7 KOKKUVÕTE

Bakalaureusetöö tulemusena projekteeriti mootori teststendi reguleeritav kinnituskronstein ja kontrolliti insenertehniliste arvutuste ning põhimõtete alusel selle tugevust. Autoril oli huvi töö tulemusena projekteeritud kinnituskronstein ka reaalselt valmistada ning olemasolevale teststendile paigaldada. Sellest tulenevalt lahendati mõningad sõlmed ning valiti elemendid võimalustest lähtuvalt.

Töö käigus analüüsiti kolme erineva tootja mootoristendide kinnitusviise ning nende omadusi hinnati hindamismaatriksi alusel. Esmased kontseptsioonid töötati välja seatud nõuete ning alternatiivsete stendide põhjal.

Võtmenõueteks oli kronsteini lihtne reguleeritavus ilma mootorit muul viisil toestamata, 600 kg kandevõime ning tarind pidi olema iselukustuv.

Valitud kontseptsioon põhineb trapetskeermega käigukruvil, mille vändaga käitamisel saab kinnituskronsteini kõrgust muuta. Peamisteks komponentideks on käigukruvi, tugilaager, laagerdused, trapetskeermega mutter, koonushammasrattad, kinnituskõrvad, ülekandevõll, vänt ning korpuse detailid.

Töö käigus kontrolliti analüütiliselt kõikide autori hinnangul ohtlike sõlmede tugevust ning veenduti tarindi ohutuses. Kinnituskõrvadele pidas autor oluliseks teha geomeetriast ajendatult ka LEM analüüsi, kasutades selleks *Solidworksi'i* LEM keskkonda.

Käigukruvi, hammasülekannet ning ülekande võlli kontrolliti lisaks muule ka väsimusele ning veenduti, et arvutuslikult saadud eluiga vastab ootustele. Arvutuste põhjal julgeb autor väita, et projekteeritud tarind peab vastu ning on funktsionaalne.

Laagrite eluea ja komponentide väsimustugevuse arvutustest lähtuvalt on tarindi hinnanguline eluiga 20 aastat, mis on selle rakendust arvestades vägagi aktsepteeritav tulemus.

Töö käigus õnnestus projekteerida lahendus, mis peab vastu 600 kg massiga mootori koormuse, on mugavalt nii vända kui akumutrikeerajaga kõrgusesse ning käsitsi piki- ja ristisuunaliselt reguleeritav. Käigukruvi tõusunurk ja tugilaagrist tingitud hõõrdejõud on piisav, et mootor oma massiga takistaks tarindi iseenesliku kõrguse muutuse ja vajaks seetõttu lisalukustust.

Läbiviidud töö tulemusena valmisid lisaks tugevusanalüüsidele ka tootmisjoonised, mille põhjal valmistatakse lähitulevikus projekteeritud tarind ning verifitseeritakse selle funktsionaalsus.

Esmase hinnangu ja inseneri kogemusele tuginedes prognoosis autor tootmiseks kuluvat aega ja arvutas selle põhjal toote omahinna, milleks kujunes 850 €.

8 SUMMARY

As a result of Bachelor's thesis an adjustable engine run stand's mount was designed and its proof of strength was determined. The author wanted to physically produce the mount afterwards and install it on an existing run stand. The design and choice of components was made considering author's own experience and access to precise manufacturing equipment.

Three different run stands from different manufacturers were compared and evaluation matrix was created. First concepts were developed based on evaluation matrix and set base requirements.

Key requirements for the mount were its capability of holding 600 kg engine, its ease of adjustment and its ability to be self-locking without needing an extra component to serve that purpose.

Chosen concept's main element is a trapezoidal thread power screw which's rotation causes a change in mounting point's height. The power screw is rotated by hand-operated crank system. Run stand's mount includes thrust bearing, flanged bearings, trapezoidal thread nut, bevel gears, fixing joints, transmission shaft, hand crank, and different parts of housing.

Autor analysed the whole mount and performed strength calculations on all joints and connectors where he estimated risk of breaking or deforming to be high. Fixing joints were analysed using Solidworks's FEM software mainly due their unusual geometry.

In addition to simple calculations, power screw, bevel gears and transmission shaft were calculated for fatigue stress as well and confirmed that their lifetime meets author's expectations. Based on conducted strength calculations is author confident enough to tell that the designed mount is durable and will work as intended.

Based on bearing's calculated lifetime and fatigue strength of components, the estimated lifetime of the engine mount is 20 years which is considering its application more than enough.

As an outcome of thesis an engine mount was designed which can withstand 600 kg engine, is easily adjustable in all three axes, and can be height adjusted using a hand crank or impact wrench. Power screw's lead angle and thrust bearing's friction prevent mount from lowering itself and therefore can be considered as self-locking.

In addition to strength analysis, technical drawings of all components were made which will be used in the near future to produce the designed mount and verify its functionality.

Due to comprehensive strength analysis there was not a chance to deeply investigate the manufacturing process hence the manufacturing times of different operations were estimated based on author's previous experience. The product cost was estimated according to manufacturing times, cost of materials and purchased components which resulted in total of 850 €.