Intelligent Patient Record

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Contents

1 Introduction

We have had the task of build a new revision, of Steven Houben Hyper Record. One of the big reasons is it was to unwieldy and heavy for the medical staff.

2 Design requirements

Numbered list of product requirements with most important first, least important last.

3 Use case scenarios

Detailed description of 3 use case scenarios which illustrate: - The user experience - Insight about a specific product feature, or user requirement

4 Design analysis and concept diagrams

Description of issues related to the design of the product: - Description of concepts, requirements and features of the product - Review of motivations for making the design decisions - Indicate the primary features of the design that are the most creative and original

4.1 Materials

For this project we got a bunch of different plastic materials from RIAS, in order to find some material that might be cheaper, and better that acrylic, since acrylic have tendency to be brittle, this becomes worse when it has been laser cut. all of the plastic was thermoplastic, which is a term that is used in the laser industry to indicate that it can be laser cut. For the laser cutter we made some simple figures to see what the result would be. The requirements for the material is that it is easy to lasercut, and don't break easy.

4.1.1 PEHD

The first material that we tried to cut was, PEHD which is used in the production of ex. plastic bottles and corrosion-resistant piping it is known for having a high strength to density ratio. The cutting went fine, but there was some residue left over from the cutting, that we had some problems removing.

Figure 1: *Cut test of PEHD*

4.1.2 PP

PP is most commonly used in packaging and labeling, and it has resistant to many chemical solvents, bases and acids. The cutting had some big problems, one of them was that after 3 cutting rounds, the laser still haven't cut through the material, which meant we had to let it be, and not trying to cut in that material.

