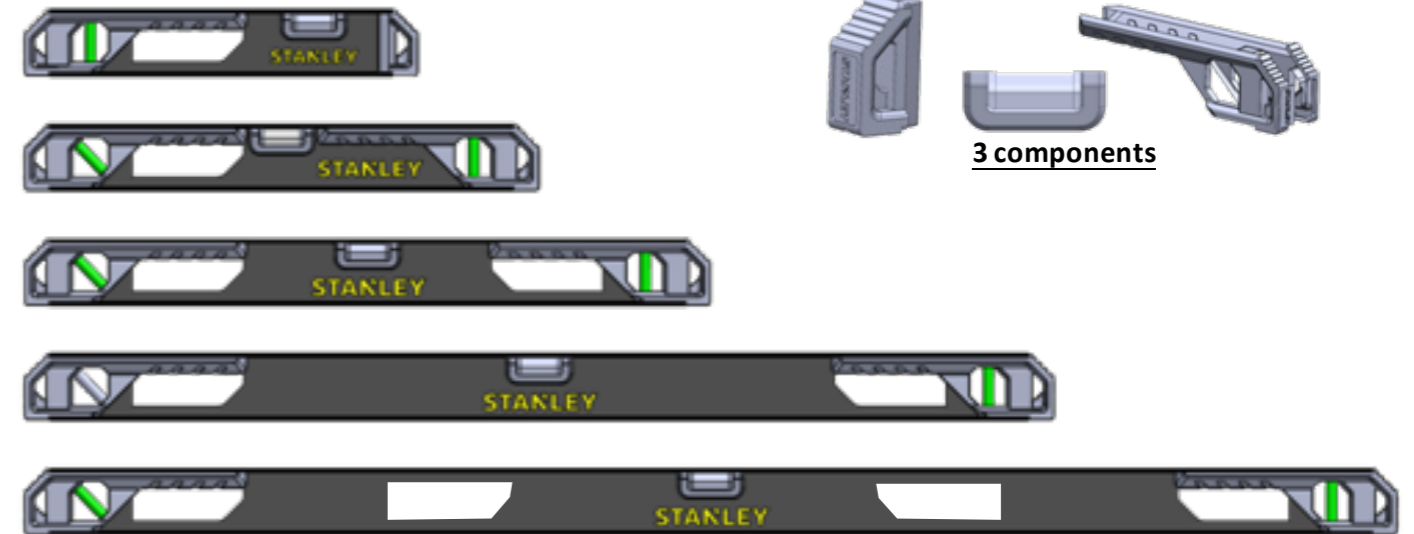
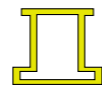
1. Vial left and right can share same component.
2. Use same mid-vial design.
3. Only 30cm level requires extra part for end cap.



