

An Internship with

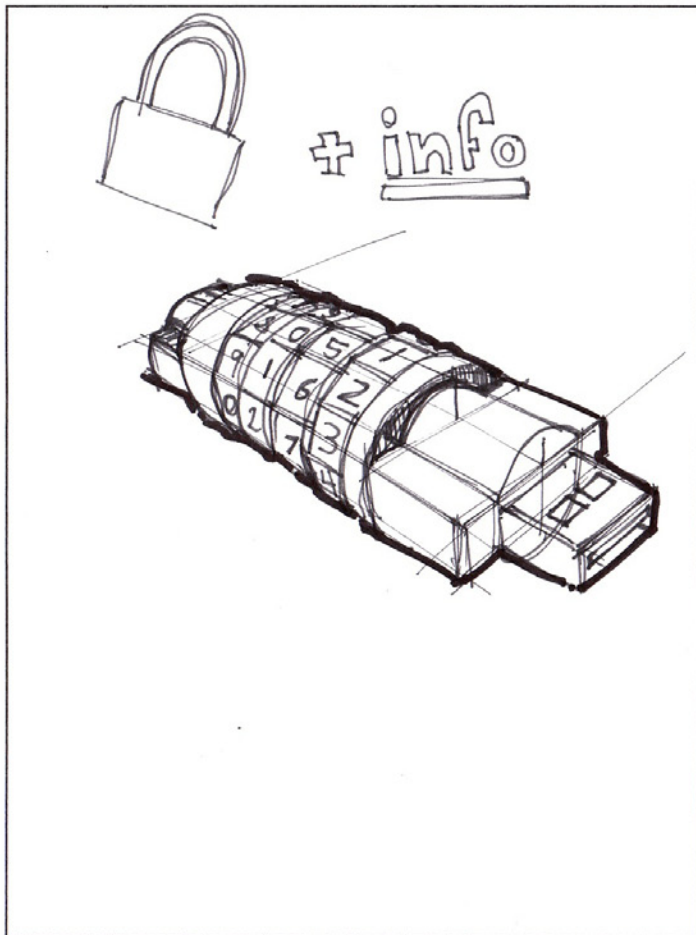


Abraham Peters

*Merging analog and digital hardware to create
a safer way of protecting your content.*

Big Idea Small Paper

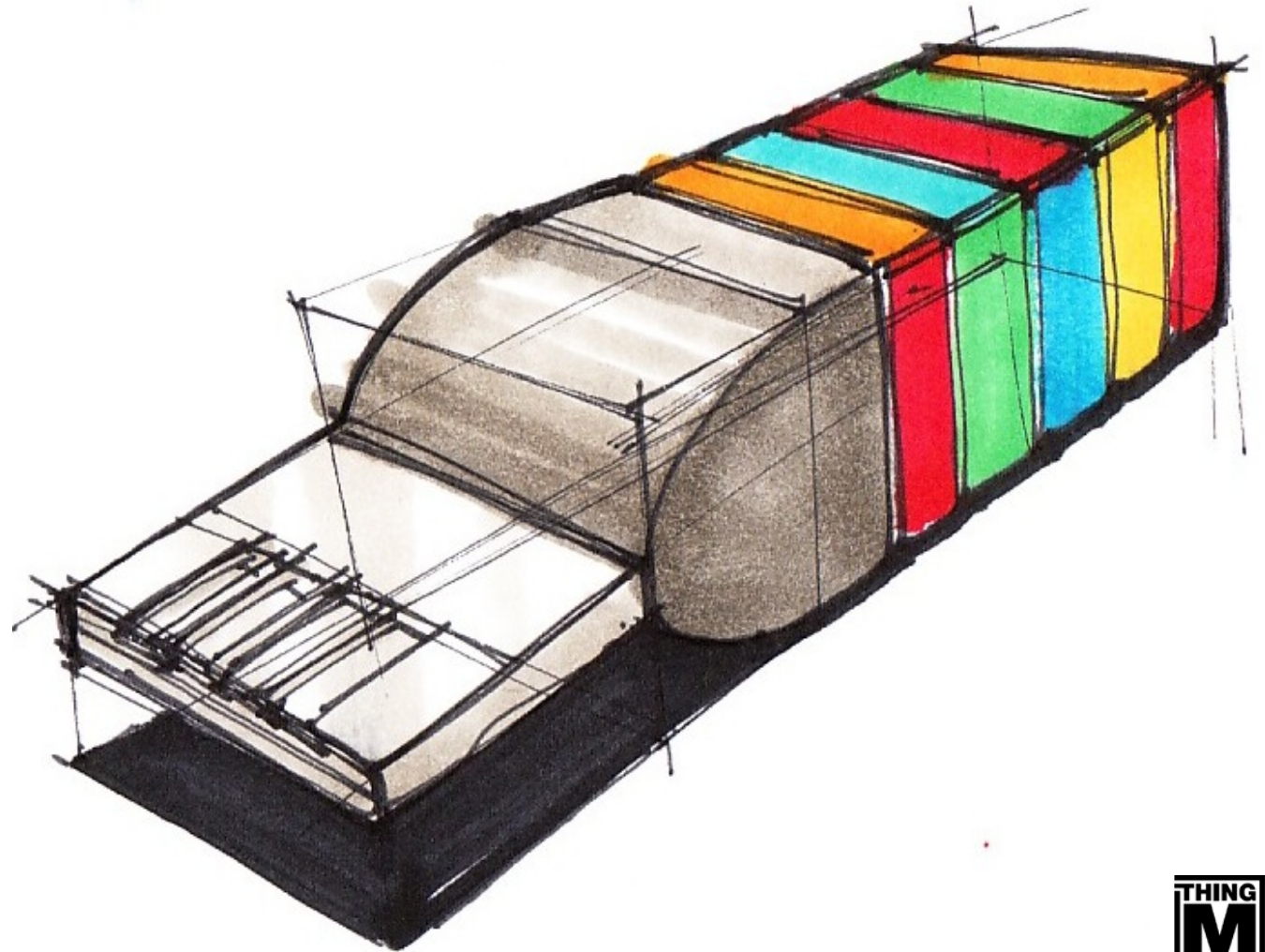
ThingM Internship
Abraham Peters



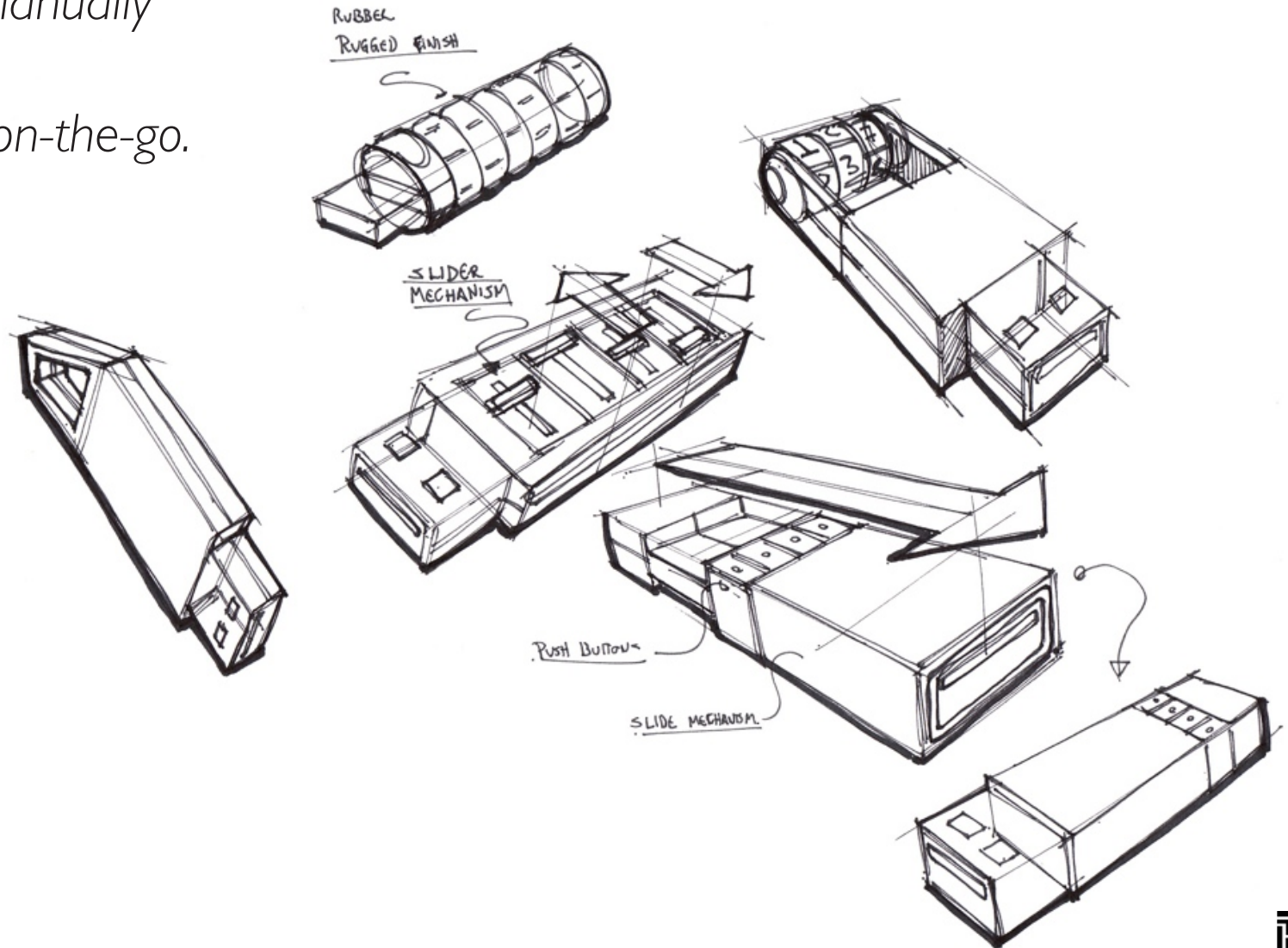
Pad USB

A USB with a manual lock that protects the data while on the go. Could use rubber belts to create the number pad for the locking mechanism.

