



## **MECHANICAL ENGINEERING IN THE FIELD OF SPORTS**

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### **Introduction**

We can easily understand the meaning of mechanical engineering and the uses of this type of engineering. We never thought mechanical engineering as a profession is field of sports. This is very popular in western sports culture now. India is a developing country so it requires more enhancement of technology and use of sports mechanics things because every movement of human's extremities is relate with sports and based on mechanical principals so that mechanical engineering is important.

Many sports engineers have a background in a traditional academic discipline such as mechanical engineering. Previous study in an area such as this provides a solid platform to develop the specialist expertise required by industry. However, pursuing a degree in mechanical engineering is certainly not the only route that can be taken, many sports engineers have backgrounds in electrical engineering, material science, medical, physics, mathematics or pure physics to name a few. Also, there are an increasing number of sports engineering and sports technology degree programmes, more of which below. Because sports mechanical engineering encompasses such a broad church of activity, individuals from a miscellaneous range of backgrounds can be very successful. However, a common trait seems in all successful sports engineers, and that trait is a love for sport that can only be rivalled by their obsession for science and technology.



### **Basic Concept:**

The Mechanical Engineering is not new course but off-course this is the new thing is in the field of sports in INDIA not in abroad and western country. The straightforward concept about mechanical engineering is to make such a great paraphernalia to enhance the sport exposure similarly technique to improve performance. Mechanical Engineering is the form of sports engineering there parts are physiology, bio-mechanical science and sports sciences.

The mechanical Engineering courses to develop new technologies for sporting applications and sporting facilities. Students will develop knowledge of human physiology and its relationship to sport and exercise. They will make equipment and facilities more efficient, and will be at the fore front of sporting performance developments.

The Mechanical engineering is combination of human movement and biomechanics, exercise physiology as well as engineering themes such as advanced materials, unconventional manufacturing, dynamics & control, sustainability engineering, computer aided design and manufacture, computational, fluid mechanics and finite element analysis whereas design is the back bone of Mechanical engineering.

Mechanical engineering needs an excessive opportunity to protected employment in the stimulating area of Sports. Though, the sports professional can also catch employment in all Mechanical Engineering areas, as an outcome of the complete dreadful in Mechanical Engineering.

### **In Sports Mechanical Engineering Why?**

In previous epochs, Mechanical engineering complications in sports have been undertaken by either engineers or physiologists, or multidisciplinary groups/committee. The absence of personnel with multidisciplinary skills has less progress. Now the branches are different and responsibility could not be same, so there is basic requirement of specialists of the particular branch so that we can improve the research on performance and invention of new techniques.

### **The possible areas for Mechanical Engineering in sports**

1. Computing
2. Fluid mechanics
3. Physiology
4. Professional Practice
5. Design
6. Novel materials



7. Mathematics
8. Electronics
9. Engineering Science

### **The Principles:**

Mechanical research may not have the lofty aims of some other engineering disciplines, but it's definitely interesting and useful work.

While some people may view Mechanical engineering in sports as a less serious side of engineering, those who work in the field feel they are making a significant contribution to the wellbeing of both players and spectators. "It is very exciting to think that our work is helping the national teams to improve their work in the Hockey World Cup, football world cup etc. or in the Olympics, "It is also stimulating to apply basic laws of science and see them at work as David Beckham uses the Magnus Effect [the lift force produced by a rotating cylinder] to swerve the ball into the top corner and out of the goalkeeper's reach."

Mechanical engineering focuses on using computational fluid dynamics to design and develop footballs. "It is known that the size and pattern of seams on a football greatly affects its flight, trying to quantify this effect.

Sports mechanical engineers focus on developing new or improved types of sports equipment, some of the mechanical engineers spends his time inspecting the engineering's actual foundation—the surfaces under players' feet. Without believes and engineering use it was not possible that a firm footing can help prevent injuries while giving sports participants, quite literally, an even playing field.