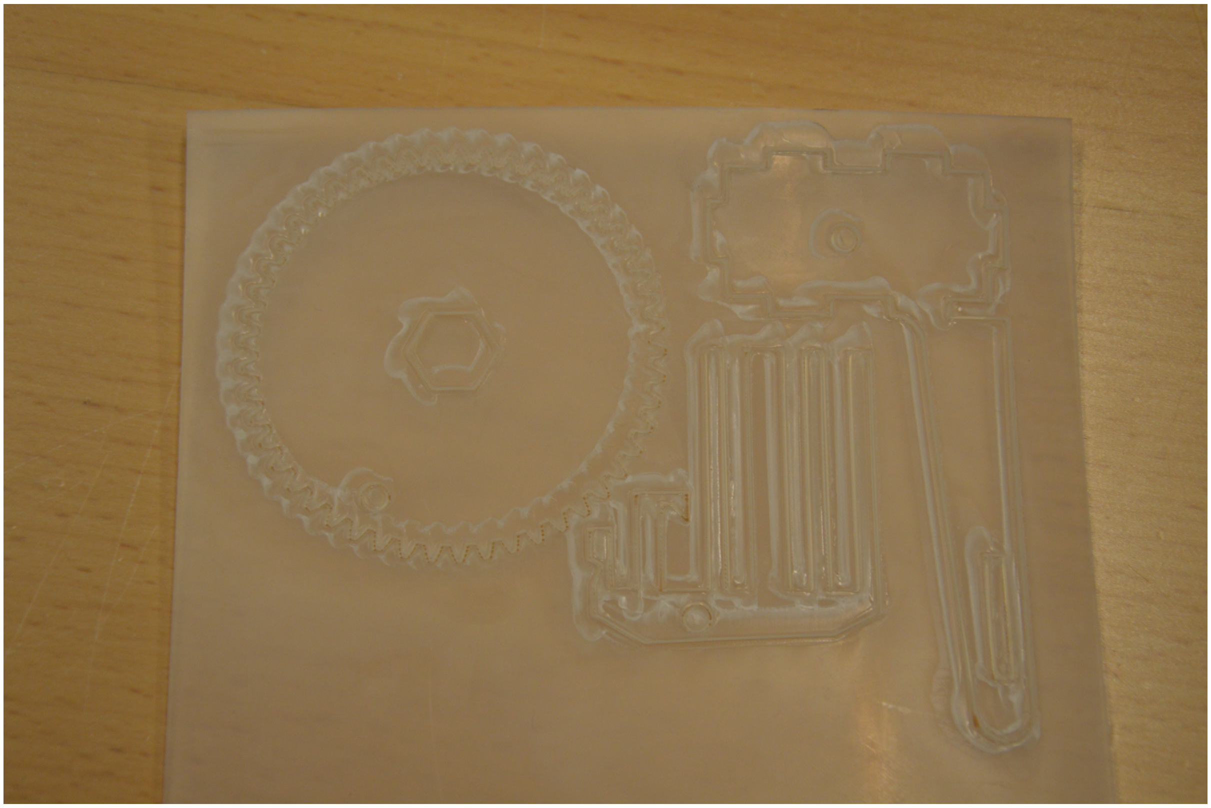

Figure 2: *Cut of RIALEN PP*

4.1.3 PP-H

Is PP where they have added Homopolymer to, this changes the materials propertyes, so it is becomes easier to cut, but it leaves some residue when cut, it also have tendency to curl up on it self, where it has been cut. However the material has memory, which means that it remember the shape is has been bend, this is a problem since we are going to have some eletronic attach to it.