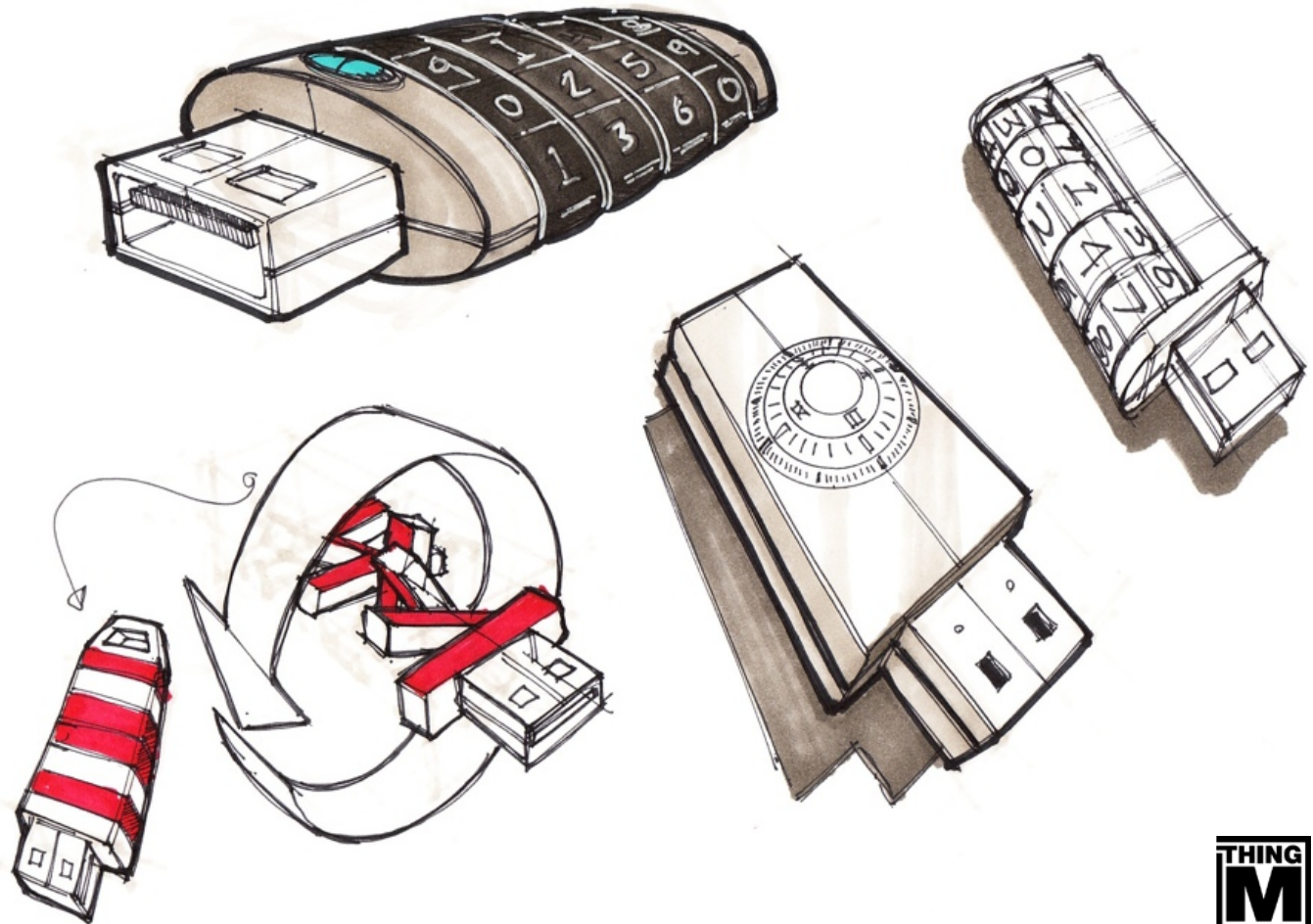
Combination Lock USB Flash Drive



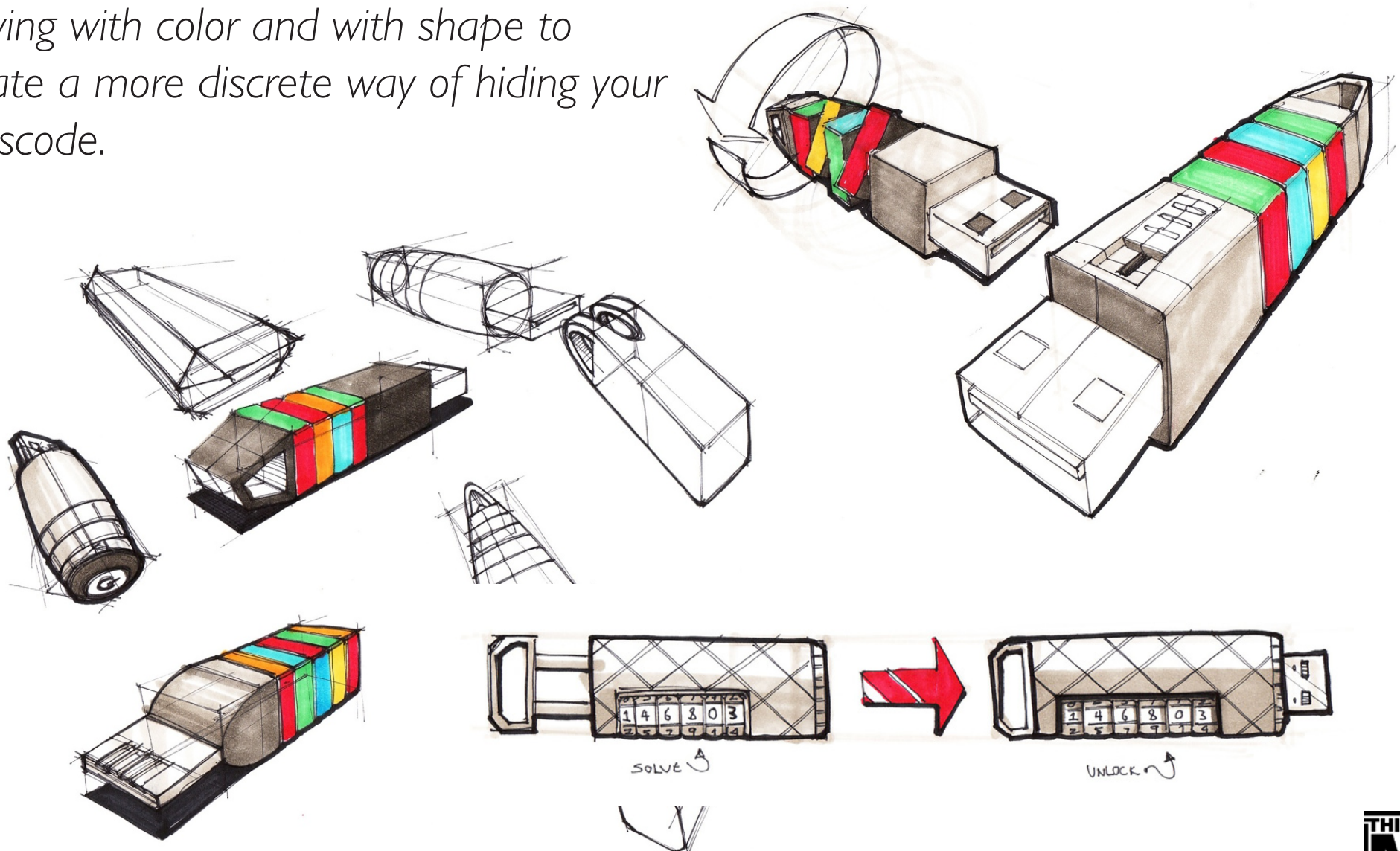
Create a way to manually lock your sensitive information while on-the-go.



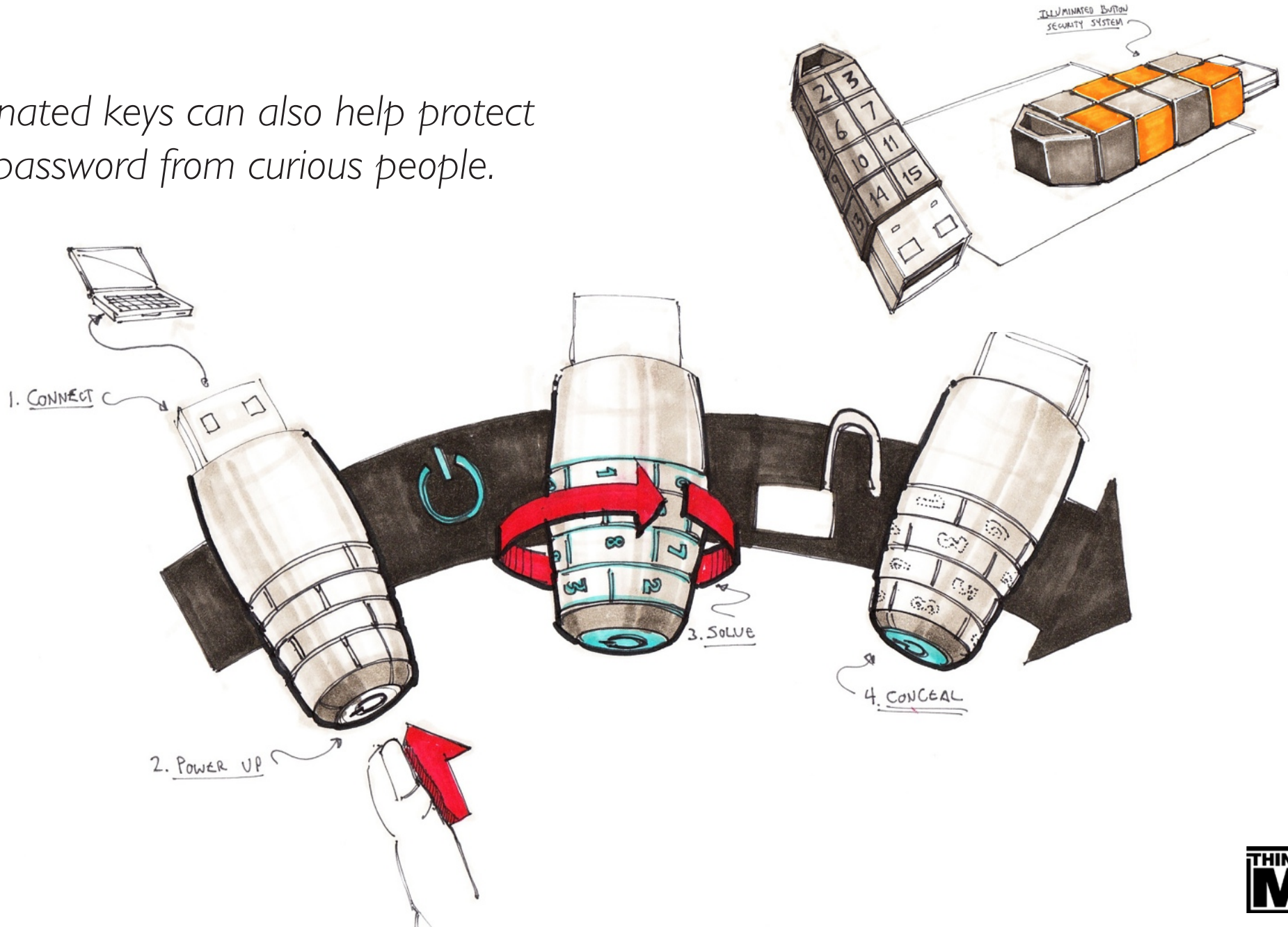
This USB flash drives uses a fun and quirky combination lock system that protects sensitive information and makes transferring files magical.



Playing with color and with shape to create a more discrete way of hiding your passcode.



Illuminated keys can also help protect your password from curious people.



Pico USB Flash Drive

Purchase a couple of Pico USB flash drives to determine minimum size and overall dimensions.

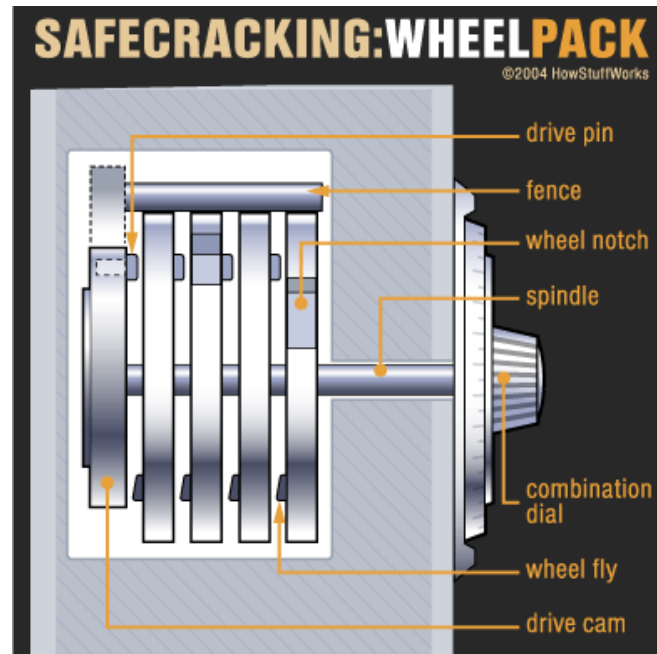
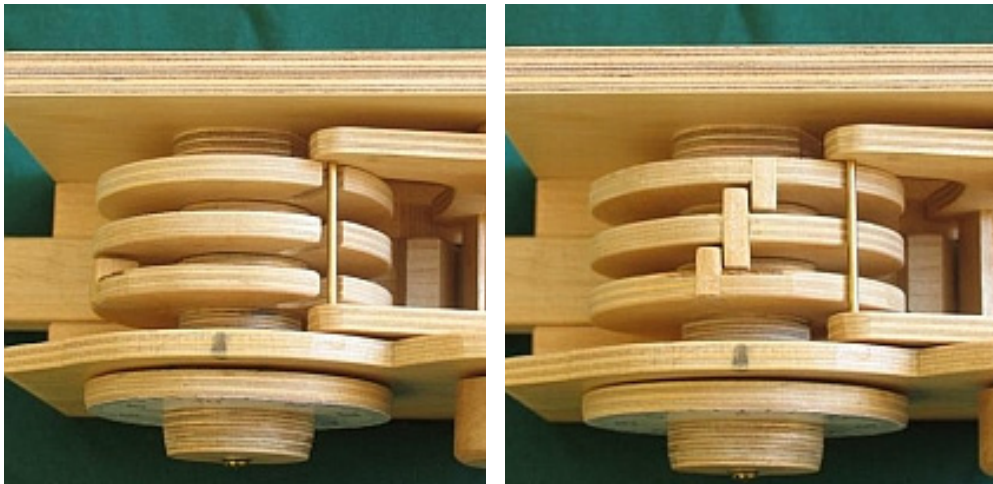
Things to notice: No visible hardware on pico drives; everything is encased inside a plastic housing. Much smaller than more traditional USB drives.



How do Locks Work?



Understanding the basic principal of how locks works will help us figure out how to make the USB drive functional.



How do Locks Work?

Bike Locks are interesting because they have no pins and rely on a customizable key combination to solve the lock.

