KOKKUVÕTE

Magistritöö on püstitatud eesmärgid saavutanud: dokumenteerida tootearenduse tsükkel, projekteerida seade, sooritada tugevusarvutused ohtlikutele ristlõigetele ja lõplikult dokumenteeritud. Järgnevalt tulemustest detailsemalt.

Töö on jaotatud nelja ossa:

- Planeerimise osas teostati turu-uuring olemasolevatele kiirjahutuste võimalustele ja selgitati välja kliendi vajadused. Tulemusena püstitati kriteeriumid projekteeritavale seadmele.
- Kontseptsioonide loomisel sai analüüsitud viite erinevat laadimise lahendust, millest valituks osutus lineaarne väljastus ja langetus.
- Projekteerimisel koostasin tootest CAD mudeli ja kõikidest põhilisest alamkoostudest joonised. Seadme projekteerimisel lähtusin asjaolust, et seade sisaldab jooksvat vett, millest tulenevalt suurem osa seadmes kasutatud materjale on plastik PC ja PMMA, roostevaba teras EN 1.4301 ning T6 termotöödeldud alumiinium margiga EN AW 6061 T6.
- Inseneritehnilised arvutused tehti pudelile pöördeid andva võlli ülekande väljaselgitamiseks ning seadme kõige ohtlikuma ristlõike kontrollimiseks. Tehtud arvutuste järgi peavad laadimismehhanismi siinid rohkem kui 1.5 kordse varuteguriga vastu.

Projekti ajakava oli sellises mahus seadme ehitamiseks väga kriitiline. Nimelt projekti algusest valmis prototüübini oli aega keskelt läbi neli kuud. Sellest tulenevalt tuli teha seadme projekteerimisel kliendiga mitmeid kompromisse ning kiireid otsuseid, milliseid sõlmi kui palju testida enne seadme lõplike detailide tellimist. Seadme projekteerimisel oli suurimaks katsumuseks laadimismehhanismi disainimine, mille puhul esmasel prototüüpimisel esines mõningaid puuduseid, mis said projekti käigus lahendatud nagu näiteks gaasiamordi lahenduse lisamine. Kiire ajagraafiku tõttu esines samuti mitmeid probleeme komponentide kättesaadavusega ajagraafiku alusel, näiteks esialgselt valitud siinide tarnimisega tekkisid ootamatud probleemid. Ajakavast kinni pidamiseks sai tehtud otsus hoopis Hiinast tellida alternatiivsed siinid.

Kokkuvõtteks jääb autor oma tehtud tööga rahule, sest suutsin nelja kuuga projekti keskmes oleva seadme projekteerida, kõik detailid ja komponendid tellida ning lisaks ka seadme valmis prototüüpida Ungaris. Heameelt teeb eriti veel see, et antud seade sai kliendi poolt kuu aega testitud ning siiani töötab kõik hästi.

SUMMARY

The Master's thesis has achieved the set goals: to document the product development cycle, to design a machine, to perform strength calculations for the most critical cross-section and to be finally documented. The following are the results in more detail.

The work is divided into four parts:

- In terms of planning, a market study was carried out on the available rapid cooling options and the customer's needs were identified. As a result, criteria were established for the designed device.
- When creating the concepts, five different loading solutions were analyzed, of which linear delivery and lowering were selected.
- During the design process, I created a CAD model of the product and drawings of all the main subassemblies. When designing the device, I was based on the fact that the device contains running water, as a result of which most of the materials used in the device are plastic PC and PMMA, stainless steel EN 1.4301 and T6 heat-treated aluminum with the mark EN AW 6061 T6.
- I performed engineering calculations to determine the riveting ability of the tool and to check the dangerous cross sections of parts. Calculations show that the front and back handle will not brake and that is with a pool factor of 1.5.

The project timeline was very critical for building a device of this scale. I had four months from the beginning of the project to the finished prototype. As a result, several compromises had to be made with the customer when designing the device and quick decisions had to be made, which nodes and how many of them to test before ordering the final parts of the device. When designing the device, the biggest challenge was the design of the loading mechanism, in which there were some shortcomings in the initial prototyping, which were solved during the project, such as adding the gas spring solution. Due to the fast paced schedule, there were also several problems with the availability of components. For example, Rollco rails were initially selected as the rails used in the device, but due to unexpected problems with delivery I had to stick to the project schedule and order alternative rails from China instead.

In conclusion, I am satisfied with the work I have done, because within four months I was able to design the device, order all the parts and components, and also complete the prototype of the device in Hungary. It is particularly gratifying to know that the device was tested by the customer for a month and everything is still working well.