

# Strength Test Performance Modification MAX 400KG For Sports Measurement and Evaluation Digital Base

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## Abstract :

This research aims to be able to make modifications to development tools back and leg dynamometer. Specific targets to be achieved in this research is the creation of modification tools back and leg dynamometer that can be used in accordance with current needs, where the back and leg dynamometer are currently only able to with stand the load resistance of up to 300kg, in fact in the last 2 years many athletes who have had the capability of more than 300 kg, thus the need for modifications to the development of back and leg dynamometer load is up to 400kg resistance. The study design of this research is the R & D (Research and Development). This research subjects was conducted in yogyakarta state university. The results of first years has been the completion of a prototype tool leg and back dynamometer innovative. In the 2nd year study shows that it has completed a prototype of a modified development tool back and leg dynamometer with capability of 400 kg. Created tools has advantages among others: the ability of measurement exceeds appliance standard (300 kg), has the ability to store data in memory on the tool developed, the framework materials using aluminum so it is not easy to rust, can be used indoors and outdoors (portable), display data with larger numbers and a strong light with LED Display, low energy. Product test results found that of the 280 athletes who followed the trial of the product in the form of test and measurement leg muscle strength are 14 athletes were found to have strength above 300 kg. Results of ultimate power reached 386 kg of wrestling athletes and track and filed up to 354 kg. From these results, it was concluded that the back and leg modification tool used to measure decent back and leg muscle strength with strength up to 400 kg.

**Keywords: Development, strenght test, leg and back, Modification, digital.**

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## I. INTRODUCTION

This research is in order to realize the idea in accordance with market demand into real products, which are then examined to get a variation of clear specifications and has the distinction of excellence which is competitiveness, which in the next stage tool that has been researched, can be patented in the name of education high and in production to serve the needs of the market. The study also as a form of realization of the follow-up modification and development of science and technology Competitive Grants Program Decentralization UNY. At each performance

sports skills required quality capabilities biomotor good components, which include strength, speed, force (strength), endurance, flexibility, agility, balance and coordination (Iskandar and Kosasih, 1999: 3). To be able to know how well the biomotor components, the necessary instruments are capable of measuring instruments or that may be used in the test and measurement of sports (sports measurement and evaluation). Here the team will examine the development of the modification of measuring instruments to measure the leg and back muscle strength, which has been known such a device with the term leg and back dynamometer.

In simple terms how to technically test the ability of muscle strength in the leg and back dynamometer with target leg muscles are participants stand on the back and leg dynamometer then set the tool chain strap with a half squat position and back in a state remain upright. Knees bent and the chain in place between the two legs, hand held instrument straight down. Tools pull using leg muscle strength without the help of hand muscles and back muscles. Meanwhile, to measure muscle strength by using a back and leg dynamometer is a participant standing on the back and leg dynamometer which then rope chain tool is set to the position of the foot remains straight with body / back bent and fixed to the front view. Handle is located in front of the horizontal leg, and did not stick to the legs. Tools pull the muscle strength back (Widiastuti, 2011: 78). Technically way of implementation as well as equipment needed tends to be the same as the measuring instrument / instruments that, but here the problem is in the device that has been widely used, is only able to show the results of a maximum capacity measurement up to 300 kg, while according to the latest data on when testing the ability of leg and back muscle strength in athletes DIY in 2011 and 2012 in the find has a lot of athletes who can take the results of measurements of the power of up to 300 kg or more, when these athletes still feel able to deal with more stimulus. In simple terms means it can be concluded that the ability of these athletes have a lot that can achieve the result that more than 300 kg. Instrument tests are very in craved by athletes who did after getting an exercise program appropriate to the ability biomotornya can be significantly increased so that the measurement of the ability biomotor really - really can be much more precisely with pre-existing conditions such as the data already in the can is. So in this case, the national olympic committee and local, Faculty of Sport Science and training center sports throughout Indonesia, because such instruments are needed in Indonesia, thus the presence of such instruments is expected the process of

measuring the ability biomotor be more steady and standard can be more clearly and precisely and more accurately measured in accordance with the needs of the biomotor capabilities. As part of the development or modification of the available tools mentioned above, it is considered the need to make development and customization tools strength test back and leg dynamometer with the ability up to 400 kg or more and the device can also be registered IPR so as to increase the wealth of Indonesian products. Another impact will provide an opportunity to the domestic industry to innovate designing measuring instruments biomotor other components, and cooperating with universities in developing the sports industry.