Some initial problems in implementing this to the USB flash drive:

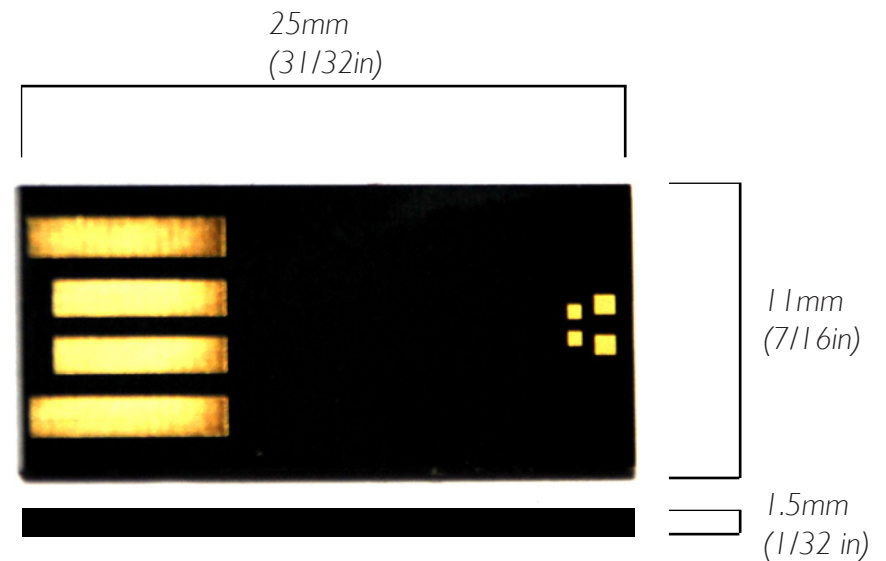
Metal connections “contact points”
Customizability
Security of Hiding the Key from others



Picos USB Dimensions and Environments

Purchase a couple of Pico USB flash drives to determine minimum size and overall dimensions.

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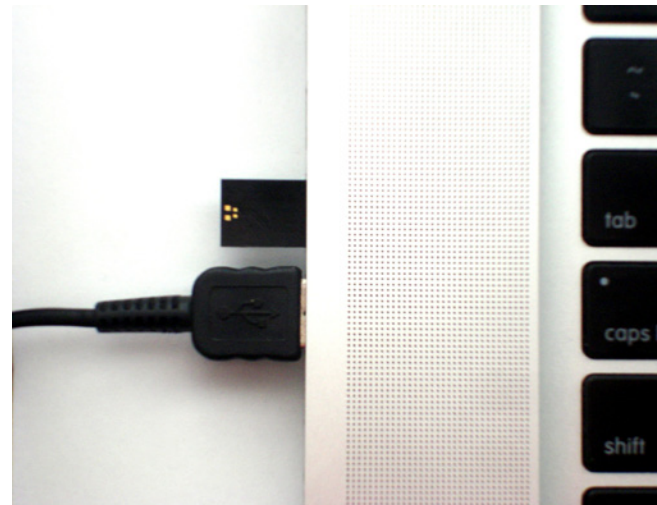
The Bad

Many USB flash drives fall under the “bulky” category where you are unable to use multiple drives or devices



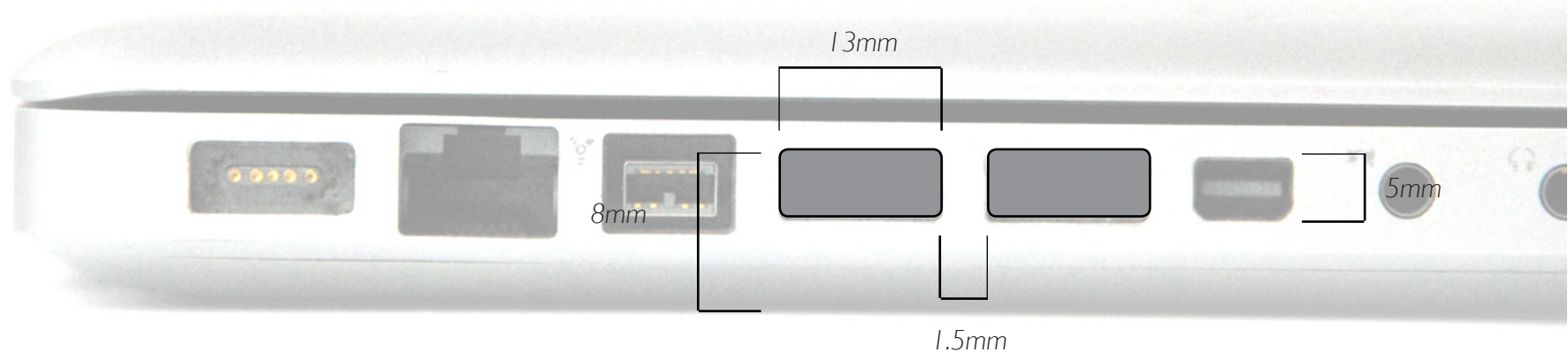
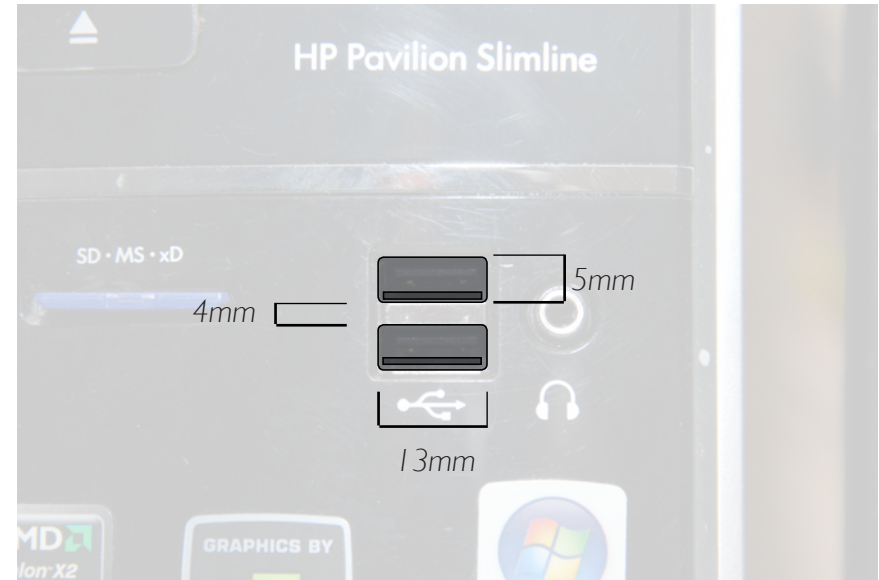
The Good

The benefit to Pico USB flash drives is that they allow you to easily use multiple drives without affecting surrounding ports.



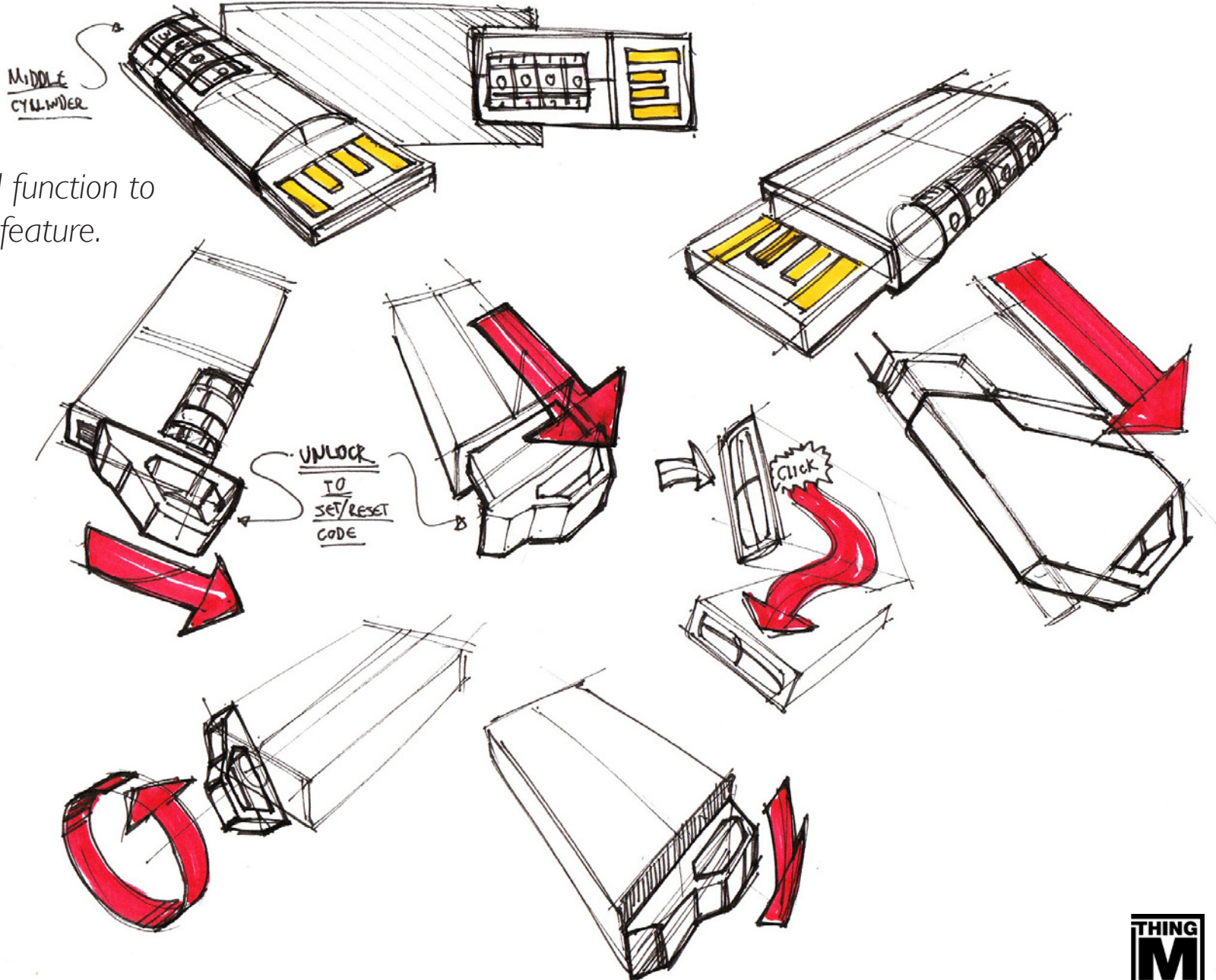
Ports and Their Dimensions

Finding the average size and affordances for the USB ports is essential because, this way, we can know what the maximum and minimum sizes to which we can work with.

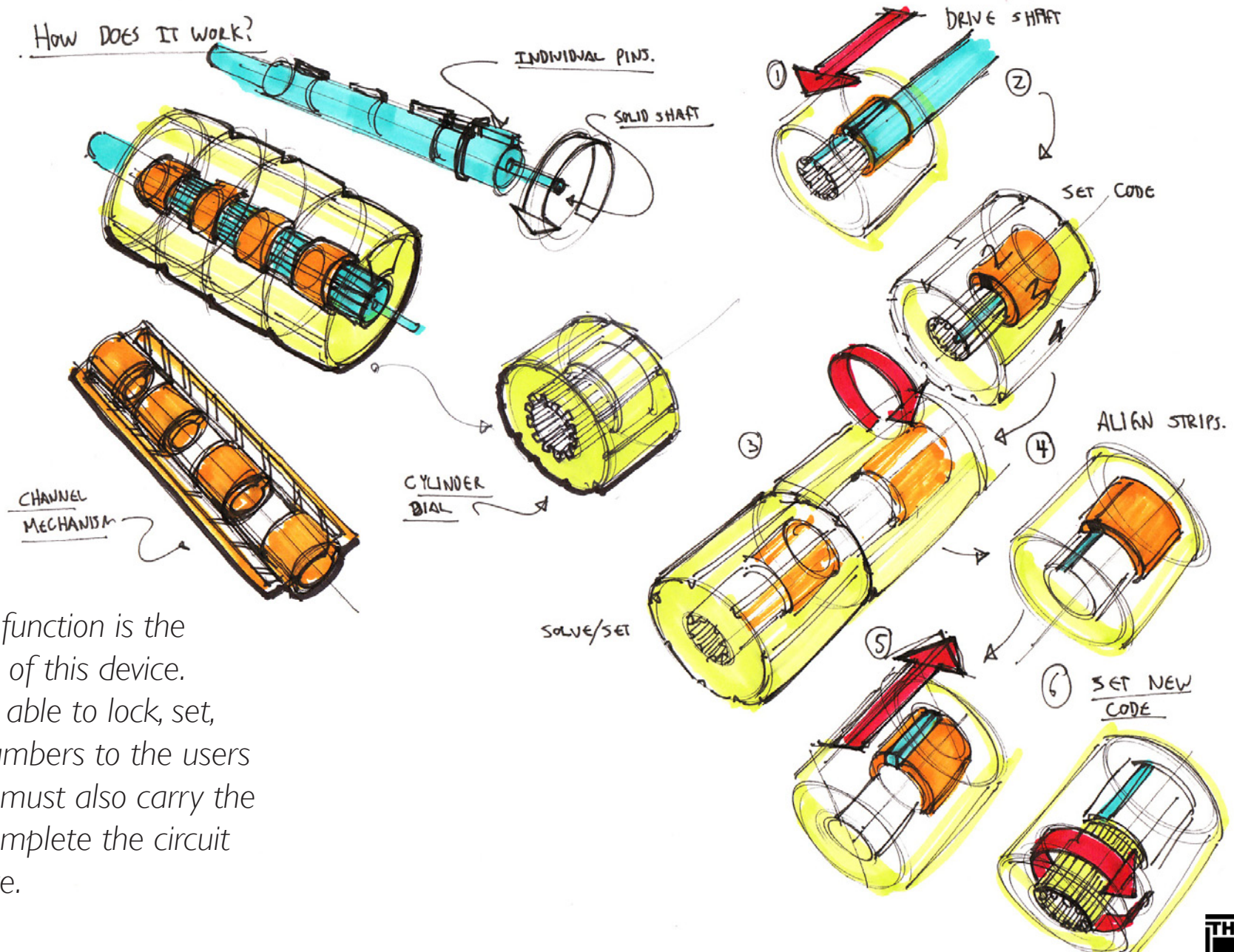


Concept Refinements

Looking at a mechanical function to activate the "Set Code" feature.

