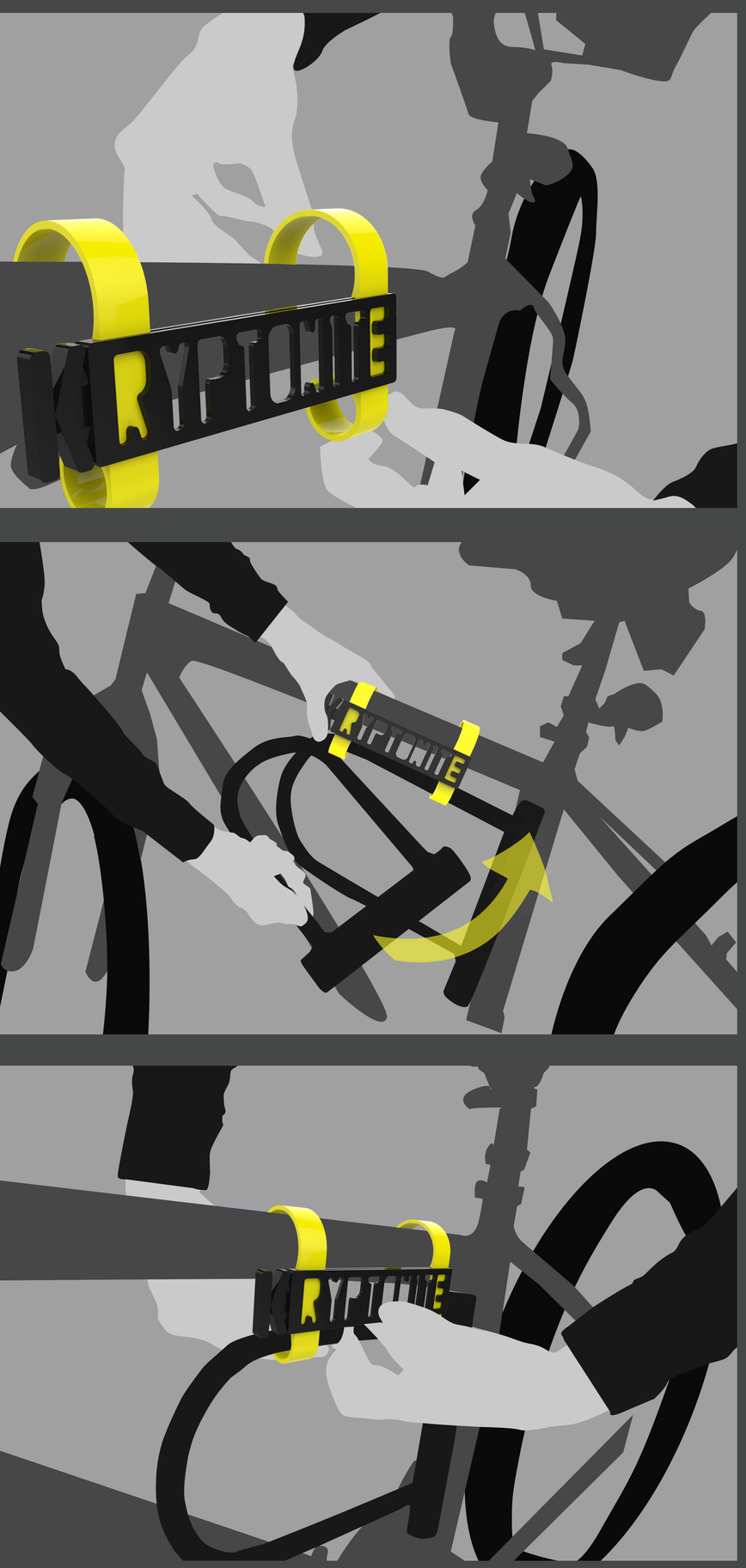
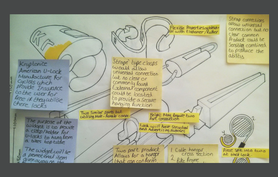
KRYPTONITE®

