

## Unit 10 SPORTS EQUIPMENT

*You can't put a limit on anything. The more you dream, the farther you get.*  
*Michael Phelps*

### Revision of Vocabulary

**Task 1** In which sports do we use the following equipment?

paddle – bat – stick – pole – bow – club – rod – fin – oar – ribbon – saddle – belt – binding – harness – shin guard – goggles – wrist band – mouth guard – shuttlecock – handlebars – compass – anchor – snorkel

### Reading - Is the Use of Advanced Materials in Sports Equipment Unethical?

#### INTRODUCTION

This article addresses the role of advanced materials in sports. At the highest professional level, sports are a highly competitive occupation with millions of dollars depending upon fractions of a second or tenths of a centimetre. However, even the dedicated amateur is willing to invest a great deal of money to improve his or her performance. Thus, just as in other fields, the use of advanced materials in athletics can be justified if it leads to enhanced performance.



#### SPORTS EQUIPMENT DESIGN

The optimum design of sports equipment requires the application of a number of disciplines, not only for enhanced performance but also to make the equipment as user-friendly as possible from the standpoint of injury avoidance. Clearly, this design includes materials science, mechanical engineering, and physics; however, knowledge of anatomy, physiology, and biomechanics is also necessary. *Biomechanics* can be simply defined as the science of how the body reacts to internal and external forces. Thus, it is an attempt to apply the basic laws of physics and mechanics to the joints, ligaments, and tissues of the body as they are subjected to loading.

In designing sports equipment, the various characteristics of materials must be considered. Among these characteristics are strength, density, fatigue resistance, toughness, modulus (damping), and cost.

#### *Advanced Materials in Sport*

##### ***Carbon Fibre***

*Carbon Fibre is a composite material which uses thin fibres of carbon which are individually of a similar structure to graphite, and sets them in an epoxy resin which is a kind of plastic. This combines the **strength** of the carbon fibres with the **toughness** of the end has an exceptional strength to weight ratio while being able to withstand shocks.*

*It is used to on bicycles, yachts, tennis rackets, badminton rackets, etc.*

### **Titanium**

*One of the most common uses of titanium is the building of high-performance bicycle frames. It is a useful material for frame-building because of its very high specific strength as well as its low density – obviously a lighter bike accelerated faster and is quicker uphill*

### **Kevlar**

*Kevlar is a modern polymer with exceptionally high strength. It can be up to 5 times as strong as steel. It is often used in the best tennis rackets where Kevlar is needed to increase toughness and durability, as well as absorbing the vibration caused when the racket hits the ball. Kevlar is also used for making bullet-proof vests.*

*Adapted from <http://people.bath.ac.uk/jac31/Advanced%20Materials%20in%20Sport%202.htm>*

## **THE IMPACT OF ADVANCED MATERIALS**

### **Running**

Shoes, in particular, have shown substantial improvements in the running events. However, this improvement has been much more in the comfort/avoidance-of-injury arena rather than in absolute performance enhancement. Thus, during the first Olympics in 1896 when Spiridon Loues won the marathon, all of Greece celebrated with him as he just broke three hours with a time of two hours, 59 minutes. Almost 100 years later, the Olympic record is two hours, 12 minutes, and 36 seconds, about a 30% improvement. The majority of this improvement can be attributed to an improvement in human performance.

### **Cycling**

The bicycle has been around for almost 200 years, maturing from the 1817 Draisienne (walking device). Today, advanced materials, in combination with aerodynamic consideration, have led to vastly improved bicycles. A number of advances have contributed to the high efficiency of the modern-day bicycle, including the development of spoked wheels, the chain concept, pneumatic tires, and accessories (e.g., seats, brake levers, and pedals). However, the two major advances are in the frame and wheels.

### **Tennis**

Until about 25 years ago, tennis rackets were made from wood. In the late 1960s, metal frames, generally fabricated from steel or aluminium, were introduced. Presently, composite rackets are very popular both from the viewpoint of efficiency (accelerating the ball across the net) and in terms of reducing the dangerous vibration that can lead to tennis elbow. The impact force experienced by a player on returning a tennis ball travelling at 160 km per hour is approximately equivalent to lifting a weight of about 75 kg. These forces can transmit a high load leading to damage to the small blood capillaries in the muscles and tendons around the elbow joint. Better technique can help, but an improved racket can also make a major contribution.