In particular, this study aims: first, to realize development modification gauges special biomotor ability leg and back muscle strength to test the measurement and evaluation capabilities biomotor, and both are able to obtain intellectual property rights. The process of goal achievement carried out in stages as follows:

1. Development of test and measurement tools by modifying the tool of examples of tools that already exist today are only capable 300 kg be even more.
2. Perform laboratory testing techniques for these tools in terms of function, service, continuity, performance and appearance.
3. Evaluate the tool.
4. Improving the tool.
5. Socialize the tool to olympic committee and sports training center.
6. To test the market / consumer test / field testing.
7. Improving appliance-based input and demands of the candidate - prospective users of the tool.
8. develop the sports industry in Indonesia.
9. Obtaining intellectual property rights on tools developed / modified.

Targeted results of this research are as follows, for the development of a modified tool back and leg strength dynamometer test of a tool that is only capable of 400 kg and 300 kg into a product obtained subsequent to the patented.

Development tool modification strength back and leg dynamometer test is designed using principal component composed of a spiral spring, and potentiometer. The advantage of this tool is that it can measure the strength of the legs and back with 500kg capacity where the old tool endurance capacity of only 300kg. In addition the tool is not in Indonesia with a 400kg resistance ability. The development of this tool is a modification of an existing tool with the ability on top of the old tools to meet the needs of sports measurement tool which is economically advantageous when produced, consideration of the user is purchasing power, benefits, reliability, easy to use. Consideration of the designer and maker is sophistication, ease of finding spare parts, ease of production. The roadmap research can be explained with 4 steps as follows:

Step one: Related studies that have been done with the title: Profile of leg and back muscles strength for Martial athlete in DIY (Siswantoyo, et al: 2011). Profile of leg and

## **II. METHODS**

This research uses research development Borg and Gall. This research is on going for 3 years. The flow chart of research work as follows.

back muscles strength (Back & Leg dynamometer) training camp athlete Yogyakarta (Tri Hadi Karyono, et al: 2012). Data from these studies indicate that the ability of the legs strength and back (back and leg dynamometer) shows that there are many athlete who already have the strength capability of more than 300 kg, while the instrument back and leg dynamometer test that there is currently only capable of a maximum capacity until 300 kg.

Step two: research conducted in 1 year. Assembly/drafting modification tool development strength back and leg dynamometer test a prototype of resilience 300 kg into a resistance of 400 kg.

Step Three : Advanced research conducted 2<sup>nd</sup> years.

Testing the modification development tools back and leg strength test dynamometer to prospective user and stakeholders concerned Scientific publications both nationally and internationally.

Step four: Study advanced Finalize last (3<sup>rd</sup> years).

Modification of test development tools back and leg strength has been able dynamometer tested, has use and assessment standards and proposed for IPR.

