KOKKUVÕTE

Käesoleva lõputöö eesmärgiks oli luua kergem sportlik sadularaami mootorrattale Honda VFR750F, mis vabastaks mootorratta kergelt purunevate gondlite kasutamisest. Sadularaam peab säilitama kõik ettenähtud funktsioonid ja olema sobilik originaalse sadulaga.

Tööd alustati turuuringu teostamisega. Kiiresti selgus, et konkreetsele mudelile puuduvad sadularaami tootmisjoonised. Erinevad mootorratta ümberehitus projektid on individuaalsed ja rattaomanikud, kes soovivad sõidukit ümberehitada peavad tootmisprotsessi ise läbi käima.

Turu-uuringule järgnevalt sõnastati ära sadularaami funktsioon, mis seadis loodavale tootele piirtingimused. Sadularaami külge kinnitub elektroonika ja numbrimärk, mis peavad olema võimalikud ka uue tootega.

Seejärel analüüsiti erinevaid võimalikke materjale, millest sadularaami oleks võimalik ehitada. Hindamismaatriksist selgus, et terase kasutamine on eelistatud tänu heale saadavusele, odavale hinnale ja tõmbetugevusele. Sadularaami ehitamiseks valiti 20x20x2 mm nelikant profiilid.

Originaalsest sadularaamist loodi fotogrammeetria abil mudel, mis lihtsustas uue sadularaami projekteerimist. Peale lihtsustatud mudeli loomist kasutati AutoDesk Inventor tarkvaras topoloogilist optimiseerimist, et leida optimaalne sadularaami kuju. Saadud tulemusele joonistati skelett, mis muudeti toruraamiks Frame Builder mooduliga. Profiilidest koostatud raamile sooritati LEM analüüs, et veenduda lahenduse vastupidavuses varuteguriga 2.

Järgnes profiilide ja kinnituslülide mudelite loomine, et detaile oleks võimalik tellida. Töös kasutatud detailid telliti ettevõttelt Fractory ja Daniwal MW. Detailide keevitus telliti eraisikult. Kogu sadularaami valmistamiseks koos tarnega kulus 10 päeva. Bakalaureuse töö käigus valmis üks sadularaami prototüüp, mis pidas vastu staatilisele koormuskatsele. Sadularaam kaalub 5 kg ja läks maksma 115 eurot, seega täitis sadularaam oma eesmärki olles soodsam ja lihtsasti toodetav.

Lõputöö autor tõdeb, et lõputöö sai koostatud piiratud ajaga, mistõttu oli töö fookus ainult raamil ning mitte erinevatel kinnitusdetailidel. Tervikliku lahenduse loomiseks tuleb tootmisprotsess eraldi läbiviia kõikidele üksikutele detailidele. Lõputööst jäid samuti välja dünaamilised koormuskatsed, mis oleksid aidanud paremini hinnata sadularaami sobivust liiklusesse. Töö sadularaami kallal jätkub lõputöö väliselt.

SUMMARY

The aim of this thesis was to create a lighter subframe for a Honda VFR750F motorcycle, which would free the motorcycle from the use of easily breakable fairings. The subframe had to retain all the intended functions and be compatible with the original saddle.

Work began on conducting a market study. It quickly became clear that there were no production drawings for the subframe for a particular model. Various motorcycle conversion projects are individual and motorcycle owners who want to modify their vehicle have to go through the production process themselves.

Following the market research, the function of the subframe was formulated, which set boundary conditions for the created product. Electronics and a number plate are attached to the saddle frame, which must also be possible with the new product.

Then, various possible materials from which the saddle frame could be built were analyzed. The evaluation matrix showed that the use of steel is preferred due to good availability, low price and tensile strength. 20x20x2 mm square profiles were chosen for the construction of the subframe.

A model was created from the original saddle frame using photogrammetry, which simplified the design of the new saddle frame. After creating a simplified model, AutoDesk Inventor software was used for topological optimization to find the optimal subframe shape. A skeleton was drawn on the result, which was converted into a tubular frame with the Frame Builder module. The frame made of profiles was subjected to FEM analysis to verify the durability of the solution with a margin factor of 2.

This was followed by the creation of profiles and fastener models so that parts could be ordered. The parts used in the work were ordered from Fractory and Daniwal MW. Welding of parts was ordered from a private person. It took 10 days to make the whole subframe with the delivery. During the bachelor's thesis, a prototype of a saddle frame was completed, which withstood the static load test. The saddle frame weighs 5 kg and cost 115 euros, so the saddle frame fulfilled its purpose by being cheaper and easy to produce.

The author of the thesis admits that the was prepared in a short amount of time, which is why the focus was only on the frame and not on different fastening details. In order to create a complete solution, the production process must be carried out separately for all individual details. Dynamic load tests were also excluded from the dissertation, which would have helped to better assess the suitability of the subframe for traffic. Work on the saddle frame continues externally.