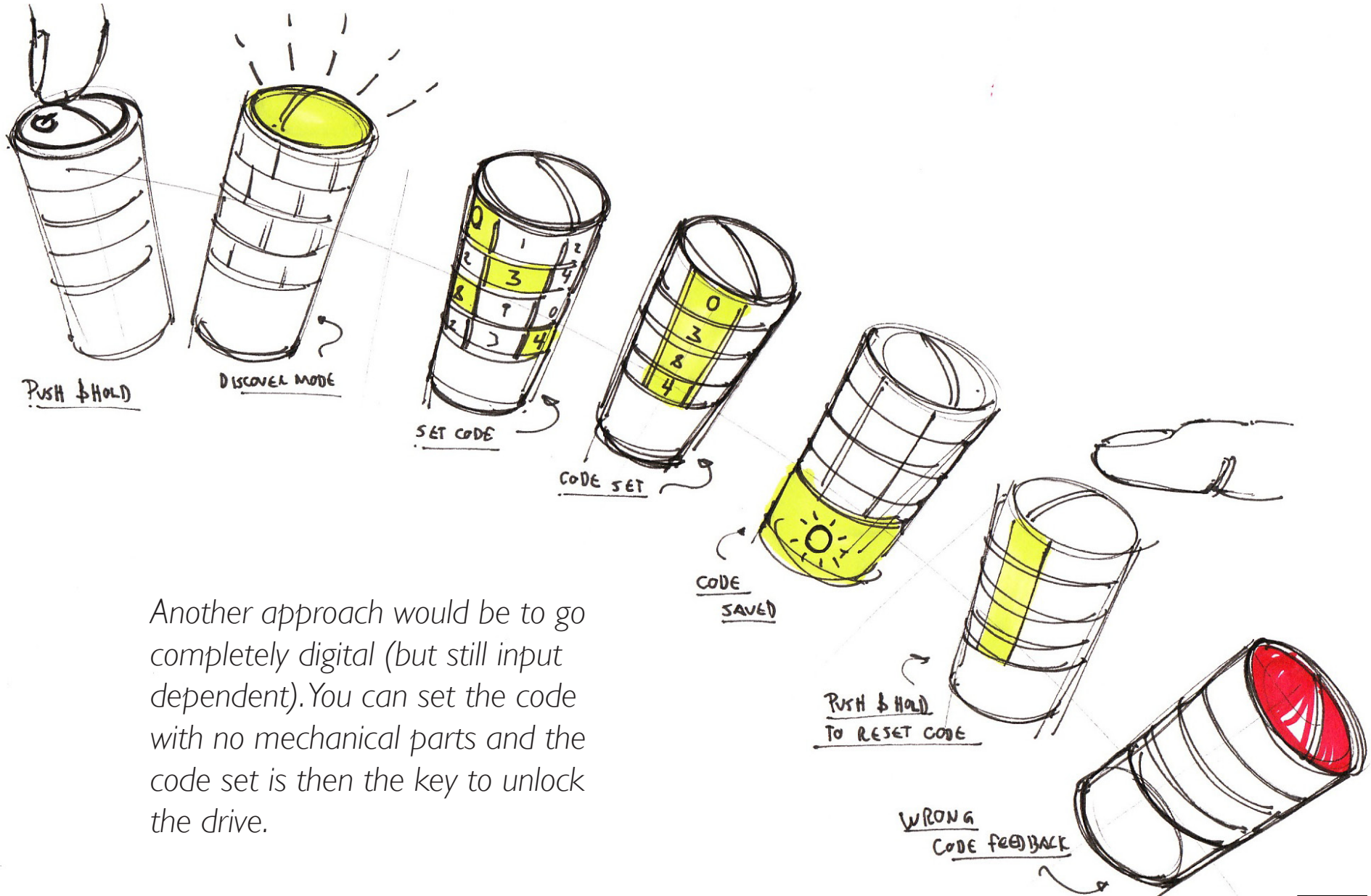


Concept Refinements

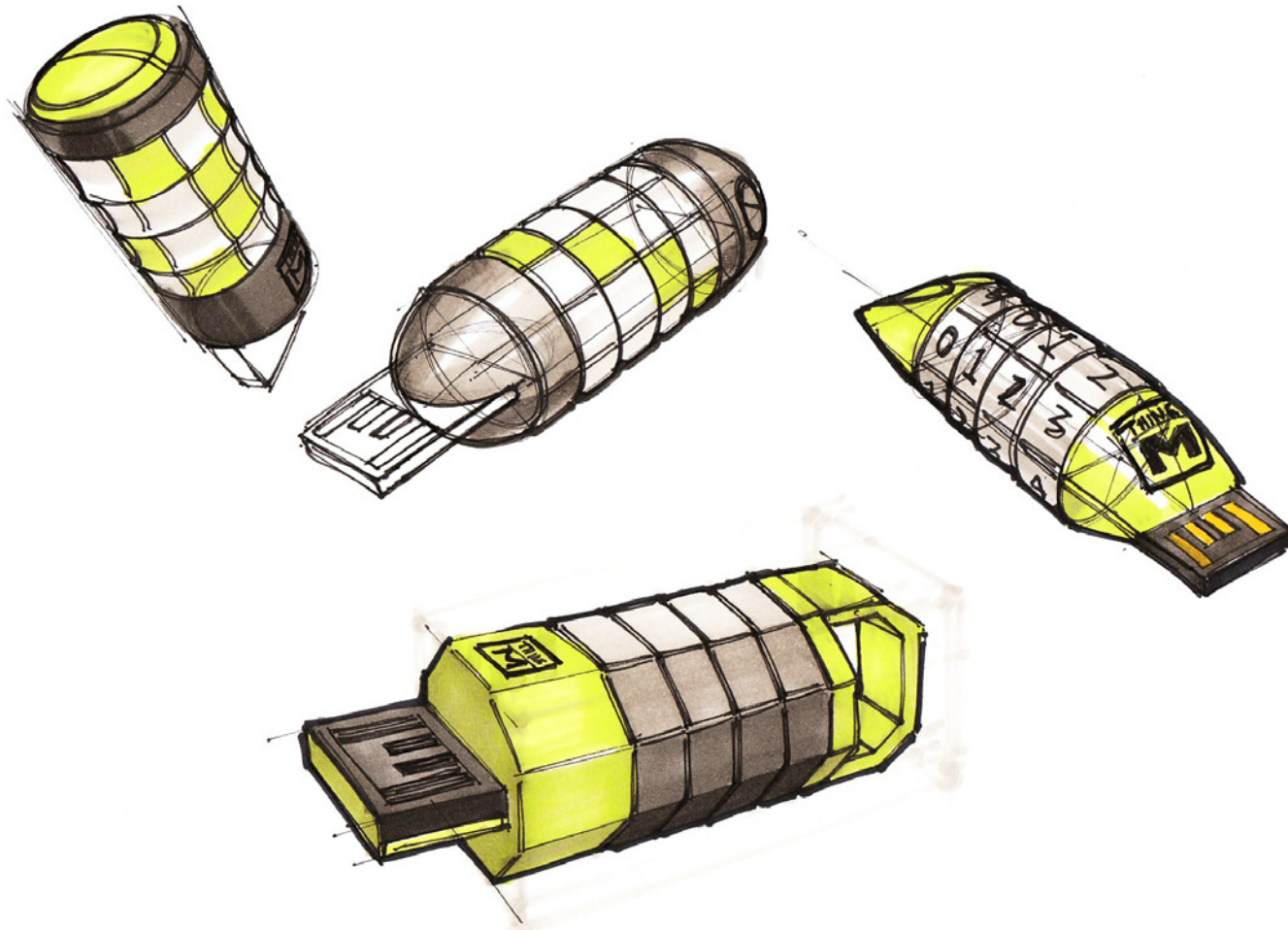


The mechanical function is the toughest portion of this device. They have to be able to lock, set, and reset the numbers to the users liking. And, they must also carry the connection to complete the circuit for the flash drive.

Concept Refinements



Another approach would be to go completely digital (but still input dependent). You can set the code with no mechanical parts and the code set is then the key to unlock the drive.