## **ETHICAL CONSIDERATIONS**

Although some examples of the use of advanced materials in sporting goods have been discussed, there are certainly more possible. The use of advanced materials in sports equipment presents some ethical questions. We can clearly enhance behaviour by allowing the use of advanced materials, but where should the line be drawn, or should there be no restrictions?

This brings us to a second question: should we allow competition at the highest level to be only affordable to the elite because of the high cost of equipment? Where should this end? Can we ensure that people are competing and not the advanced materials? Certainly, we do not want to go back to a wooden pylon. But how about electronically guided darts, solar-energy-enhanced bicycles, and terrain-following golf balls that automatically find the lowest local elevation on a surface (the bottom of the hole)?

Lots of questions, few answers. What do you think?

(adapted from <http://www.tms.org/pubs/journals/JOM/9702/Froes-9702.html>)

## Task 2 Questions

1. What is the role of sports equipment in sports?
2. What disciplines are applied in sports equipment design?
3. Summarise the impact of advanced materials in running, cycling and tennis.
4. Give more examples of technology impact from your sport.
5. What are the burning issues in this field according to the author?

## EXTRA READING



### Fina extends swimsuit regulations

**World swimming governing body Fina has once again moved to limit the impact of the controversial hi-tech swimsuits.**

Swimmers will no longer be able to wear anything under their costumes after Therese Alshammer had a world record erased<sup>2</sup> for wearing two swimsuits. An extra suit can help swimmers compress<sup>3</sup> their body and trap<sup>4</sup> air, which provides greater buoyancy<sup>5</sup> in the pool. There were 105 world records broken last year, 79 of them by swimmers wearing one suit, the Speedo LZR Racer.

Alshammer, who improved her own record in the 50m butterfly in Sydney, is the first swimmer to lose a world record under the new rules. The Swede said she believed she was allowed to wear a 'modesty suit' under her skin-tight racing gear. But Fina executive director Cornel Marculescu said: "Nothing must be worn underneath. One suit only, that's it." Officials at the Australian Swimming Championships had said women were allowed to wear bikini bottoms for modesty purposes at the event but not a full suit and any world records set would not stand if they used them.

Following a recent three-day meeting in Dubai, Fina also stipulated<sup>6</sup> swimsuits should not cover the neck and must

not extend past the shoulders and ankles. The changes, which will be in place for July's World Championships, also limit the thickness<sup>7</sup> and buoyancy of the suits. "Fina wishes to recall the main and core principle is that swimming is a sport essentially based on the physical performance of the athlete," read a statement from swimming's world governing body.

The first swimsuit to combine stitch-free<sup>8</sup>, ultrasonically welded<sup>9</sup> seams<sup>10</sup>, water-resistant fabric and strategically placed polyurethane panels (designed by Nasa), the LZR took the swimming world by storm last year. At the Olympics in Beijing, LZR swimmers, most notably American Michael Phelps, won 94% of the golds on offer and broke 23 of the 25 records. But opponents of the hi-tech suits argue the buoyancy they create equals to "technological doping".

Suits to be used from 1 January 2010 will have to be put in for approval by 1 November. And future submissions will have to be made 12 months in advance of a World Championship or an Olympic Games, with the approved models to be available at least six months before the events. Fina will also publish a list of approved models and these will be used in competitions starting 1 January 2010.

Story from BBC SPORT:

[http://news.bbc.co.uk/go/pr/fr/-/sport2/hi/olympic\\_games/7944084.stm](http://news.bbc.co.uk/go/pr/fr/-/sport2/hi/olympic_games/7944084.stm)

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1 impact – dopad  
2 erase – smazat  
3 compress – stlačit  
4 trap - chytit/polapit  
5 buoyancy - plovatelnost  
6 stipulated – určit, specifikovat

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7 thickness – tloušťka  
8 stitch-free – bezešvé  
9 welded – svážené  
10 seam - šev

## JOINING SENTENCES – CONJUNCTIONS

### I. Although, though, even though, in spite of, despite

After **although** (ačkoli, i když, přestože) we use subject+verb:

*Although it rained a lot, we enjoyed our holiday.*

Sometimes we use **though** (ačkoli, i když, přestože) instead of although with the same meaning:

*I didn't get the job though I had the necessary qualifications.*

A stronger form of although is **even though** (ačkoli, i když, přestože):

*Even though I was really tired, I couldn't sleep.*

After **in spite of** (navzdory, přestože) or **despite** (navzdory, přestože) we use a noun, a pronoun or –ing:

*In spite of the rain, we enjoyed our holiday.*

*Despite the rain we enjoyed our holiday.*

We can say **in spite of the fact (that), despite the fact (that)**:

*I didn't get the job in spite of the fact (that)/despite the fact (that) I had the necessary qualifications.*

### II. In case

**In case** (pro případ) is not the same as **if** (jestli, zda). We use *in case* to say why somebody does (or doesn't do) something. You do something now in case something happens later:

*Your car should have a spare wheel in case you have a puncture.*

*We'll buy some more food in case Tom comes.*

(We will buy some more food now)

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*We'll buy some more food if Tom comes.*

(If Tom comes, we will buy some more food. If he doesn't come, we won't buy any more food).

You can use **in case + past** to say why somebody did something:

*I left my phone switched on in case Jane called* (because it was possible that Jane would call).

**In case of** (v případě) is not the same as in case (especially on notices):

*In case of fire, please leave the building.*

### III. Unless, as long as, provided/providing

We use **unless**(když/pokud ne) in the meaning of except if:

*You can't go in the club unless you are a member.*

Instead of unless it is possible to say **if...not**:

*Unless we leave now, we will be late – or – If we don't leave now...*

**As long as/so long as/ provided (that), providing (that)** mean if or on condition that (pokud):

*You can borrow my car as long as/so long as you promise to drive safely.*

*Travelling by car is convenient provided (that)/providing (that) you have somewhere to park.*

We don't use future after all the above conjunctions.

### IV. so that

We use **so that** (aby) for purpose especially when the purpose is negative or with can / could:

*I hurried so that I wouldn't be late. We moved to London so that we could see our friends more often.*

*She is learning English so that she can study in Canada.*

### V. Because, as, since, because of

**As** (protože) and **since** (protože) mean the same as because:

*As/because/since I was hungry, I decided to find somewhere to eat.*

**Because of** (kvůli) expresses the reason of something: *We didn't go out because of the rain.*

**Task 3.1** Complete the sentences with **although, in spite of, because, as, because of**:

1. .... it rained a lot, we enjoyed our holiday.
2. ....all our careful plans, a lot of things were wrong.
3. ....we'd planned everything carefully, a lot of things went wrong.
4. I went home early..... I was feeling unwell.
5. I went to work the next day..... I was still feeling unwell.
6. She only accepted the job.....the salary, which was very high.
7. She accepted the job.....the salary, which was rather low.
8. I managed to get to sleep.....there was a lot of noise.
9. I couldn't get to sleep..... the noise.

**Task 3.2** Complete the sentences with **in case or if**:

1. I'll draw a map for you..... you have difficulty finding it.
2. You should tell the police ..... you have any information about the crime.
3. I hope you'll come to London sometime. .... you come, you can stay with us.
4. Write your name and address on your suitcase ..... you lose it.
5. Go to the lost property office ..... you lose your bag.
6. The alarm will ring ..... somebody tries to break into the house.
7. You should lock your bike ..... somebody tries to steal it.

**Task 3.3** Choose the correct expression for each sentence:

1. I'm playing tennis tomorrow *unless/providing* it rains.
2. I'm playing tennis tomorrow *unless/providing* it doesn't rain.
3. I don't mind if you come home late *unless/as long as* you come in quietly.
4. *Unless/provided* they are with an adult, children are not allowed to use the swimming pool.
5. Children are allowed to use the swimming pool *unless/provided* they are with an adult.

**Task 3.4** Complete the sentences using your own ideas:

1. He passed the exam although.....
2. He passed the exam because/as.....
3. I didn't eat anything although.....
4. Since I didn't eat anything.....
5. In spite of the fact that I was very hungry.....
6. I hurried so that .....
7. I left Dave my phone number so that.....
8. Please arrive early so that.....
9. We'll be late unless.....
10. I like hot weather as long as.....
11. It takes me about 20 minutes to get to school provided.....
12. I don't mind walking home as long as.....
13. You can borrow the money providing.....
14. You won't achieve anything unless.....