Aluminum extrusion bar

**Less metals**

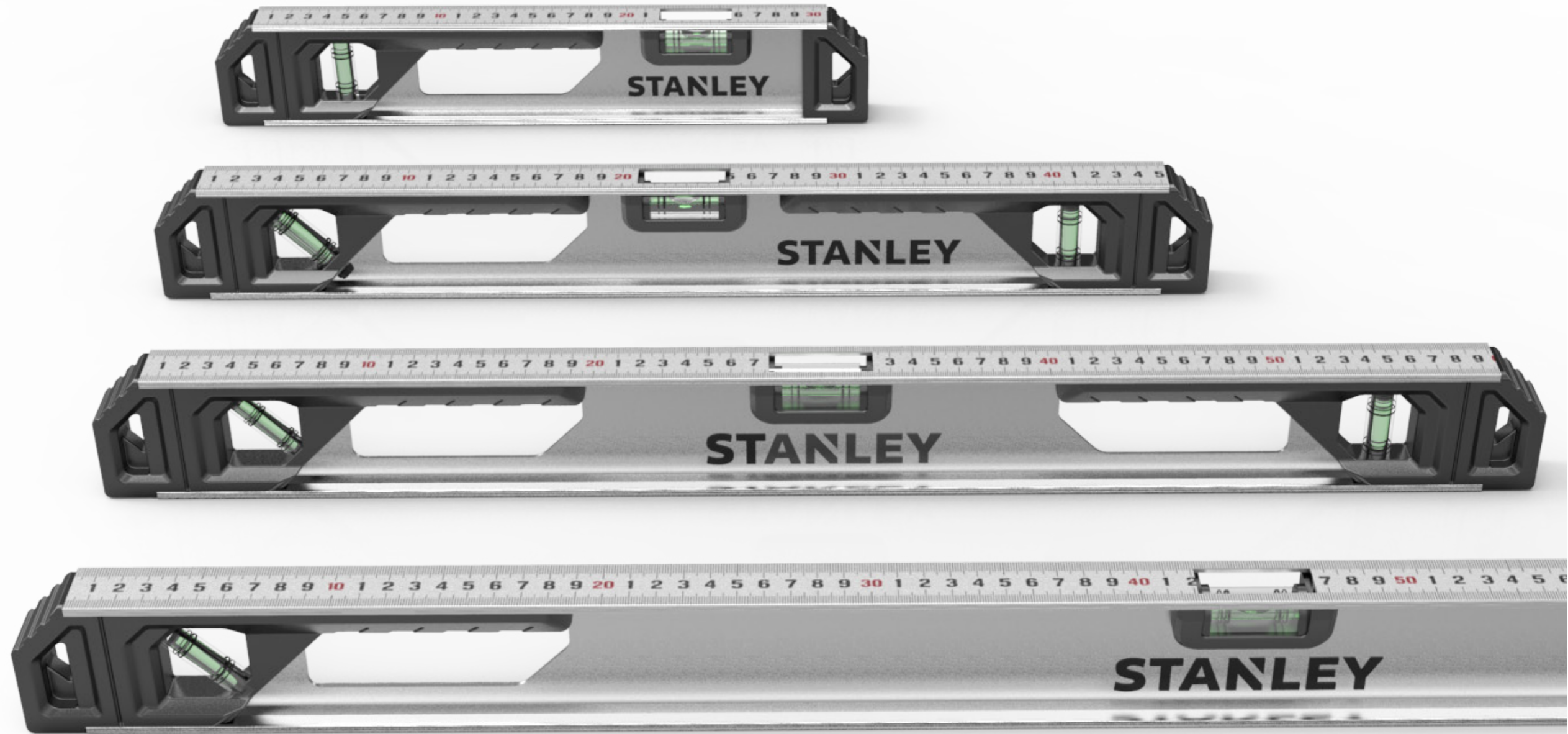
we have tried to reduce the amount of metals that we need, and came out this design which has minim of Aluminum used.





## Design Features

- More competitive in price range
- Designed with platform in mind
- Pad print scale on the top for extra usability
- Milling surface to enhance accuracy
- Large window for high visibility
- Large handle for easy access