USER SCENARIO



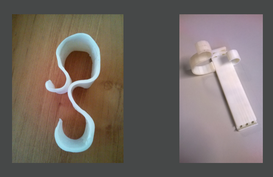
MANUFACTURING PROCESS

SKETCHES



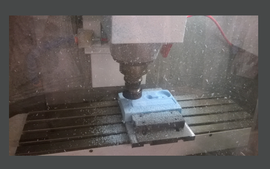
Ideation and conception of initial ideas with development and analysis. Through problem solving and re-design the final design was produced. These were important to refer back to during the manufacturing process to keep the initial widget design consistent.

3-D MODELS



Models were produced to gain further understanding of the product, size, proportion and the feel of the product which can then be assessed for further development. Both models are important to the design process: the clay model for initial changes and the 3D printed model for an accurate representation of the final product.

FOAM BLOCK TEST



Before the steel blocks can be cut on the CNC machine the coding and CAD model firstly has to be tested using blue foam. This will highlight any issues or problems that need to be changed with the programming such as feed rate, sequence and the timing.

GROUP DISCUSSION

Meeting up as a whole group is important to the manufacturing process as the problems and issues that needed to be changed can be discussed and solved together. This ensures everyone works from the latest engineering files and knows what mistakes to avoid. Once all issues had been worked out the steel blocks could then begin to be manufactured.

CNC STEEL BLOCK

Once the blocks of steel were carefully aligned in the CNC machine the mould could then be machined. From this the internal tolerances could be checked to ensure the inserts will fit accurately into the cavities.

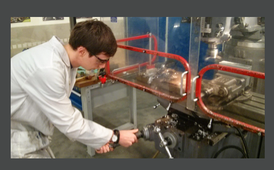
TURNING

In order to produce the two round inserts and the two main alignment pins we had to use a centre lathe. For the inserts we turned and faced off the aluminium down to size in order to fit the correct tolerance in the mould. The pins were turned to create a chamfer on the end, this is to make inserting the pins easier and for de-burring.

DRILLING

We used the drilling machine on the two mould blocks to ensure the alignment pins fitted securely in place. This included drilling the hole and reaming it to M6. We also drilled a hole beneath the main round insert to make the removal of the insert easier.

MILLING

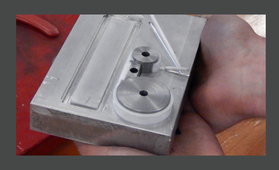


The milling machine was used to cut the middle insert to size and face off the mould blocks so that they are square and sit flush in the injection moulding machine.

FINISHING

Lastly the mould block and inserts had to be finished using a file and wet and dry paper to ensure no bumps or marks will show up on the injection moulded product. This included any imperfections. We also used air blaster to prevent dirt from being mixed with the polymer.

FINAL PRODUCT



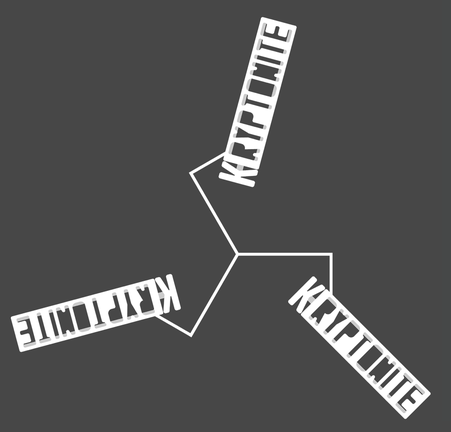
Once the inserts and mould were accurately completed the product could then be injection moulded out of the two halves using LDPE plastic. Firstly with white as this has the lightest pigment and then all the way through to black.