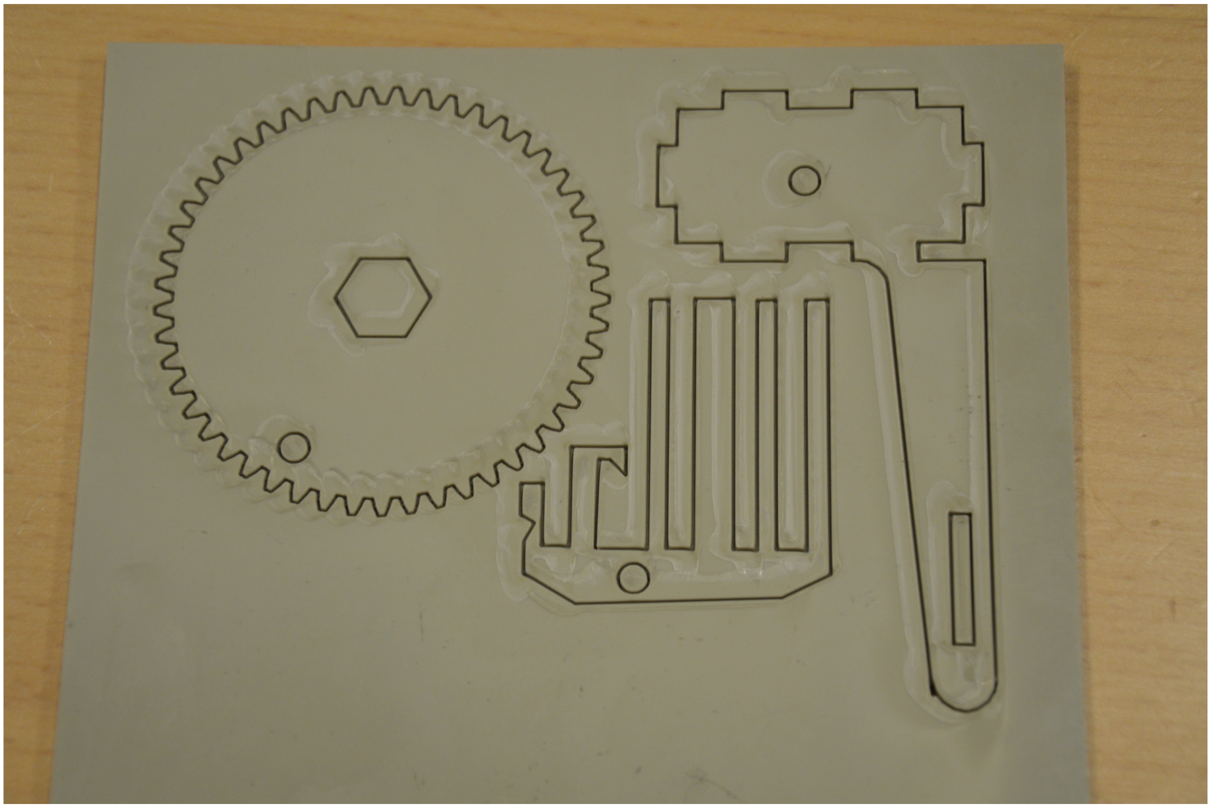

Figure 3: *Cut test of PP-H*

4.1.4 PETG

PETG is used alot in the production of plastic bottles, and is a durable material. The cutting process did not go as hoped, be side that one can see the burn marks, it also had a very strong chemical smell, that took weeks to dissipate.

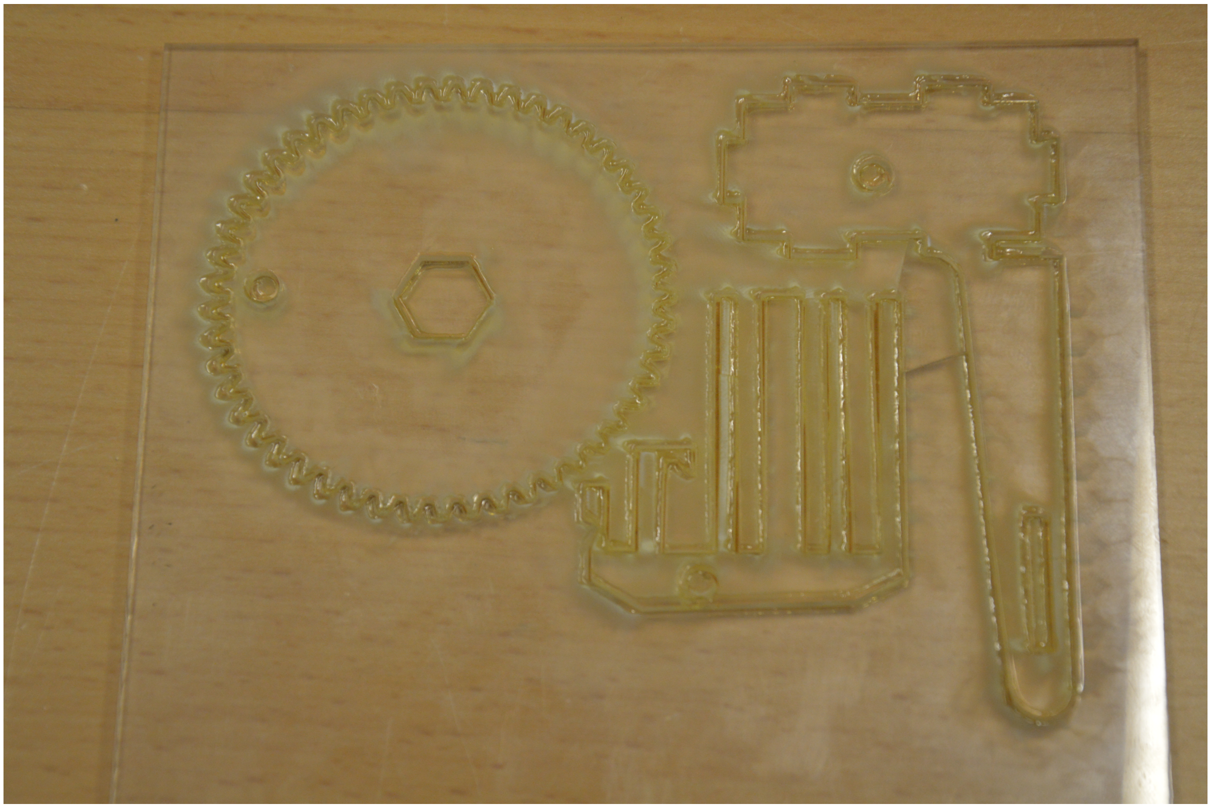

Figure 4: *Cut test of PETG*

4.1.5 POM-C

POM-C is a material that works well with laser cutting, it is used commonly in small gear wheels, ball bearings, and many other product where you need low friction and stiffness. The cutting of it went fine, but we found out that if we want to use it, we may have some problems since the glue, that is used for it is highly toxic, furthermore the material more expensive compared to Acrylic.