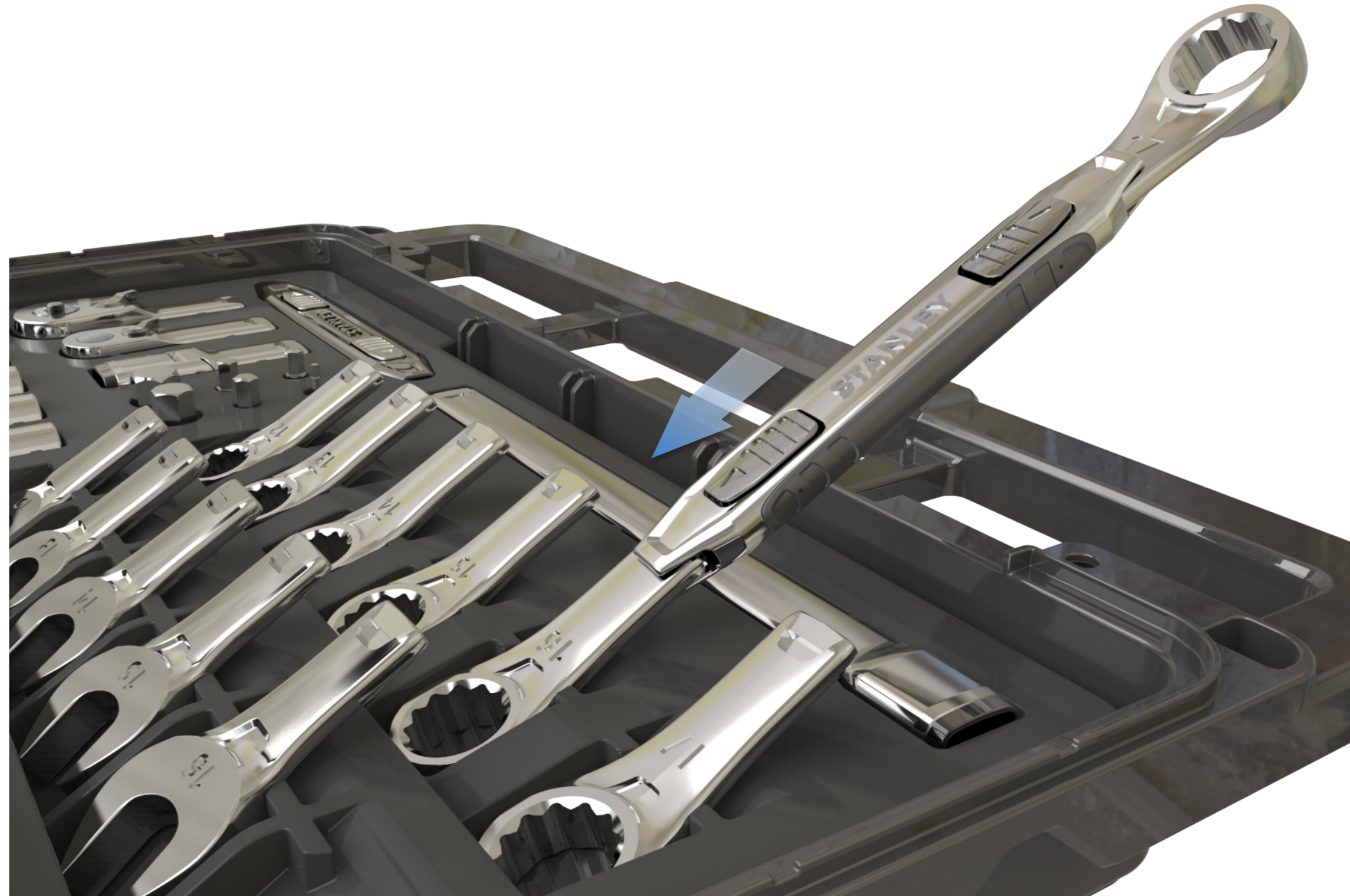


# Ratchet & Wrench [ combination set ]

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The idea of this project is to discover any opportunities in the automotive category which can enhance user experience and create more benefits in an affordable price range.

By leveraging what we observed during research, we discovered some interesting facts that intrigued and inspired us!



**Dieter Rams**  
"Less is more"

**Status Quo of GEM**  
"Cheap is more"  
便宜就是更多

Emerging market is without doubt a price driven market; however, they are also thrifty with the resources they have. They always try to fix/change the modular part instead of buying a new tool. This gave us an idea – what if we are able to utilize this opportunity?



Modular Component

**Interchangeable**

If we separate the head (modular part), then users don't have to buy a whole new tool again once the head is damaged. They can keep their old handle and just replace the broken part.



