

**To:** Mr. Christopher Bauer, Chief Financial Officer in BMW Cars Company, main branch of Gemany

**From:** The Fantastic Four Engineering Design & Research Group, Lebanon

**Subject:** Proposal to study the feasibility of replacing regular car wheels by spherical ones that are able to move in all directions and thus improving future car performance.

**Date:** Monday, April 4th, 2011

**Introduction:**

Since the time it was innovated by the Mesopotamians about 3500 B.C., the wheel has played a major role in enhancing human beings’ welfare. In particular, the automobile industry focuses as much as possible on the concept of the wheel with its cylindrical shape that we know, as it presents the most sufficient method for boosting car performance, or does it?

Nowadays, major car companies like yours are ready to insert, within the future car concepts, whatever it takes to make them easier to drive, and to improve them to the maximum, in order to meet the dream of the “intelligent car”. Large, international tire companies, such as Pirelli and Bridgestone, annually release new tire designs that maximize the benefits of using the concept of the “cylindrical wheel”; e.g., reducing friction or optimizing grip and handling. In addition, they study well the effect of each design on torque, safety, and power of the car. (Pirelli, 2011)

**Problem:**

 Although cylindrical wheels present advantages in the domains in which it is employed, it is inefficient in various domains of automobile performance. This inefficiency appears in tasks such as car parking or responsiveness to high-speed steering to avoid accidents, due to the fact that motion by cylindrical wheels is uni-directional, or as mechanical engineers like to call it “one-degree-of-freedom” motion.

This fact, in addition to virtual insights and images featured in many science-fiction movies, is what gave the intuition of looking towards unorthodox ways of designing wheels for the car of the future. Among those ideas is that of the spherical wheel, which is multi-directional, and thus enhances boosting up the performance of cars and their ability to move easier.

Also, note that whatever form of new wheels we think about, the main condition of transforming circular motion to linear motion tangential to it and vice versa must always hold true; the issue of momentum conservation must be satisfied at all instances for the idea to work.

**Scope:**

Basically, we intend, as the “Fantastic Four” team, to establish a comparison between spherical wheels and “old-fashioned” cylindrical wheels. We will focus on the points where the regular wheel fails in the domain of automobile performance, precisely where the idea of the spherical wheel comes in handy.

Moreover, we will study the outcomes of replacing cylindrical wheels of cars by spherical ones, and classify those outcomes into drawbacks and competitive edges, hence analyzing the feasibility of the idea by observing what overweighs the other.

Also, we will research ways in which spherical wheels can be used or applied in cars, as well as providing our own design of a spherical wheel built in a car. For instance, a spherical wheel could be attached to three much smaller cylindrical wheels, all tangential to its surface, polarly arrayed over the circumference; hence the motion of the spherical wheel will depend on magnitude and direction of rotation of the smaller wheels. This is almost the same technique the roll-ball computer mouse uses, with the difference that the computer mouse is an input device, while the one we’ll study is an output device (Lawrence, 2004).

**Procedure and Limitations:**

**Procedure:**

For our feasibility study paper, we will use both primary and secondary information resources. We will try to interview some engineers from BMW Car Company – Lebanese branch, which is represented by Bassoul Heneine Sal, the main BMW representative dealing company in Lebanon; and car tires companies such as Bridgestone. If, for any out-of-hand reason we could not arrange such an interview, we will manage one in advance with Prof. Marwan Darwish, chairperson of the ME department in AUB as he has a lot of experience in studying mechanics of motion.

We will provide AutoCAD drawing for the designs of the parts needed for spherical wheels as well as classic wheels (to compare and contrast).

If time permits, we will use a questionnaire to ask AUB students whether or not they like the idea to be implemented in the future cars, especially when we speak a bit to our representative targets about some pros and cons.

Plus, we will use as much adequate secondary resources as we need, but we will base it on web resources such as the net and the AUB database, as this topic needs up-to-date info.

**Limitations:**

In our primary resource usage, we are limited by the range of interviewees; had this not been the case, we would have taken it to international levels. And because of time limitations, we won’t be able to study the safety aspect of our design.

Also, one must keep in mind that the secondary resources that we must be looking into are limited. This is primarily because of the fact that the domain of automobile industry is a major part of our everyday life that requires safety for the drivers and pedestrians; that’s why it would be hard to think about new methods as it would be very risky. Hence, the change would take time, and so does acceptance of the new idea, especially that we have been using the same overall-cylindrical shape of the wheel for 5500 years now!

**Scheduling:**

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| **Tasks to be done** | **Date** |
| **From** | **To** |
| \*Research outline | 22/3/2011 | 29/3/2011 |
| \*Letter to Bassoul Henneine Sal | 7/4/2011 | 7/4/2011 |
| \*Letter to tires companies (Bridgestone or Micheline) | 7/4/2011 | 7/4/2011 |
| \*Interview with Prof. Darwich | 15/4/2011 | 15/4/2011 |
| \*Interviews with companies (BMW and tires) | TBA (according to response of the letters) |
| \*Designs with AutoCAD | 20/4/2011 | 29/4/2011 |
| \*Research Draft | 20/4/2011 | 10/5/2011 |
| \*Final paper | 25/5/2011 | 25/5/2011 |

**Closure of Proposal:**

Finally, we hope you approve our proposal, as it is quite important for us to do research on such an original methods that could change the image we have in mind about future cars. Moreover, this innovation would take the name of your company even higher among your market competitors.

**References:**

*- Car Tires, Motorcycle Tires, Truck Tires, Motorsport Tires – Pirelli.* Retrieved from: http://www.pirelli.com/tyre/ww/en/car/catalog.html

- Lawrence, A. (2004). Life in the Fast Lane. *Sports Illustrated*, 101(12), Z10. Retrieved from: EBSCO*host*.