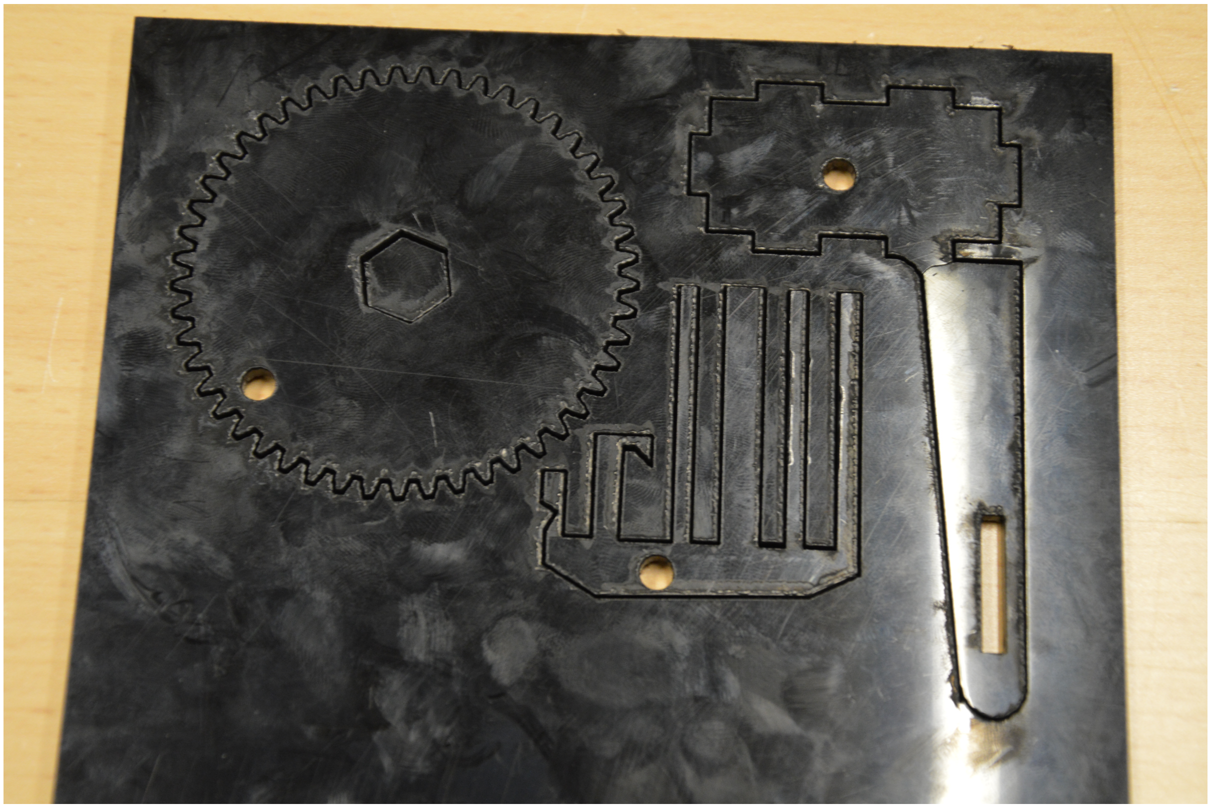

Figure 5: *Cut test of POM-C*

4.1.6 PEEK

PEEK is one of the materials that we would have liked to try out since it is one of the materials that are used in the medical industry, however it is an expensive material and it is hard to get in sheets, we did have some conversion over mail with RIAS, but was unable to secure some samples.