Different heads

Opportunities such as:

- Torque meter
- Light
- Angled extensions
- Joints
- Extension bar
- Male to male

**High flexibility**

Once the head is modular, it means users can replace the head to achieve different functionality. The tool can become a box/ open end wrench, ratchet and bit ratchet, all sharing the same handle.

**Cost reduction**

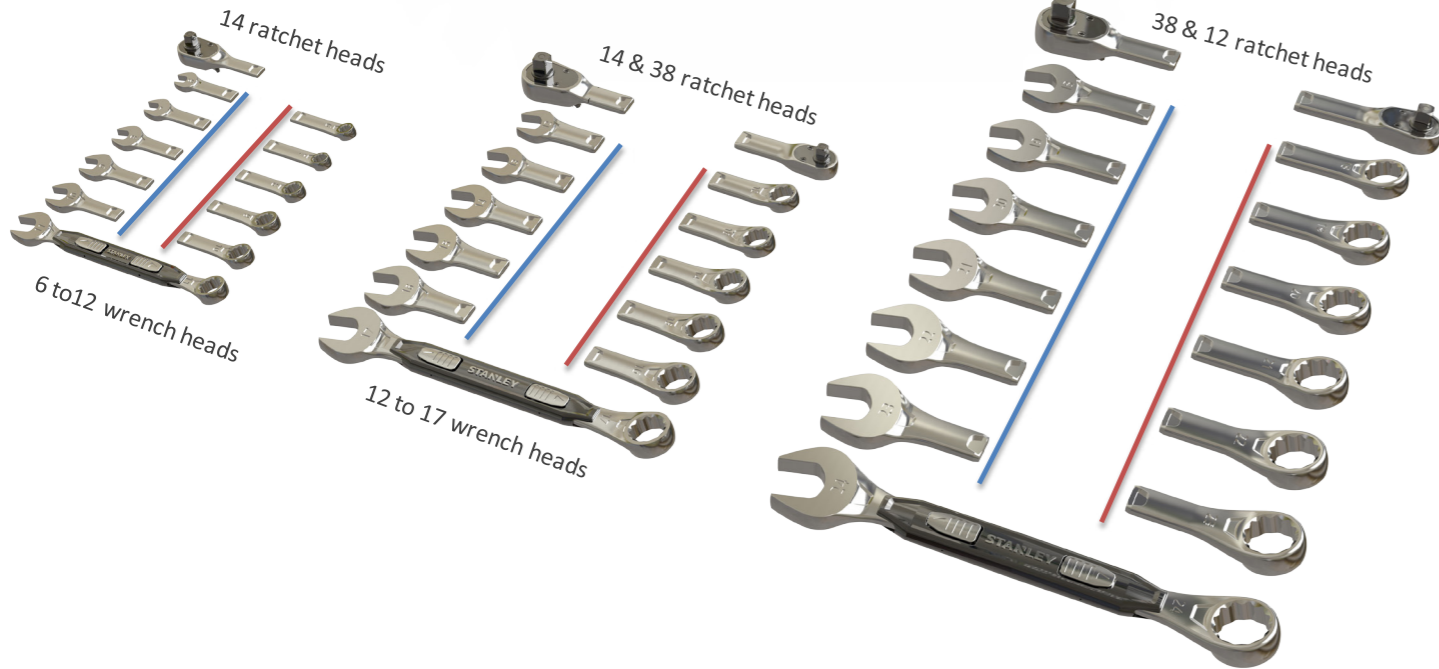
- Less material means lower cost.
- Smaller forging means higher yield rate.
- Users can spend less money for essential components.



### 3 handles shared with full range

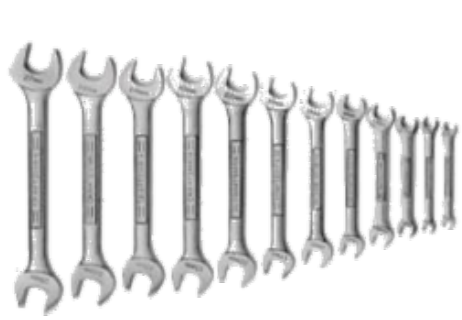
Based on the differentiates of size, 3 handles can cover the whole range of combination wrenches-

Each side could have different heads or sizes attached for various application purposes.