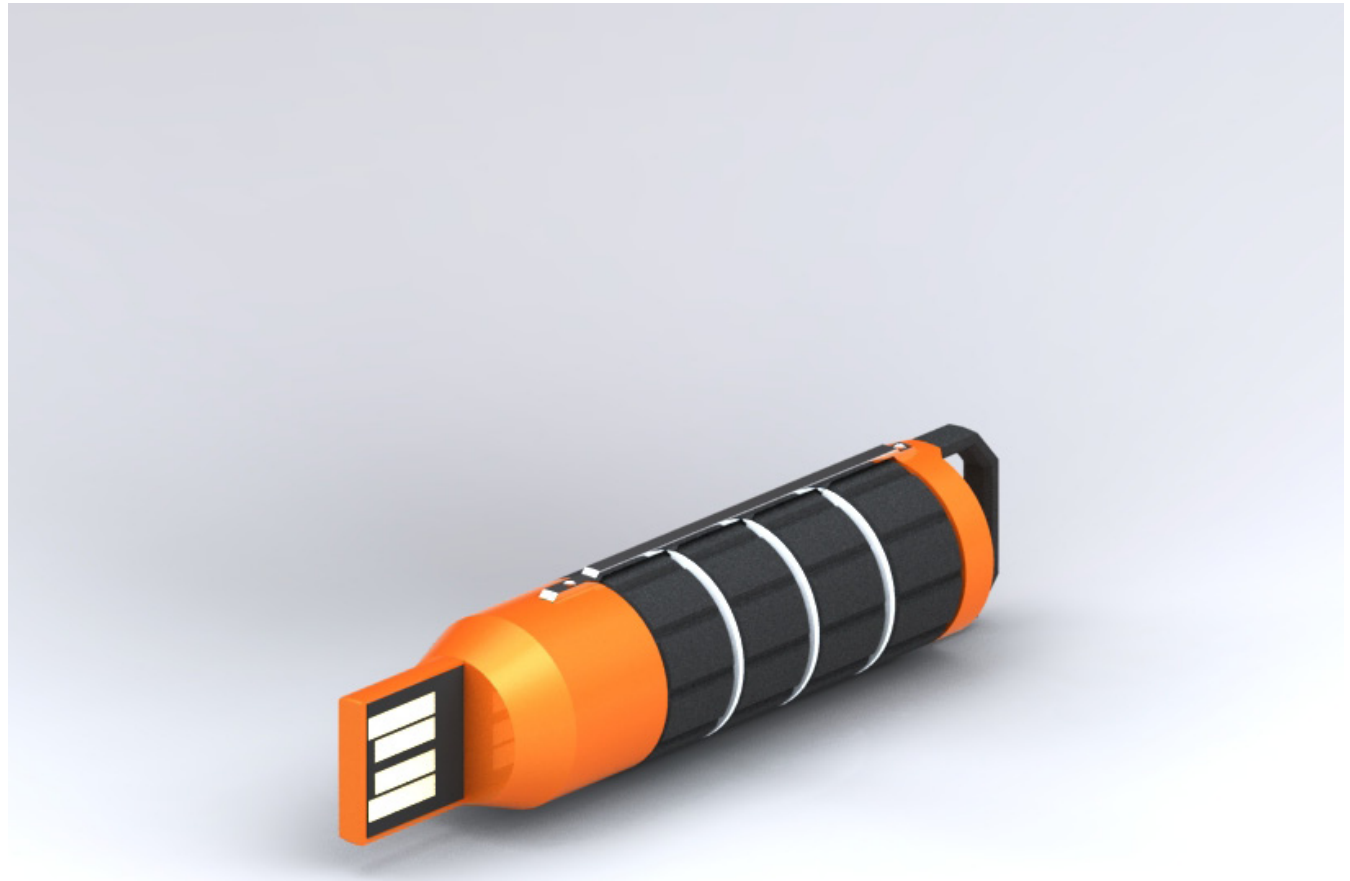


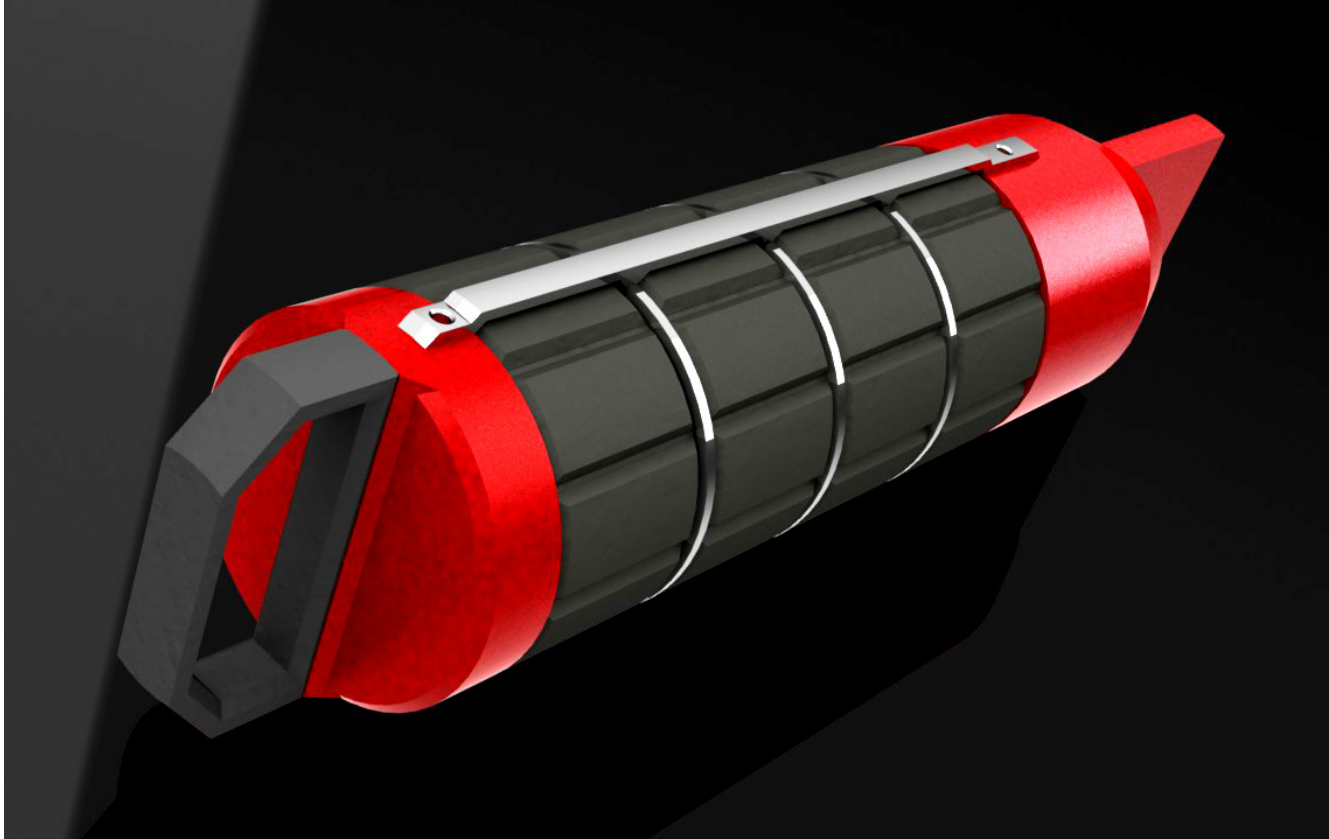
Initial concepts for both the mechanical and digital combination locks. Color combination could also help distinguish the aesthetics of the device among competitors.

Next, play with different form types like: aggressive, feminine, sleek, retro, rugged, etc.

Initial 3D Model

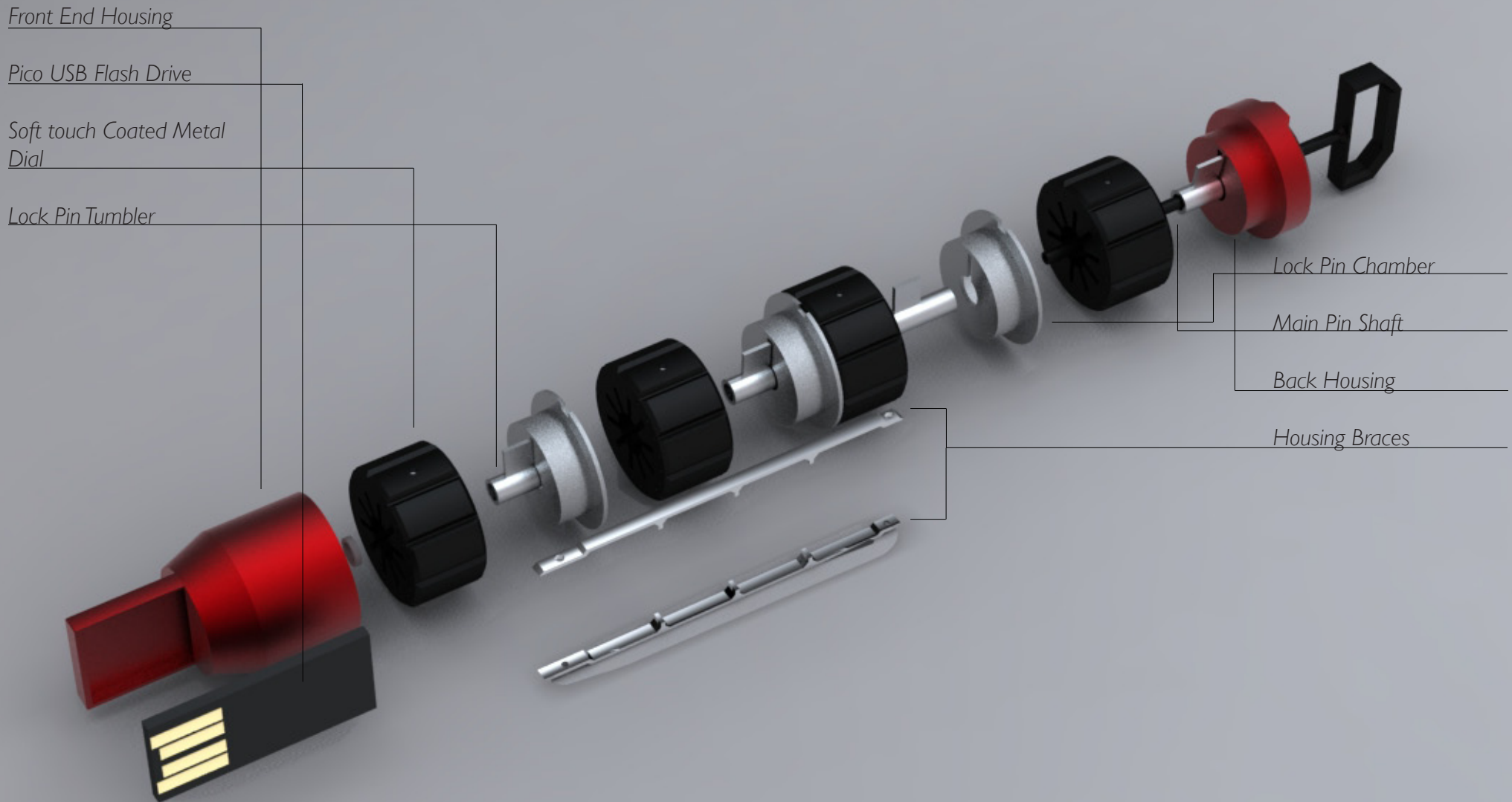
First 3D model proved to be very difficult to fit so much in such little space.