4.1.7 ACRYL

Acrylic is a easy material to use in a laser cutter, the biggest problem with it, is that it is brettle, and does have a tendency to break when it hits something hard or comes under tension. we did not try to make test cuts in it, since we have cut a lot of acrylic and know the properties of it.

4.1.8 Conslusion

The conclusion is that we are going to use acrylic, since we have easy accesse to it, and can try to mend the disadvantages.

4.2 Iterations

we have used prototyping in order to get a viable device, through the different designs we have been able to see different problems, which have meant that we had to iterate to a new version, we have been limited by time, so we have had to make some compromises.

4.2.1 fisrt

The first iteration that we build did have some problems. The first is that it is expensive to build, since we are using a lot of acrylic, the second point is that it still is heavy, and unwieldy. But i did give some ideas for the next iteration.

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4.2.7 Conslusion

5 Prototyping analysis

Discussion of experience in building prototypes during the design process: - Illustration of all the prototyping activities - Discussion of specific areas where the experience of building prototypes affected the design requirements and specifications

6 Design specifications

Explanations of how to build the product, including information such as: - System architecture - Drawings and sketches - Parts and supply ordering information

Design specifications marked for: - Quality - Accuracy - Originality

7 Theory

7.1 Rapid prototyping

Prototyping of a physical product is an age old process that has evolved all the way to today. Up until the emergence of virtual prototyping with CAD applications, prototyping was manual, and tended to be craft-based, thus very slow [4].
In the 1980s, virtual prototyping became more widespread, as computer tools became more mature. Virtual models could now be analysed and modified as if they were physical prototypes, and several iterations of designs could be easily carried out. But as the prototypes became more complex, the time required to make a physical model increased, and therefore craft-based production of a

physical prototype became tedious [4].

A new type of prototyping has therefore emerged in the 1980s, called rapid prototyping (RP). Rapid Prototyping can be defined as techniques used to quickly fabricate a scale model of a part or assembly, using three-dimensional computer aided design (CAD).

Rapid Prototyping has also been referred to as solid free-form manufacturing, computer automated manufacturing, and layered manufacturing [2]. An RP model's most used scenario is for testing various qualities of a physical product, and in some cases, the RP part can be the final part, but typically the RP material is not strong or accurate enough.

There exists many experimental RP techniques such as Stereolithography (SLA), Digital Light Processing (DLP), Laminated Object Manufacturing (LOM), Electron Beam Freeform Fabrication (EBF3), Fused Deposition Modelling (FDM), and more [1]. The latter was specifically used in this project, because of its almost ubiquitous presence in universities, fab-labs, and hackerspaces.

The main reasons for using Rapid Prototyping are very compelling. It decreases costly mistakes and engineering changes, thus minimizing development time. By being able to have a look at the product early in the design process, mistakes can be corrected, and changes can be made while they are still inexpensive.

Rapid prototyping can be performed in many different ways, but they all adopt the same basic methodology:

- A virtual model is designed in a CAD application. It represents the part that is physically built as an enclosed volume, and will specify the inside, the outside, and boundaries of the model.
- The model to be built is next converted into an STL (Stereo Lithography) file format. The STL format approximates the surfaces of the model by polygons.
- A program analyses the STL file, and "slices" the model into cross-sections. It generates paths to be filled and calculates the amount of material to be extruded, in the case of a 3D printer that uses fused deposition modelling [3]. In short, it converts a digital 3D model into printing instructions for a 3D printer.
- The model and any supports are removed. The surface of the model is then finished and cleaned for imperfections [2].

8 TESTING - ignore

- The individual entries are indicated with a black dot, a so-called bullet.
- The text in the entries may be of any length.