**30%**  
**less space**





*Open end wrench*



*Box end wrench*



*Combination wrench*



**Compact design**

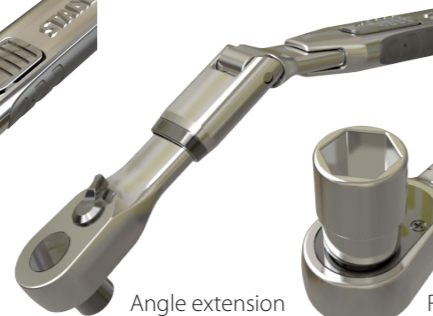
Compared to existing wrench sets in the market, this concept can merge three wrench sets into one. It is lighter, more compact, more flexible and more usable as a single set.



Ratcheting ring



Bit heads



Angle extension



Ratchet heads plus sockets



Quickly and comfortably access various heads



# [ Screwdriver ]

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This is a localization project designed to meet the needs of specific regions. The goal is to design a classic hexagonally shaped screwdriver which is not only comfortable to hold but also easy to apply torque during use. The design enhances the user experience by making the task safer and faster to win the market.



## Goal of this project

The goal of the project is to design a screwdriver which fits the needs of emerging markets such as India, Mexico and Brazil and to create a simple, durable and more efficient-to-use screwdriver for the masses.

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## Design requirements from regions:

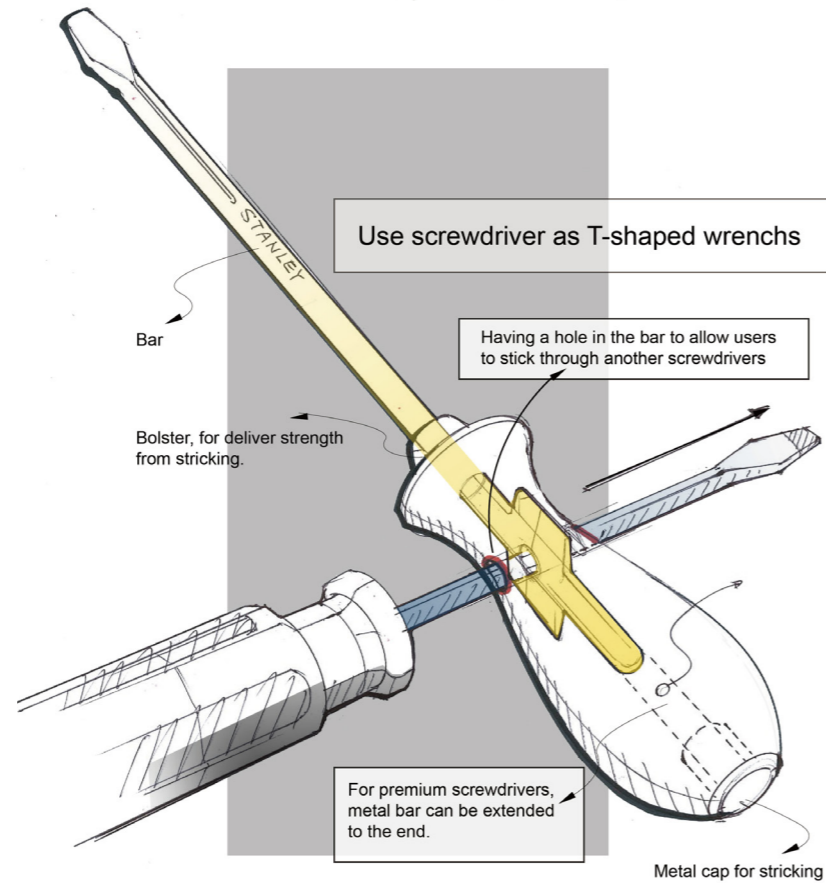
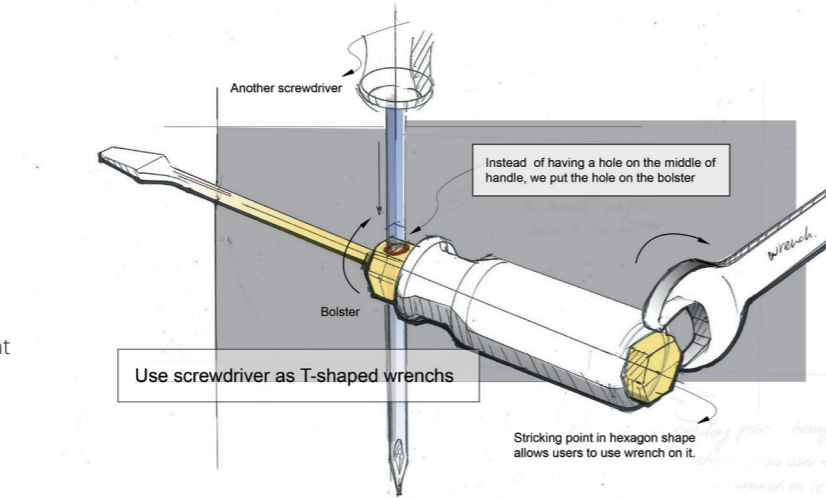
Precision cold-formed tips with hex cross-section handle.