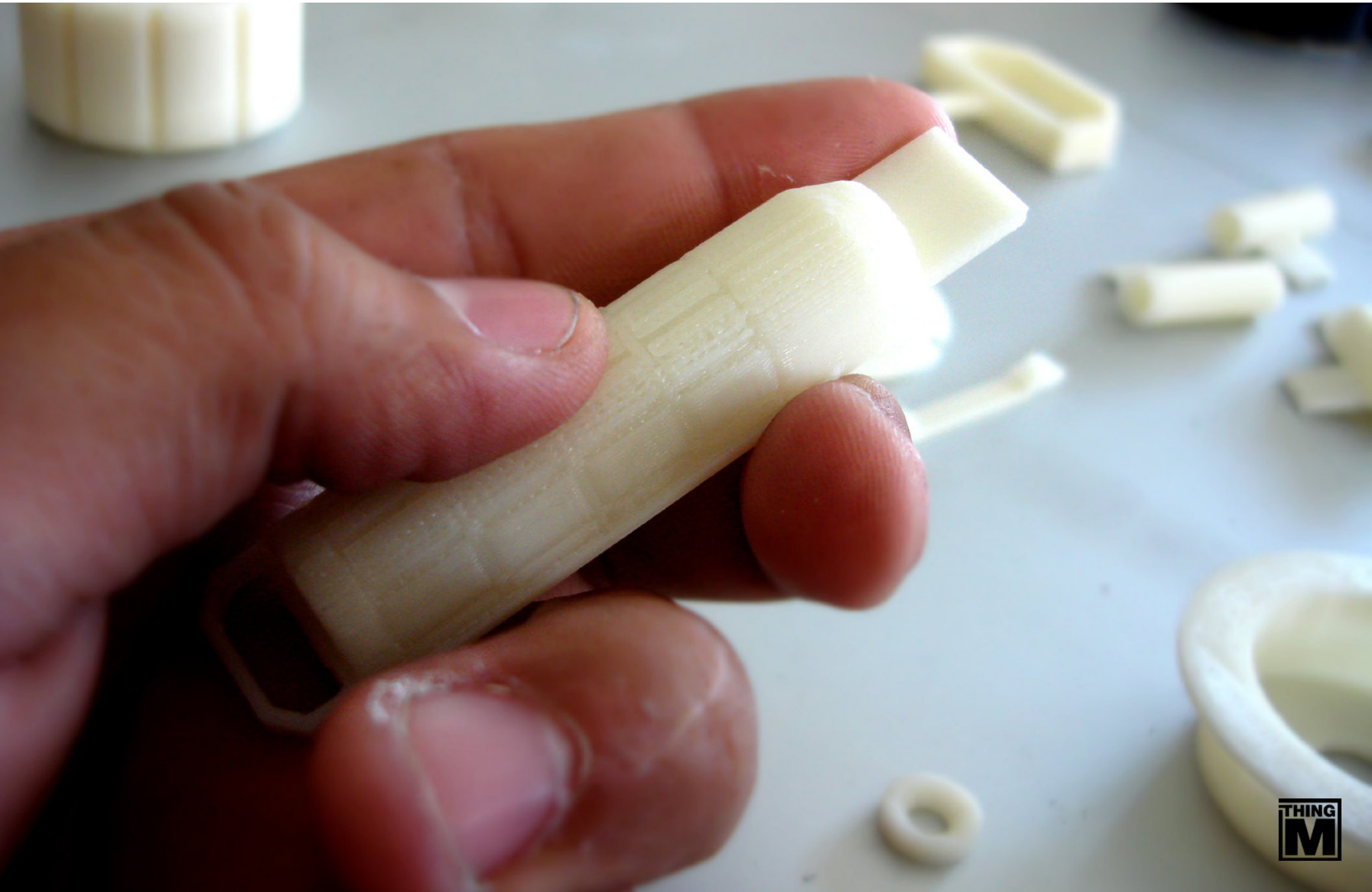




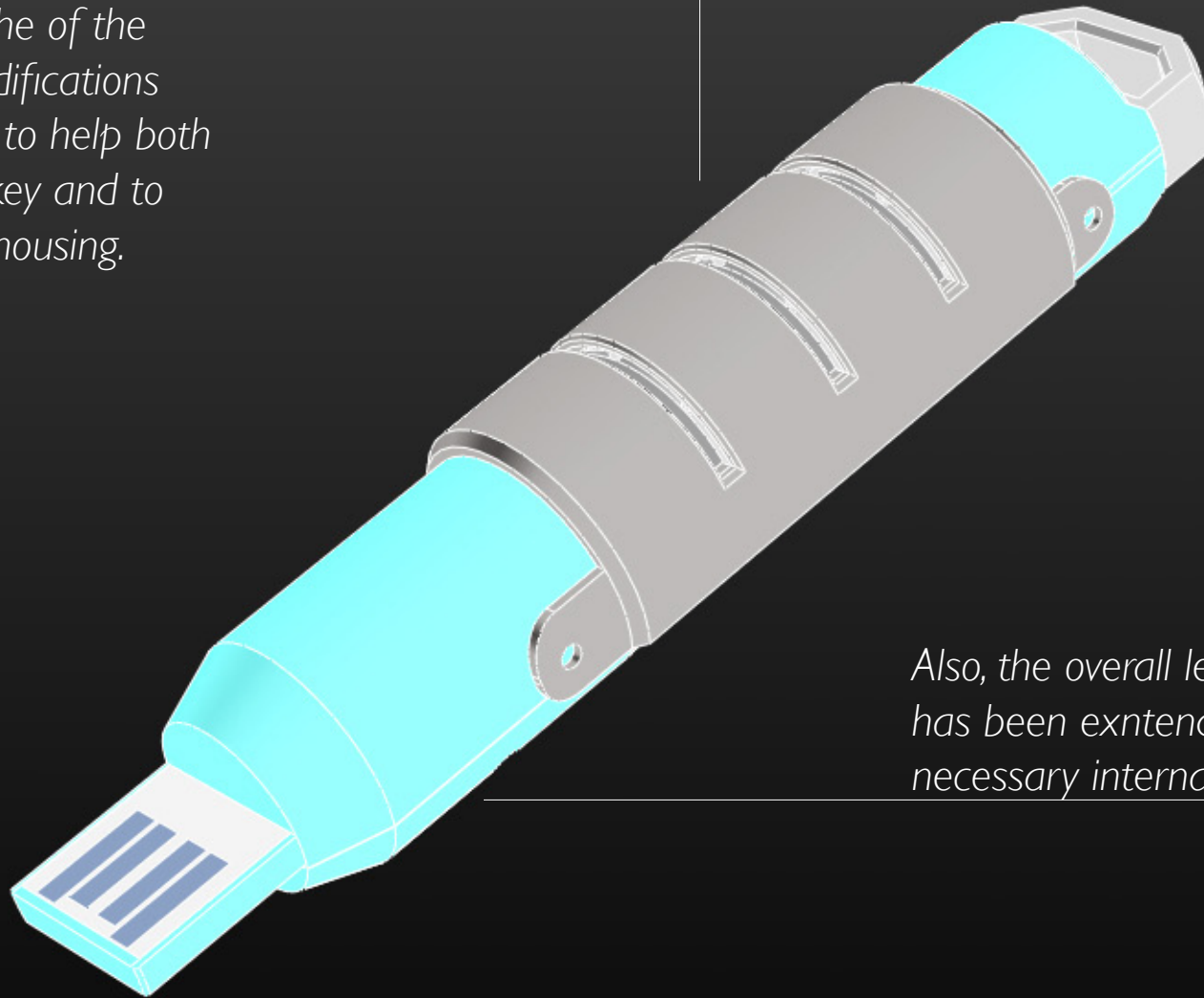
Some problems yet to be solved are: wiring the tumblers to recognize a solved key, keeping the chambers fixed in space, and also adding a spring mechanism to keep all the internals spring loaded.

Initial 3D Model

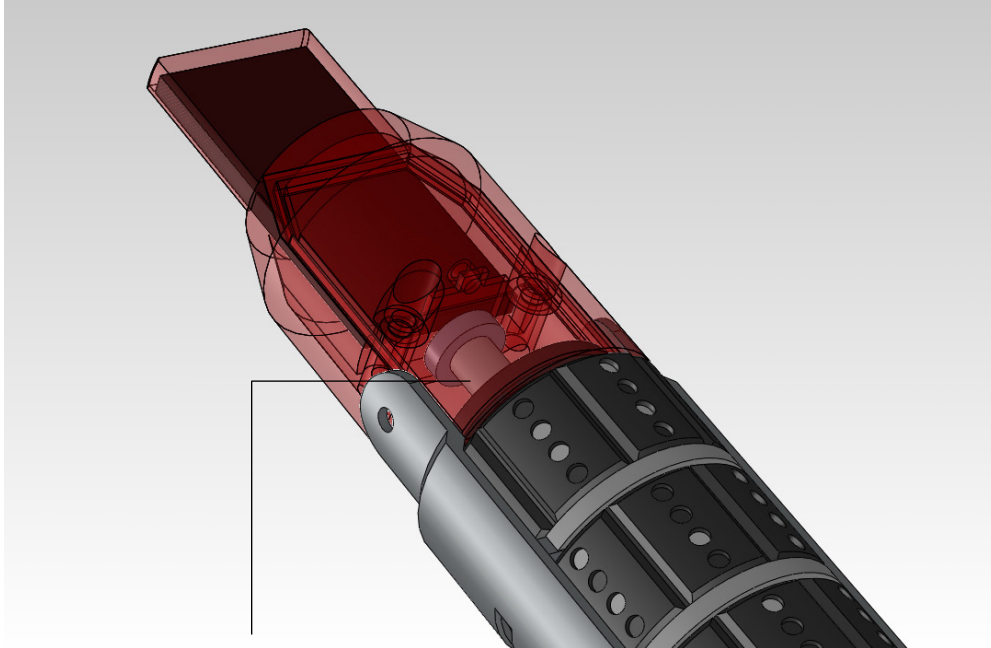




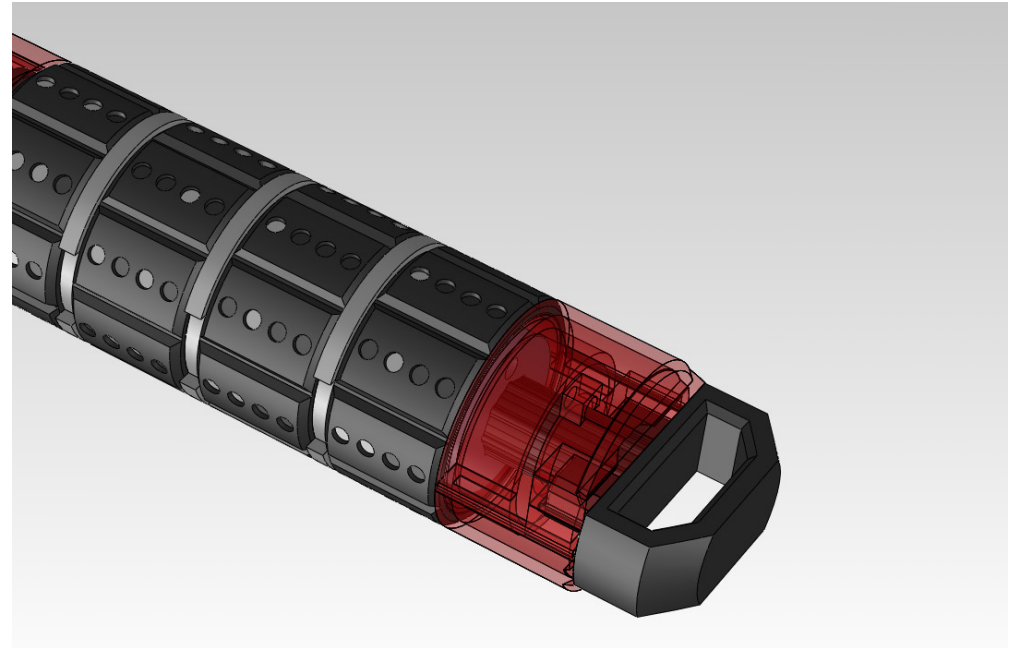
The edited version of the of the lock drive received modifications like a the brace sleeve to help both hide the combination key and to strengthen the overall housing.



Also, the overall length of the device has been exntended to fit the necessary internal mechanisms.



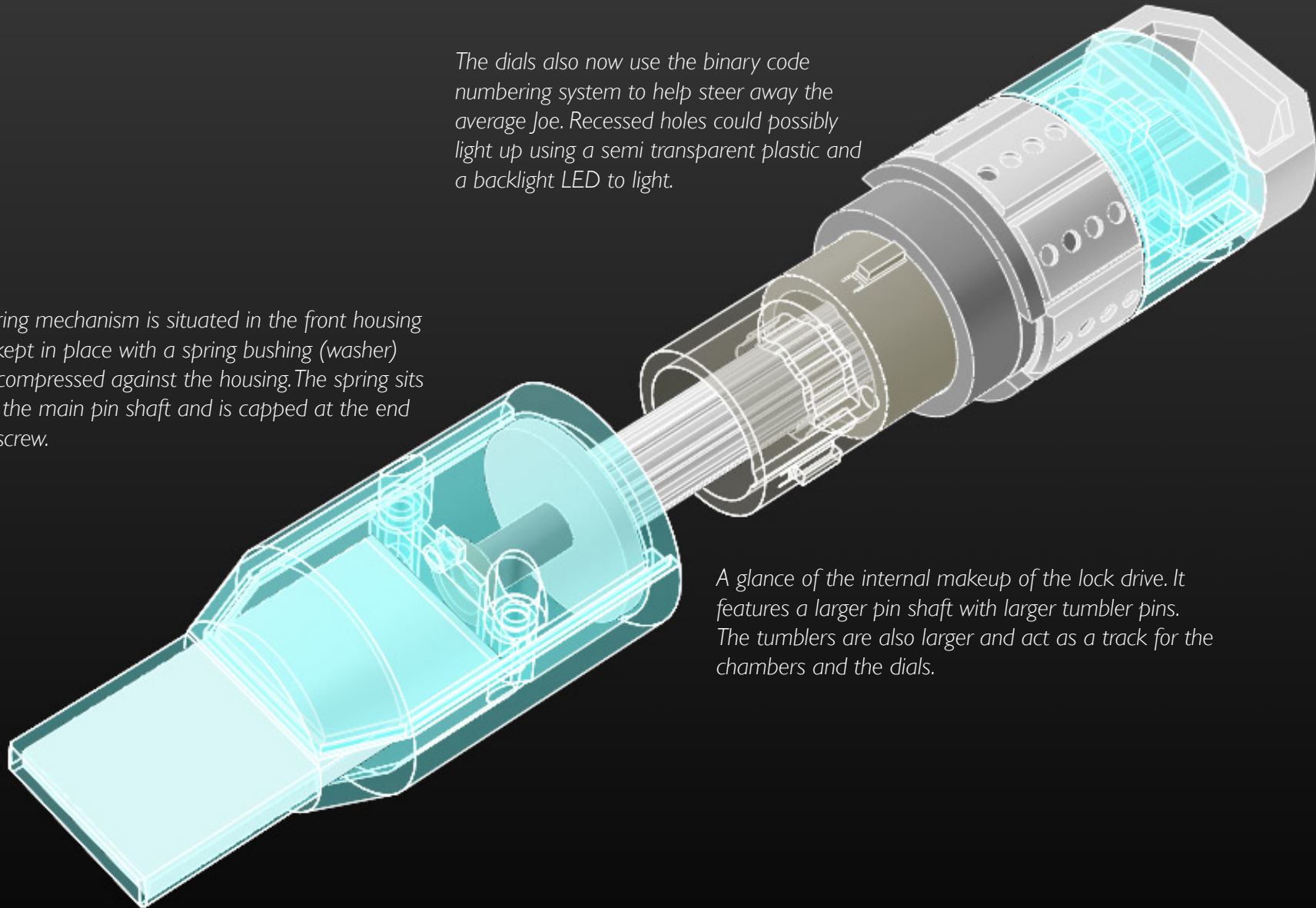
An internal spring mechanism has been added to keep the tumblers under tension.



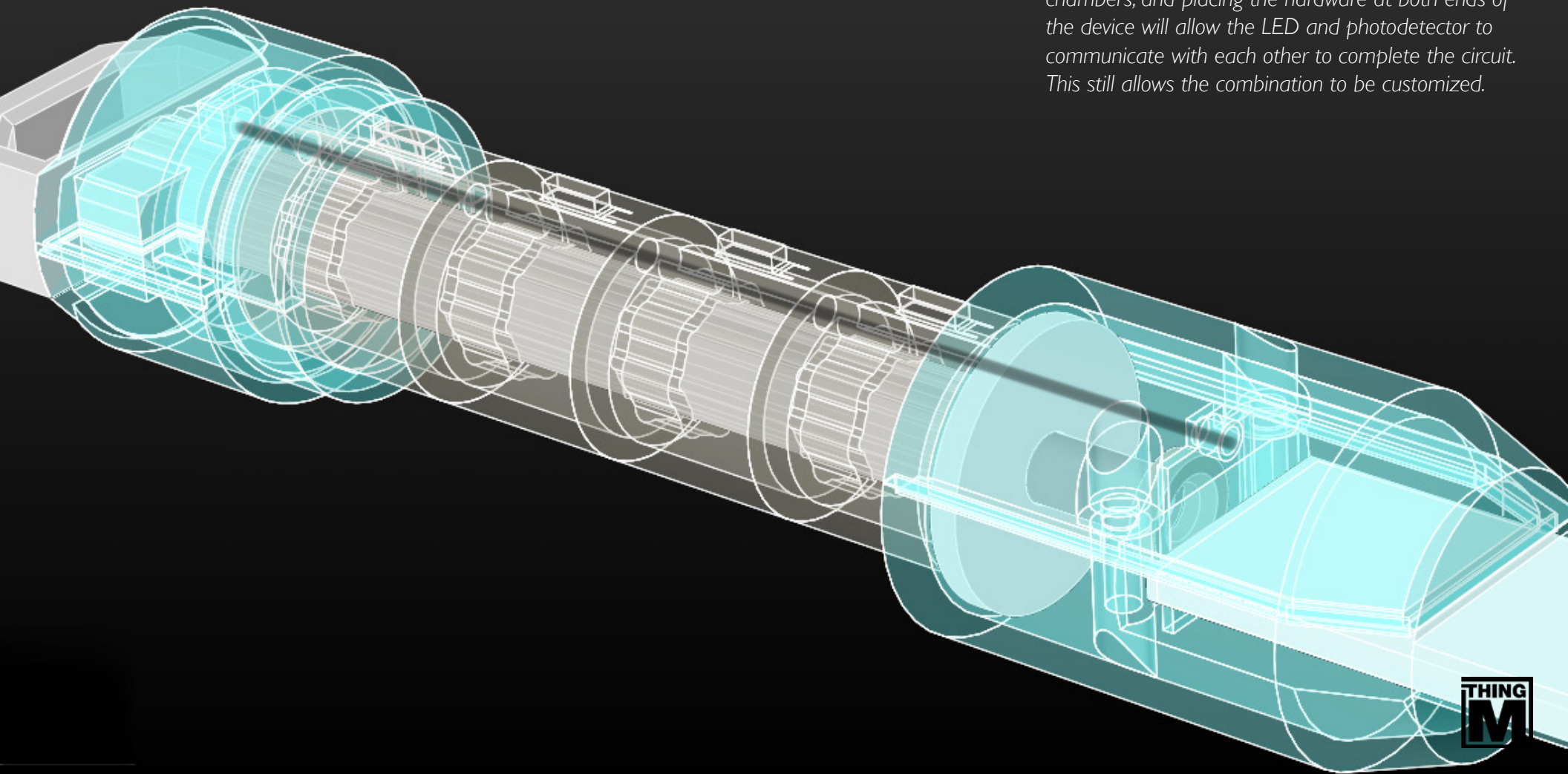
The back housing has been modeled to hold both the LED emitter and the release mechanism for the pull tab that guides the main pin shaft.