9 Conclusions

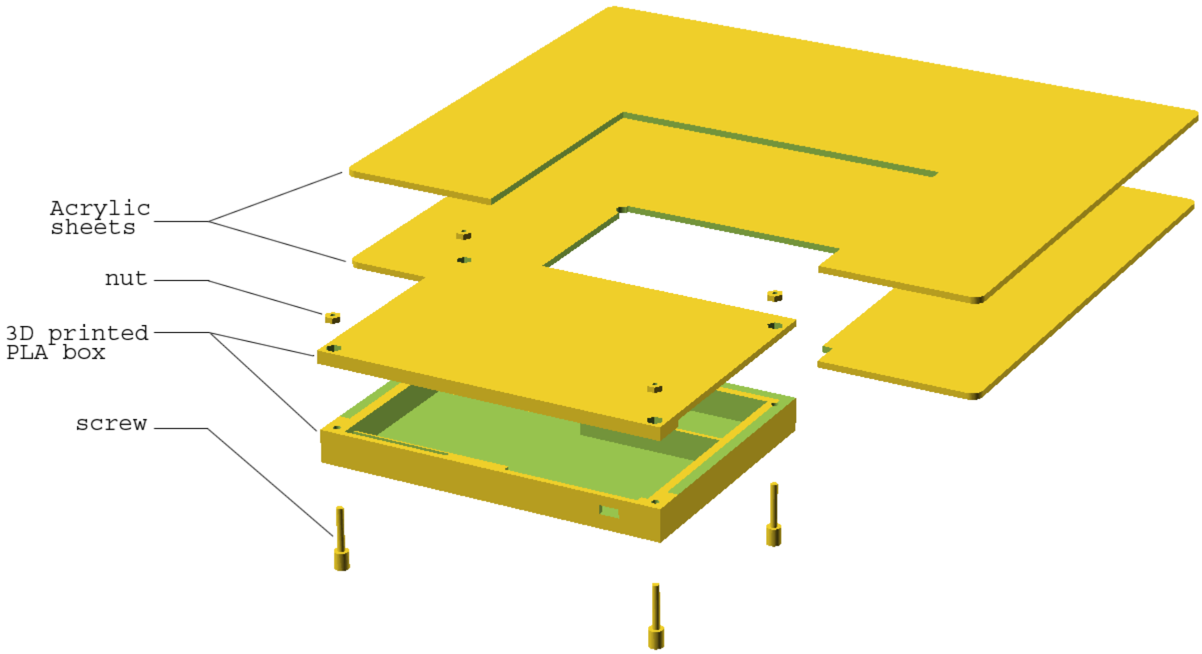

Figure 6: *This is a description*

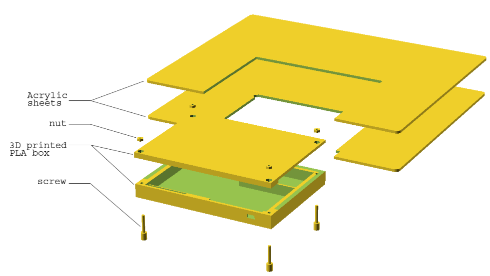

Figure 7: *This is a description*

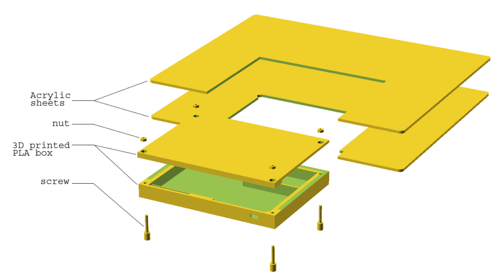

Figure 8: *This is a description*

References

[1] 3d printing / wikipedia. http://en.wikipedia.org/wiki/3D_Printing.

[2] Rapid prototyping: An overview. efunda.com/processes/rapid_prototyping/intro.cfm.

[3] Slic3r - g-code generator for 3d printers. http://slic3r.org/.

[4] Chee Kai Chua, Kah Fai Leong, and Chu Sing Lim. *Rapid prototyping: principles and applications.* World Scientific, 2010.