## SD Types

Screwdrivers are one of most common hand tools for both consumer and industrial end users.

Industrial- needs high impact resistance handle with heat-treated alloy steel bars to hold up to stronger torque and repeated use.

Customer- needs ergonomic handle with slip-resistant textured grip for comfortable hold.



These two ideas focus on industrial end users and allow them to apply stronger torque and work more efficiently.

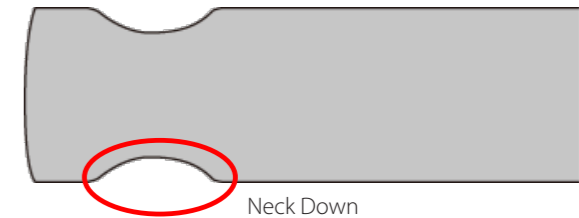
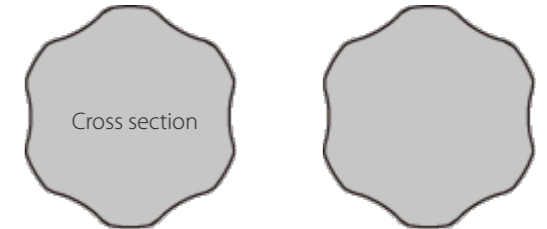
## Cross-section

Square, tri., and round cross section handles all have their own unique benefits for end users.

A square handle fits well in the hand and helps to provide additional torque, a tri cross-section allows the user to apply more torque, and a round handle is the most comfortable to hold but may roll off of work surfaces.



Typical straight handle.



## Current Hex SDs

Most of hexagon SDs are made by extrusion process which only provides one type of cross-section to hold.

The cross-section is very close to round which could become slippery if greasy, causing extra difficulty to operate. Also, the neck down area is shallow providing poor support for fingers while pushing the screwdriver.



## Design Features

- Different sections designed for different purposes.
- Wider neck helps to fix the handle in hand during operation.
- Deeper grip for maximum contact.
- Ergonomic design provides better user experience.
- Larger diameter in palm for higher torque.

