Steering Team

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Abstract

The steering system is composed of 2 U-joint, 60 degrees bent shaft, with spline based connections. Rack & pinion housing is made out of one-piece Magnesium alloy. It has steering wheel rotation range of ±110 degrees for 3.5m radius turn. Compared to 2013, the steering mechanism of the 2014 Technion race car has improved in means of total weight, more natural driver feel and better stability and accuracy. Members of the steering team were committed to ensure the design of a safe system, while taking into account driver ergonomics.

Project Objectives and Requirements

1. Minimize backlash and increase the reactivity of the steering system.
2. Reduce the driver’s force needed to operate the steering.
3. Design a steering mechanism with high reliability that will maintain high performance throughout its lifetime.
4. Reduce the weight of the whole steering system.

System Description

The system is composed of three sub-systems:

1. Steering column – contains the wheel, quick-release mechanism, U-joints and the shaft.
2. Column bearings – contains the upper bearing assembly and the intermediate ball joint.
3. Rack and pinion system – compose of rack assembly, radial and linear bearings, pinion and housing.

Steering and Suspension:
The position of the steering rack is ahead of the front wheel axis, thus avoiding the use of a bevel gear, which caused a lot of problems for last year’s race car.

2013 Steering system had 2 major flaws:
1. It was too heavy.
2. It developed free play with time.

A 3rd harness was added to the steering column, in the form of ball joint in between the U-Joints. This should eliminate radial freedom of the intermediate shaft.

Usage of bevel gear was canceled in order to eliminate even the slightest backlash in the column.

Major weight reduction:
Choosing to manufacture the housings form light weight Magnesium and avoiding the usage of bevel gear has resulted in reduction of more than 30% of the weight, compared to last year.

Acknowledgements

Special thanks to: Dr. Yehuda Rosenberg, Prof. Reuven Katz & Faculty of Mechanical Engineering, Dr. Hagay Bamberger, Gideon Grader & G-TEP Program, Nimrod Meller, Yaacov Hauzer, Lea Stern, Kfir Cohen, Svetlana Iuski, Moshe Golan, Yosi Cohen, Zeev Hershkovitz, and many others for their support and assistance with this project.