A. Flow Chart Research

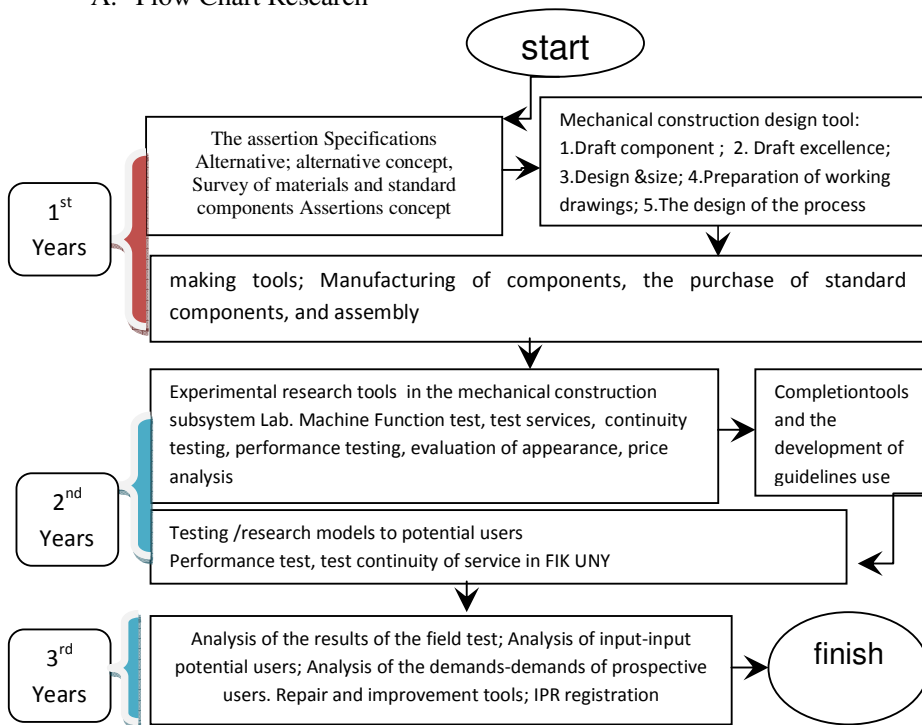


table 2. chart research

	1 <sup>st</sup> years	2 <sup>nd</sup> years	3 <sup>rd</sup> years
	1.The assertion specification, alternative-an alternative concept, the survey materials and standard components, affirmation concept 2. The mechanical construction design tool melilputi; designing components,design excellence, design size, making ofworking drawings, designing the process 3.Preparation ofthe toolinclude; manufacturing ofcomponents,the purchase ofstandard components, and assembly.	1.Experimental research tools in the mechanical construction subsystemLab. Machineswhichinclude;Function test, test services, continuity testing, performance testing, evaluation of appearance and price analysis 2.Completion of the tools and the development of guidelines use 3.Testing/research models to potential usersin a way; Performance test, test and test continuity of service in sport science YSU.	1.Experimental research tools in the mechanical construction sub system Lab. Roomates machines include; Function test, test services, continuity testing, performance testing, evaluation of appearance and price analysis 2.Completion of the tools and the development of guidelines use 3.Testing/research models topotential users in away; Performance test, test and test continuity of service in sport science faculty YSU.
Su perficial	Has been the creation of product development modification tool back and legs trength dynamometer test the feasibility of a prototype ready tobe tested	1.Testing of product development modification tool back and leg strength test dynamometer with samples competent and related compounds as potential users 2.Publication of national and international scientific journals	Evaluating short age-a short age of product development modification tool back and leg strength test dynamometer for improving that these tools really-really feasible and can be received in the user communities and viable future for the patented his work to obtain IPR
indicator s of Achieve ment	Successfully assembled product development modification tool back and leg strength test dyanometer	The results indicate modification development product testing tool back and leg strength test dynamometer with samples competentandrelated compoundsaspotential userstobe followed upin orderto improve products	The successfuldevelopment ofa modifiedtoolback andlegstrengthtestdynamometere ligible tobe marketedand used by therelevant partiesasusersandalso deservetoget the recognitionof IPR.

Research Sites Design, manufacturing and the research was conducted in the laboratory machine, sport laboratory

### III. DEVELOPMENT RESULTS AND DISCUSSION

Results of the development of gauges leg muscle and back muscles strength (leg and back strength test) in year 2 have been improvements and testing with the following stages.

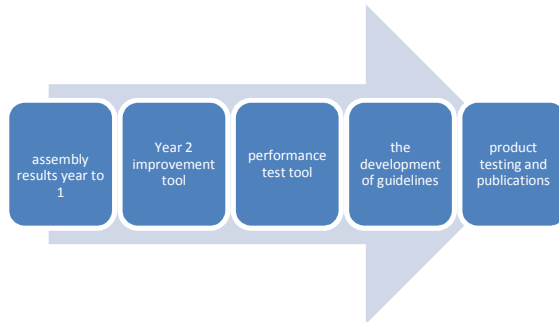


Figure 1: work flow improvements, performance testing and product testing prototype assay leg and back strength

From Figure 1. above can be confirmed with an image/photo series of processes through which there search activities in the research. The stage of completion tools, test performance and test products as follows.



### RESEARCH ACHIEVEMENT OF YEARS II

Figure 4.2: a series of process improvement prototyping leg and back dynamometer and test products

The results showed that it had completed a prototype of a modified development tool back and leg dynamometer with capability of 400 kg. Created tools has advantages such as:

- 1) have the ability to measure more than 300 kg, ie 400 kg.
- 2) have the ability to store data in memory on a tool developed in considerable numbers,
- 3) using an aluminum frame material that is not easily corroded, light weight brought to every place / portable.
- 4) can be used inside or outside the room,
- 5) display data from the use of an LCD display using LEDs display with figures sharper/ sensitive.

Some things that the advantages of the prototype developed on a basic capital to be able to provide convenience to the users of these tools, and provide a challenge to the researcher for the repair and preparation of standard norms as well as the maintenance of patents in the third year. In the next year this prototype can be realized in the form of a ready tool on the market to support the sports industry in Indonesia as well as getting IPR / patent. In the second year of this study it can be concluded that it has completed a prototype refinement tool leg and back dynamometer with a power of 400 kg.

By engineered technology that made this growth will provide opportunities for sport technology innovation in the future. It is strongly supported by a vast market and user considerable inter alia of environmental health laboratories in universities in Indonesia, club sports, olympic committee and related institutions.



Results of the development of a tool back and leg strength test dynamometer with a maximum power up to 400 kg assembled, refined and in trial well. Such a device has some advantages and ease of use, among others: the ability of measurement of up to 400 kg, has the ability to store data in memory on the tool developed, the framework materials using aluminum so it is not easy to rust, can be used indoors or outdoors, the display display the data with larger numbers.

#### Suggestion

Based on the results of this second year, it is advisable to be more specific in the selection of components, materials and equipment required. Besides, it also needs to be developed designs as well as instructions for using the tool with clear and easily understood by any user.

#### Aknowledment

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