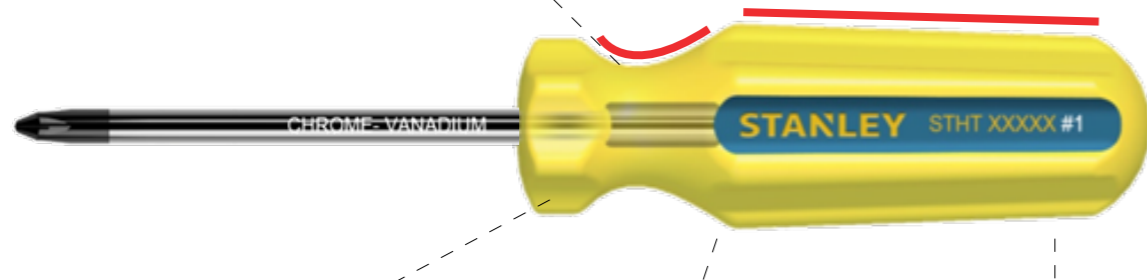


### Tilted Handle

Helps to prevent slipping while pushing.

### Neck down

Deeper neck allows users to apply strong force easily.



Cross section 1

Cross section 2

Cross section 3

### Rounder section

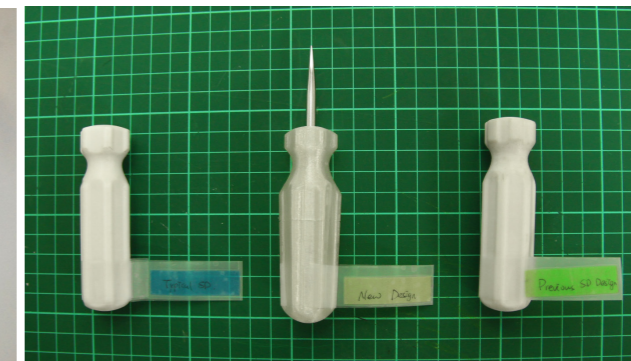
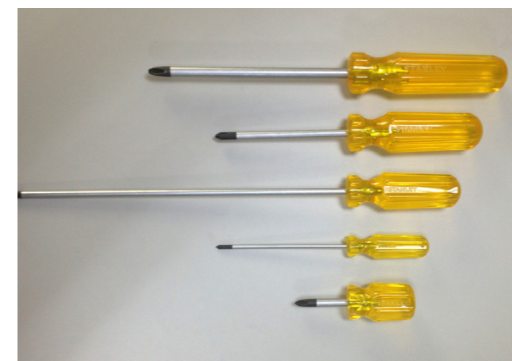
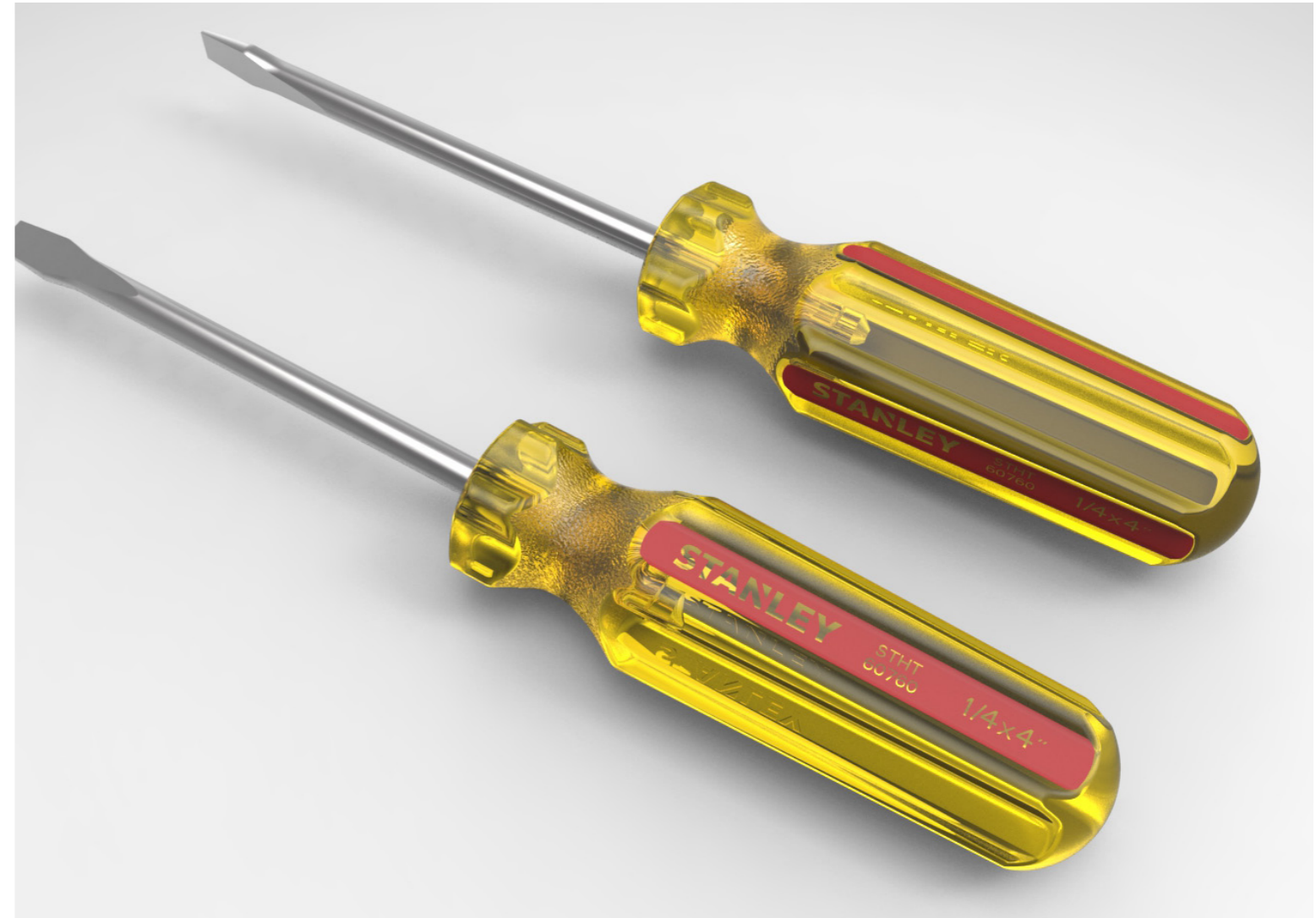
Larger radius for better touch feel.

