



K L UNIVERSITY

Team VIJAYAN'S Report

On

Human Powered Vehicle Challenge (HPVC) -2015

Project: Design and Fabrication of a HUMAN POWERED VEHICLE
(RECUMBENT CYCLE)

Team: V.Rithvik, M.Kshatrindra, B.Seetaram Prasad, N.Rupesh Kumar Reddy, A.Rajasekhar, N. Prashanth Yadav, Viswanath, V.Lokesh, K.Sai somanadha sastry, Sambit Kumar Dash, J.Naveen Reddy, A.Teja, Y.Sai Chandh, R.Mounika, R.Lakshmi Sravya



ABOUT ASME: ASME (American Society Of Mechanical Engineers) is a not-for-profit membership organization that enables collaboration, knowledge sharing, career enrichment, and skills development across all engineering disciplines, toward a goal of helping the global engineering community develop solutions to benefit lives and livelihoods.

ASME serves this wide-ranging technical community through quality programs in continuing education, training and professional development, codes and standards, research, conferences and publications, government relations and other forms of outreach.

ABOUT HPVC: Human powered vehicle challenge (HPVC) is one of the most prestigious competition that is being conducted by American Society for Mechanical Engineers (ASME) every year. Human-powered transport is often the only type available in underdeveloped or inaccessible parts of the world, and if well designed, can be an increasingly viable form of sustainable transportation. ASME's International Human Powered Vehicle Challenge (HPVC) provides an opportunity for students to demonstrate the application of sound engineering design principles in the development of sustainable and practical transportation alternatives. In the HPVC, students work in teams to design and build efficient, highly engineered vehicles for everyday use—from commuting to work, to carrying goods to market.

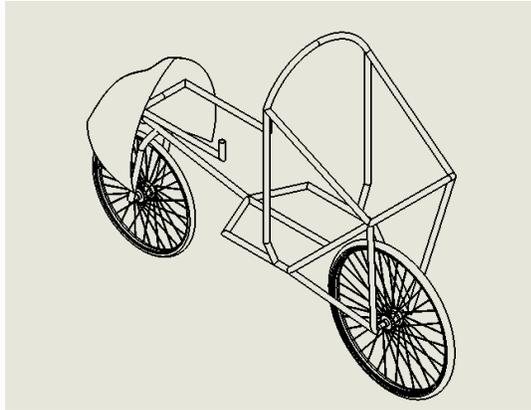
ABOUT OUR VEHICLE: A **recumbent bicycle** is a bicycle that places the rider in a laid-back reclining position. Most recumbent riders choose this type of design for ergonomic reasons; the rider's weight is distributed comfortably over a larger area, supported by back and buttocks. On a traditional upright bicycle, the body weight rests entirely on a small portion of the sitting bones, the feet, and the hands.

Most recumbent models also have an aerodynamic advantage; the reclined, legs-forward position of the rider's body presents a smaller frontal profile

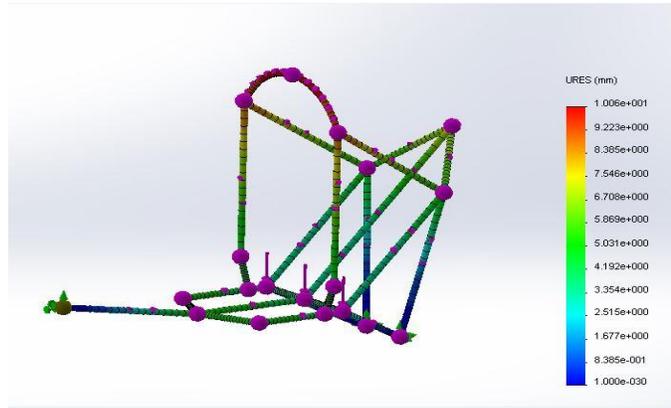


Reasons For Recumbent vehicle: Comfort, Stress injuries, Speed, Safety, Wide view, Disabilities.

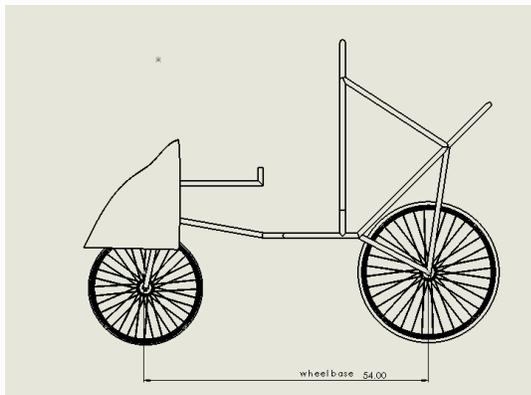
Isometric view



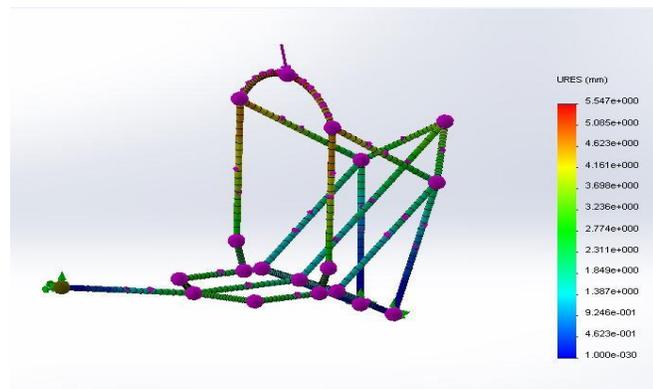
dead weight displacement



side view



top load



Gas welding



material cutting



TEAM MEMBERS DESIGNATION:

DESIGN TEAM: V.Rithvik, B.Seetaram Prasad, N.Rupesh Kumar Reddy, K.Sai

Somanadha sastry

TRANSMISSION TEAM: N. Prashanth Yadav, Viswanath, Sambit Kumar Dash

BRAKES AND TYRES: J.Naveen Reddy, A.Teja, Y.Sai Chandh

MATERIAL ANALYSIS AND FABRICATION: M.Kshatrindra, V.Lokesh

ENERGY DEVICE: Mounika, R.Lakshmi Sravya

RIDERS: Sai chand, Lokesh, Kshatrindra, Mounika, Rithvik

HPVC 2015:

This is a three day **National event**. This is the second time that HPVC is conducted in India which was hosted by “Delhi Technological University”.