The dials also now use the binary code numbering system to help steer away the average Joe. Recessed holes could possibly light up using a semi transparent plastic and a backlight LED to light.

The Spring mechanism is situated in the front housing and is kept in place with a spring bushing (washer) that is compressed against the housing. The spring sits around the main pin shaft and is capped at the end with a screw.

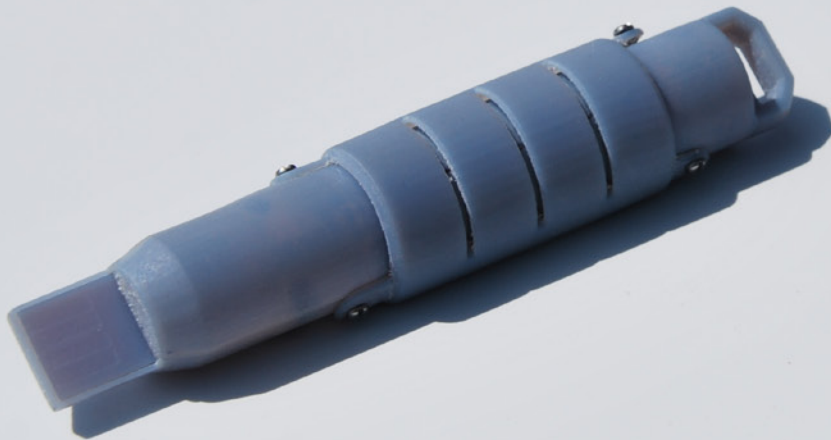


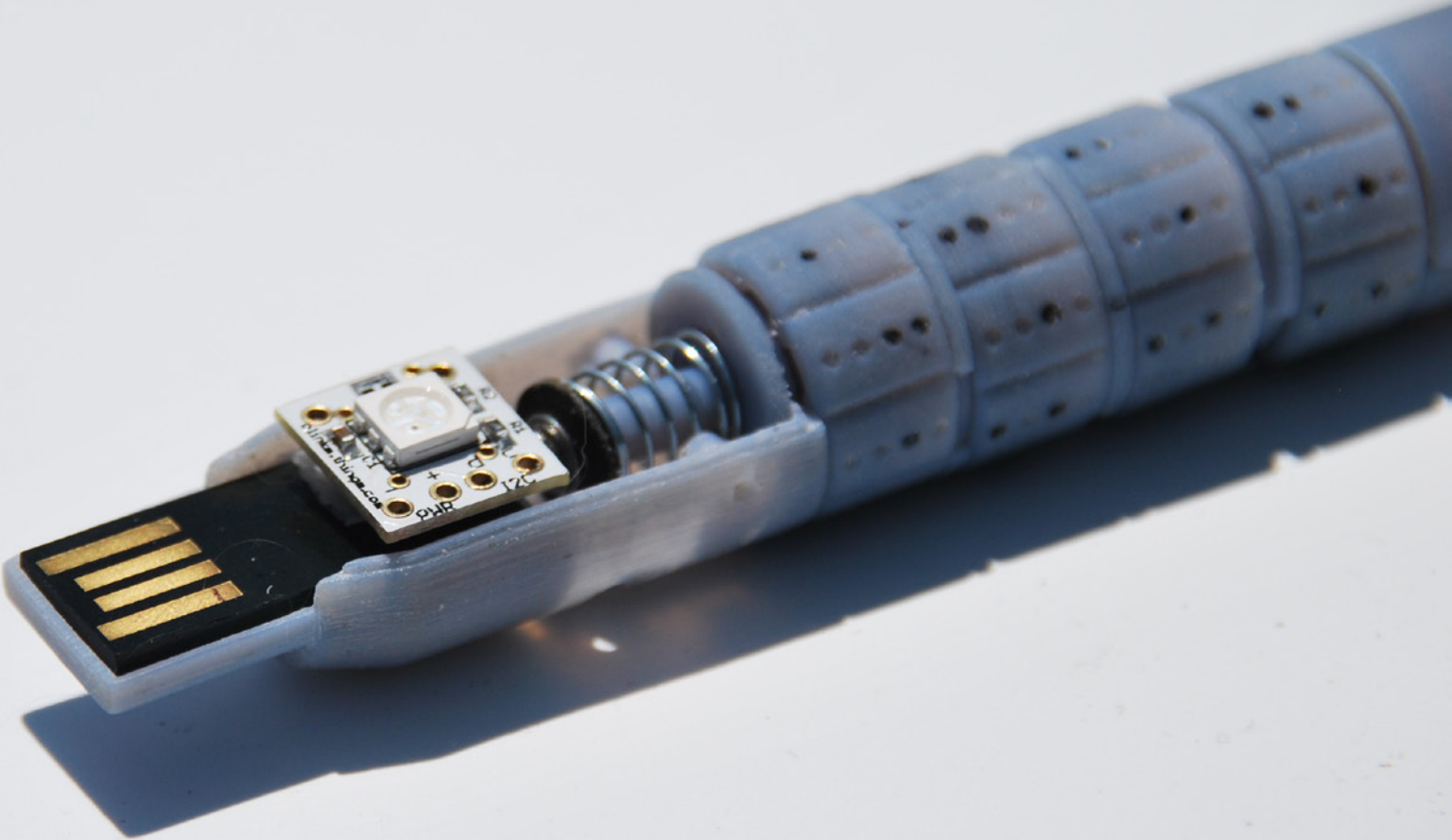
A glance of the internal makeup of the lock drive. It features a larger pin shaft with larger tumbler pins. The tumblers are also larger and act as a track for the chambers and the dials.



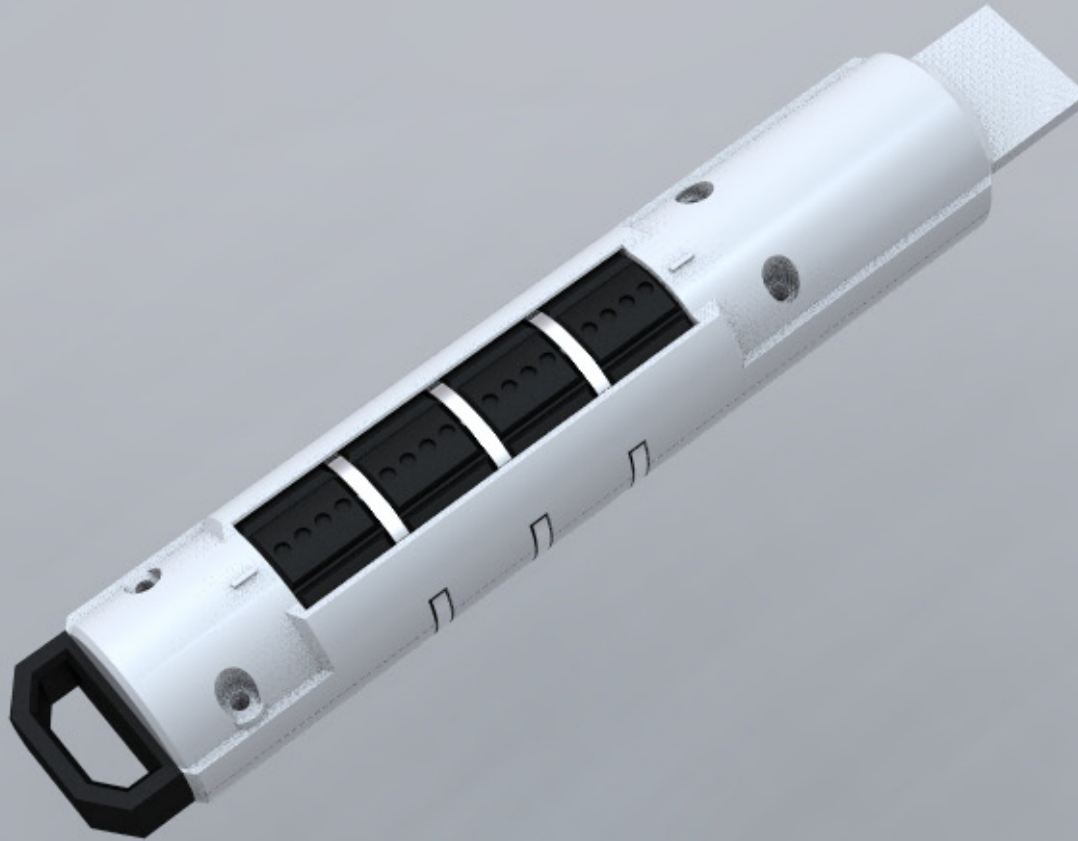
Now, instead of using contact points to complete the circuitry, the use of an LED emitter and a photodetector will be used to complete the circuit. Adding dedicated holes throughout the tumblers, chambers, and placing the hardware at both ends of the device will allow the LED and photodetector to communicate with each other to complete the circuit. This still allows the combination to be customized.

The revised version features a longer housing to make room for the necessary components and mechanism to make the the device work.