MASS PRODUCTION PROPOSAL

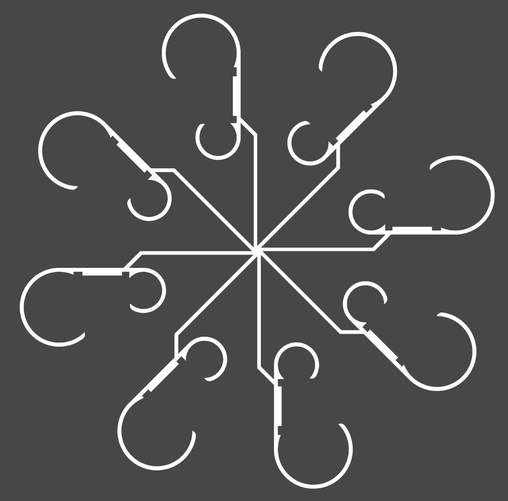
TOTAL TIME REQUIRED
FOR
3,000,000 WIDGETS
IS
6,450,000 SECONDS

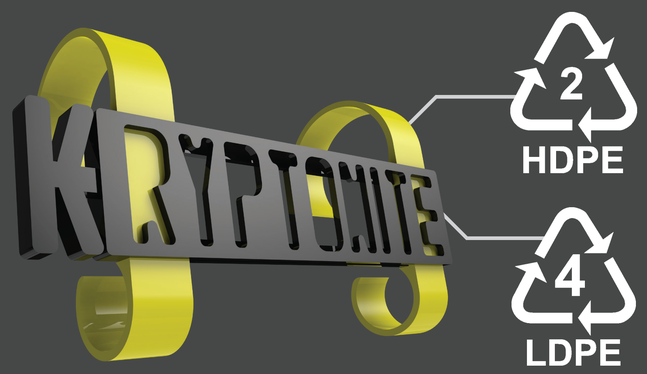
THIS LEAVES
289,200 SECONDS LEFT OVER,
3 FULL DAYS
TO ADDRESS UNFORSEEN ISSUES

CLIP MOULD HAS
RADIAL CAVITIES **3**
IT TAKES 3,000,000
SECONDS TO INJECT
IF INSERT REPLACEMENT IS
TAKEN INTO ACCOUNT



HOOK MOULD HAS
8 RADIAL CAVITIES
IT TAKES
3,450,000
SECONDS TO PRODUCE THE REQUIRED
NUMBER OF HOOKS



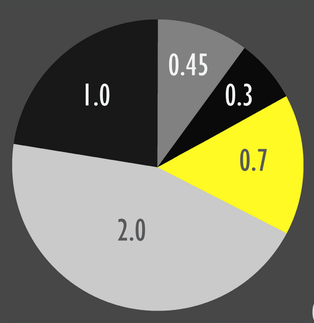


The product will be used outdoors so a biodegradable polymer would be unsuitable due to the relatively low stability.

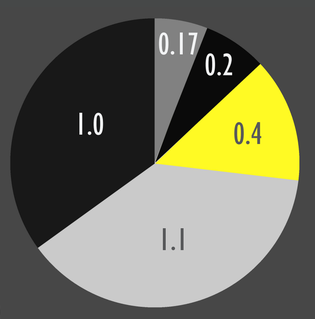
For this reason fossil fuel sourced polyethylene would be best, with a focus on ensuring it can be easily recycled.

This means reducing the number of different additives required to provide the necessary mechanical and aesthetic qualities.

CYCLE TIME FOR HOOKS



CYCLE TIME FOR CLIPS



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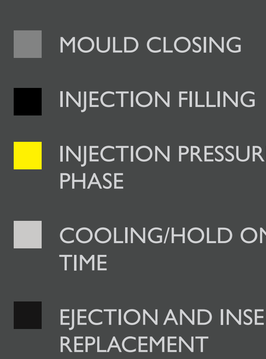

Lillie Burton Helen Couper Peter Davies Lucy Fidgett Jack Hayman Lawrence Ingham Robert Percy