The complete details of the competition are as follows:

1. Evaluation of design
2. Drag Race
3. Endurance Race
4. Prize Distribution

Day 1: Evaluation of design (16th jan)

On the first day of the competition i.e, 16th of January, evaluation of the design was carried out. This evaluation was done in two levels, the first one is a static test and the other is dynamic test.

Static test: In the static test, the safety of the vehicle was tested considering the roll over protection system, fairing, side reflectors, mirrors etc. Our vehicle satisfied all the required conditions and was shortlisted for the dynamic testing. The jury were very much impressed by the way we designed our vehicle and the safety measures that we implemented in our vehicle. The unique feature of the side reflector which impressed the jury most was that, it is not just a radium strip but is a gold colored paint which reflects the light when light falls on it. At the end, the jury suggested us few changes

regarding the front fairing and asked us to make sure that there will be no any sharp edges on the fairing during the dynamic testing.



Dynamic test: In the dynamic test, the vehicle was tested dynamically and the performance was measured. The tests that the vehicle underwent were stability test, brake test, and the turning radius test. In the stability test, the vehicle is expected to move in a straight line path without any deviation and our vehicle moved in perfect straight line path in the given track which made us eligible for the remaining part of the dynamic test. In the brake test, the brake distance will be calculated and for our vehicle, it was under the permissible limit.



In the turning radius test, the radius at which the vehicle turns will be calculated and was under the given limit. As the vehicle passed all the three tests, our vehicle was shortlisted for the competition to compete with the remaining teams. There were 39 teams in total which were shortlisted for the competition apart from our vehicle.

After the tests, our vehicle is approved officially that it is safe to ride by the jury and is acknowledged with a safety sticker, without which the vehicle will not be allowed to participate further in the drag and endurance race.

Apart from the above mentioned tests, there was a presentation round where Ms. Monika presented about the energy device, Mr. K. M. Viswanath presented about the transmission part of the vehicle apart from Mr. Rithvik, the team captain who presented about the design of the vehicle.

DAY 2: DRAG RACE

This is the first race of the 3 day event where, the teams which were shortlisted in the design test participated. Before the beginning of the actual race, there was a qualifier round in which every team need to compete with their immediate team. The race was held according to their vehicle numbers. In the qualifier, our vehicle competed with the team number 9 (NMIMS University) , but unfortunately due to over lubrication of the chain and water that was accumulated over the chain due to fog and snow, the chain got separated from the sprocket and got struck in the frame. Still, Kshatri who was riding the vehicle then, exhibited all his skills and somehow finished the race. Due to this unforeseen incident, the vehicle took about 3 minutes to complete the race and just qualified in the qualifier round.



According to the positions in the qualifier round, the opponents for each vehicle was decided and our vehicle had to compete with team **25 (Acharya Institute Of Technology)** , which stood 3rd in the qualifier. There was a cut-throat competition between the teams and at the end, team 25 won the race with a narrow time gap of 5 seconds. Since our vehicle lost the race, we were in losers bracket and we need to compete with the team **19(IIT PATNA)**. The vehicle and the rider both were in devastating form and it became pretty difficult for the opponent team to defeat our vehicle and our team eventually won the race.



After that race, we had a knock out race with the team **Civet** of **K L University**, both the teams from our university competed against each other and team civet won the race. Both the teams exhibited sportsmanship in the of the race. Since our vehicle lost 2 out of three, we were out of the competition and stood 17 in the drag race.

DAY 3: ENDURANCE RACE

It is the last stage of the competition, where every team will have to ride the vehicle for two continues hours independent of number of riders. There are certain rules to which all the teams should abide by. Some of them are:

- It is mandate that every rider should ride the vehicle for a minimum of three laps, otherwise the laps that the rider rode would be cancelled
- To change the rider, the vehicle should be brought to the pit and from there, the new rider should continue
- If the vehicle got any repair in the middle of a lap, only the rider is allowed to repair it and no other fellow team mate should involve.
- The vehicle should be brought to the pit only by the rider and no other team mate should help the rider in bringing the vehicle

Respecting the above rules and regulations, the race was started by Mr. Saichand from our team where he completed 6 laps and during the 7th lap, unfortunately his legs got arrested by cramps and was unable to ride the vehicle and thus the 7th lap got cancelled.



In continuation of the race, Ms. Monika took up the challenge and rode three laps and since the rider is female, the laps that she rode got multiplied by 1.5 times as in the rule



book and hence the total number of laps by the time she ended became 10.5. After that,

there wasn't much time left for us to complete the event and it was Mr. V. Lokesh who continued the race and he could only complete four laps by the end of the time.



And in total, our vehicle performed satisfactorily and stood 12 in the endurance.

The final result is as follows:

Design: 13th place

Drag race: 17th place

Endurance race: 12th place

Overall rank: 15th place

Rank In SOUTH INDIA: 2nd place

Finally our Heartful Thanks towards K L University, KLU-ASME, Dr.P.V.Chalapathi Rao (HOD MECH.), and K.Sai Prasad Sir (Faculty Advisor) for encouraging and supporting us throughout the project and competition.

TEAM VIJAYAN