In this, the engineer's studied the effect various combinations of top soil and wetness have on players' healthiness and performance. "Natural soil surfaces are subject to large differences in mechanical properties due to differences in wetness content," observes. "In the biomechanics lab, we are using 3D indication capture apparatus to regulate body movement, and force platform and pressure monitoring equipment to look at the stresses applied to the human body and the sports surface."

The confidence of Sport Mechanics will eventually be used for constructing safer and stronger sports surfaces. "The injury risk will be assessed by bearing in mind what is an optimum values for adhesive friction, difficulty and roughness parameters for a number of different sports surfaces and movements; I feel that it was research that makes an alteration for players, spectators and venue operators." Example –In Kabaddi game now the surface are totally change (Soil/Sand to soft Foam Mat)

There are some examples of mechanical engineering in sports:



### **Wearable Swimming Technologies:**

Using a small wearable device a swimmer can now train in their own pool and on their own but gather performance data like they were supported by coach and timekeeper and in an instrumented pool with video analysis. In general the measurement of sport specific performance characteristics is an important part of an athlete's training and preparation for competition.

Now the new generation research is setting sensors on the hands and monitoring the propulsive forces as well to help improve technique more directly.

### **Running Technology:**

Optical motion analysis systems are typically used to perform kinematic analysis of human movement. However these systems are primarily laboratory-based, expensive, have a limited calibration volume, and often require considerable post processing time. Such an approach to motion analysis is therefore often unreasonable for analysis of athletes during actual training and performance surroundings. A strong need exists to develop methods that provide meaningful information about athletic performance in the field without gratuitously filling the athlete or constraining the natural environment.

We are currently using the device to quantify aspects of elite running performance including ground contact time, impact attenuation, trunk stability and sprint start technique. In the near future we propose to incorporate gyroscopes into the device to provide information about the orientation of the body under dynamic conditions.

### **Boxing, Martial Arts and Combative Sports:**

In the combat sports it all happens so quickly, best practice for scoring often involves a number of judges and set areas that can count as scoring areas. Enter the electronic age where we can monitor striking, defending and scores quicker than the eye can see. Impact force can also be monitored. Put this all together to have a real time judging system and analysis of weak points in protection or attacks. Combine this with safety equipment and it's a winner all round.

### **Racket, Bat and Ball:**

Monitoring players on the field gives us information but what about monitoring the bat or racquet they are using, put a little something in the ball too as an aid to athlete performance and game statistics. Have a look at what we are doing in cricket and tennis.

A major challenge faced by tennis professionals and sports experts is to be able to accurately measure what athletes are doing in the training and competition atmosphere. Such information is important because it has potential to provide insight into physical activity levels associated with performance, as well as the skill based techniques involved in the



activity. A common feedback method used to enhance the performance of athletes is subjective visual assessment by an expert observer such as a coach. Some problems with this method are that different observers could have different ideas and give differing feedback and that some high speed motions cannot be clearly detected by human eyes.

Today, the performance of many professional and elite players have been monitored and analyzed by using objective measurement systems as an aid to counter these problems

Two different popular monitoring methods for high speed motions are digital optical systems and video cameras. Both approaches rely on placing the markers on the area of interest with the position and motion of the markers recorded. The systems are quite accurate and have been used to monitor the performance of athletes for many years.

By taking advantage of the advancement in microelectronics and other micro technologies, it is possible to build cheap, miniaturized, light weight, and non- invasive instruments to monitor the performance of athletes in a number of sporting activities. These new technologies have sufficiently accurate outcomes when compared to optical and video systems. Micro Electromechanically Systems (MEMS) based inertial sensors including accelerometers and gyroscopes are good examples of using micro-technology to monitor athletes.

With the shortage of engineers entering the field, now is the time to become a Sports mechanical engineer in the field, if it appeals.

"We currently are in short supply of all disciplines of sports engineering personnel as related to the typical energy engineering industry needs. This is in part due to the fact that many of our Engineers/Professionals have chosen to focus their training in a different line of business, such as the information technology industry." Depending on the specific industry chosen, many mechanical engineers will earn six-figure salaries within a few years and find name and fame.



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