### Wider diameter

Provides more surface contact with the handle making it easier for end user to apply torque.

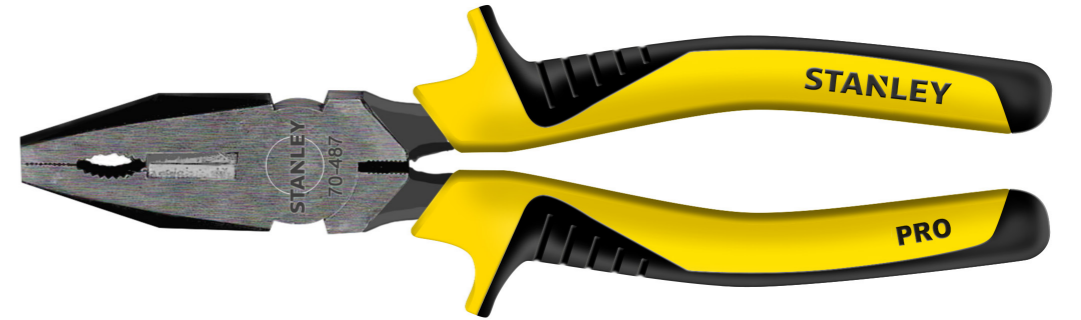
### Smaller diameter

Smaller end for quick turning.





[ 2D Renderings ]



# [ Sketches ]