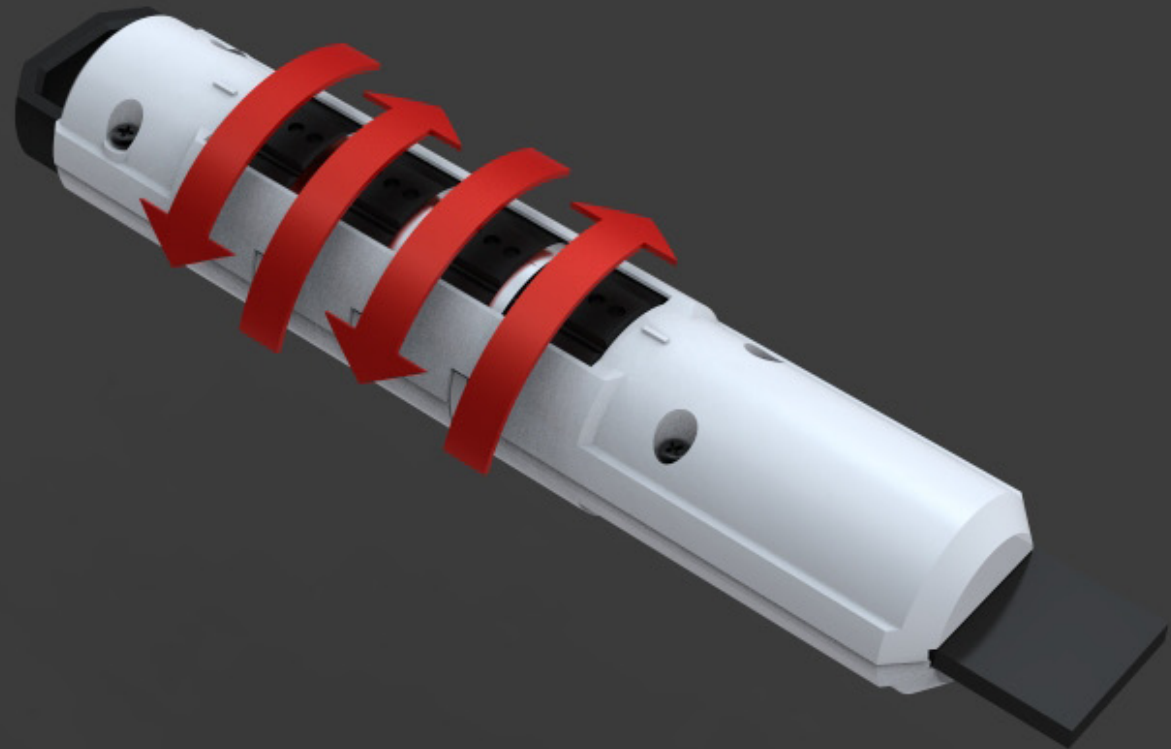




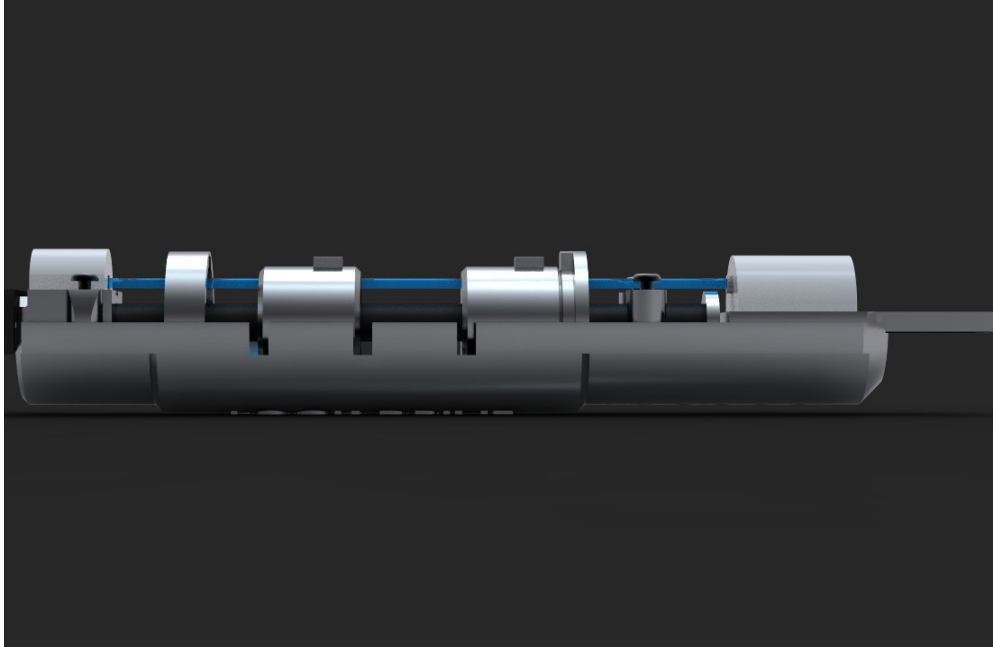


The new redesigned body brought forth a simplified body that minimized the housing parts from 6 to 2. This makes the body stronger and even more robust.

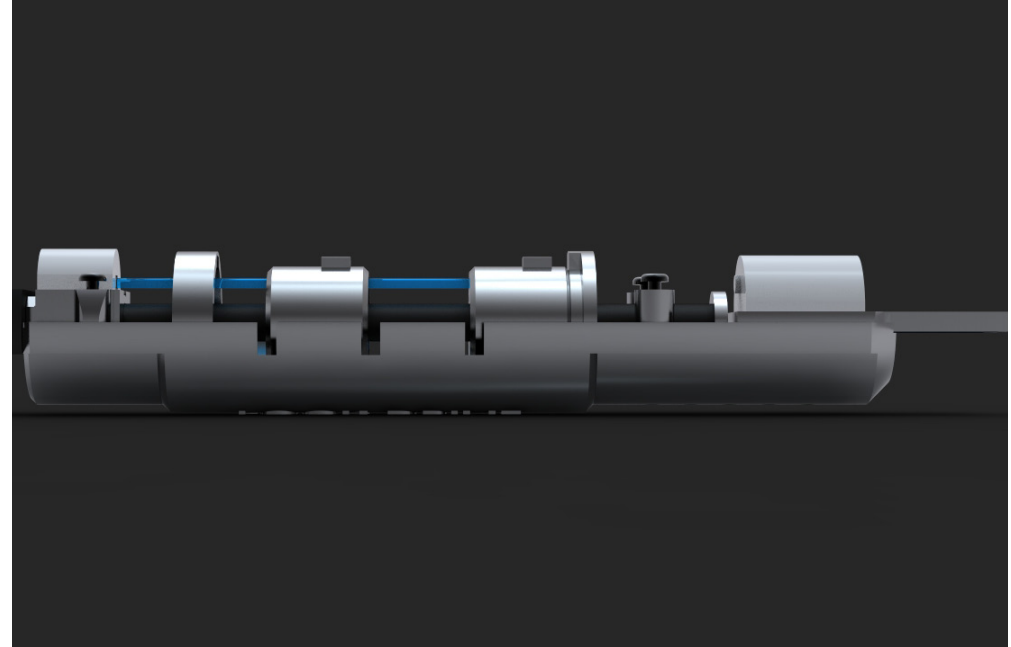
To access your content, it's easy as solving the binary combination.



Redesigned Body

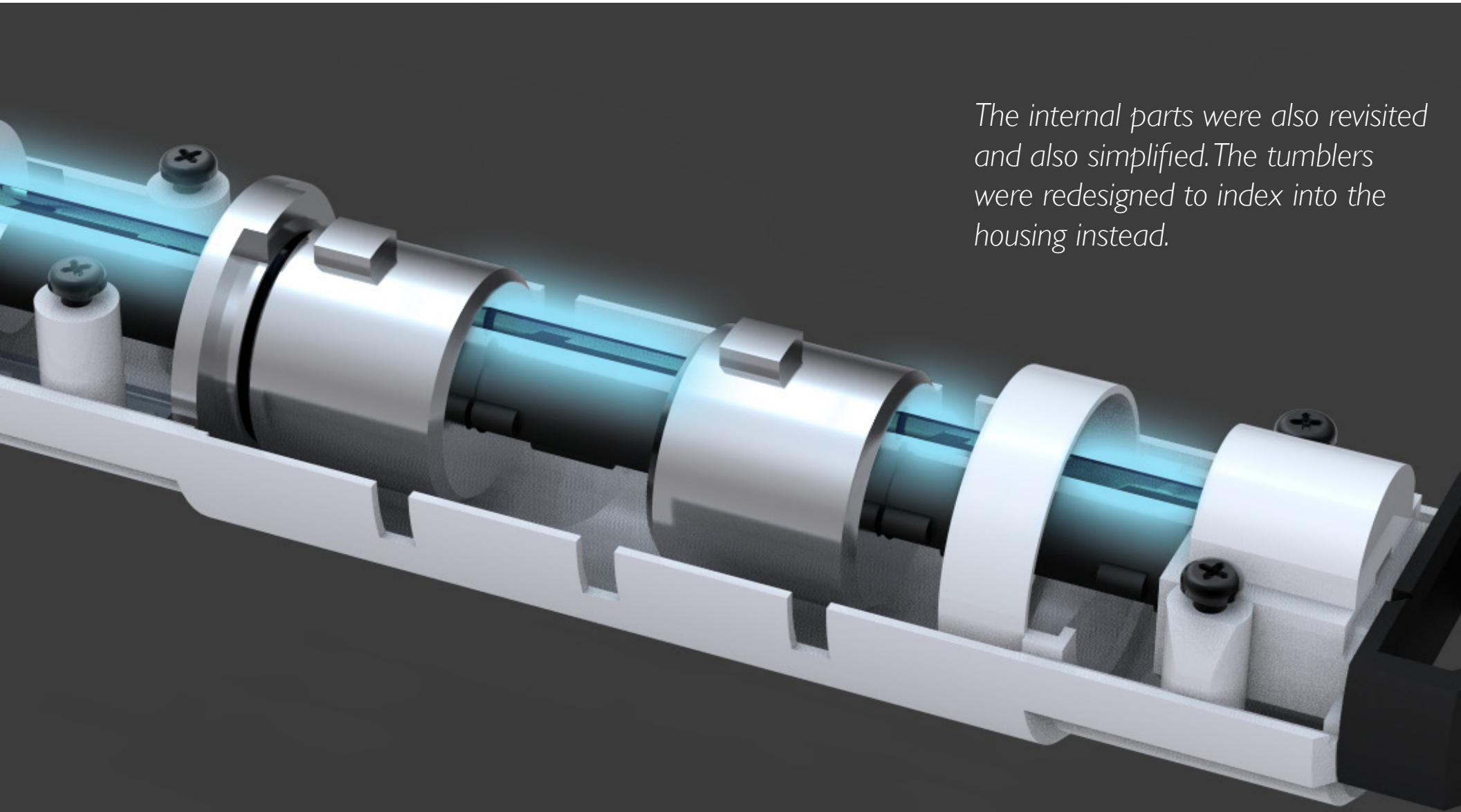


Using a photodetector and a IR LED, the lock drive only works when all the tumblers are in line.

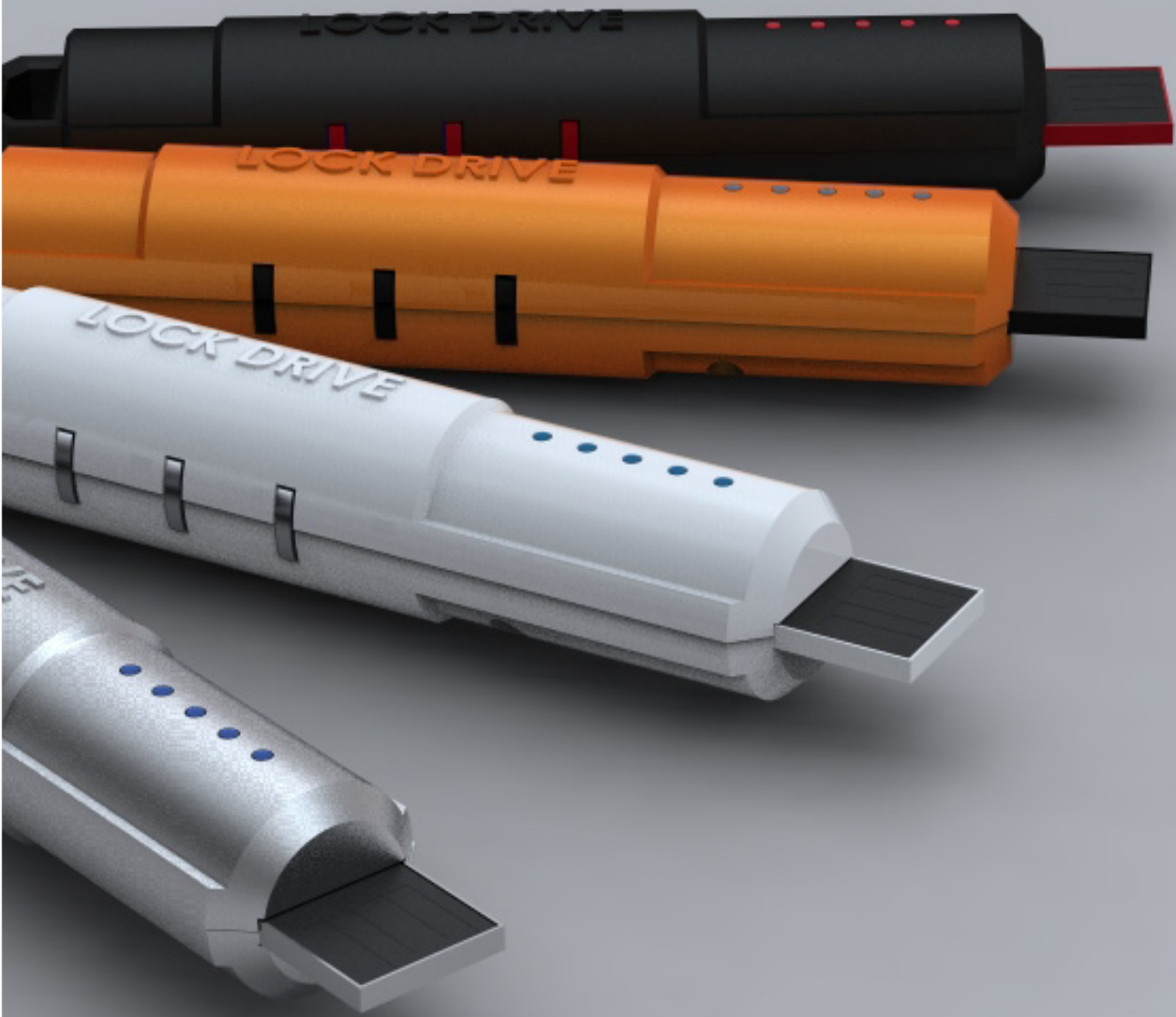


If even one tumbler is not lined up, the thumb drive will not work.

Redesigned Internals



The internal parts were also revisited and also simplified. The tumblers were redesigned to index into the housing instead.





LockM

A Combination Lock Thumb Drive
that protects your precious content.



Thank You.