Sports

Stainless Steel in Sports Equipment

Many people now have sedentary professional lives and sport provides an enjoyable way of keeping active for all age groups. It has also become a significant source of entertainment and has developed into a very substantial market.

Stainless steel has come to play a significant role in a wide range of equipment which is used for sporting activities, from the very simple implements, such as a referee’s whistle, to the more complex such as the back plate for a scuba-diver’s air bottles, to the exquisite accessories, such as the gleaming winches, cleats and pulleys on a sleek yacht.

By John Rowe, Secretary-General, ISSF

The International Stainless Steel Forum (ISSF) has recently completed a project, managed by Bernard Heritier and Jo Claes, which examines the markets for sporting equipment and their use of stainless steel. This article will deal with a variety of sporting activities, some of which may be more Extreme than others, and will look for stainless steel examples in each of them. It is not intended to be comprehensive, but rather to highlight the development possibilities that can become available when the imagination is set free.

Climbing

Climbing is a broad category covering a range of activities each of which carries significant risks. At higher altitudes breathing aids are sometimes required and the weather is frequently unpredictable. And yet there are virtually unlimited opportunities available to those who enjoy climbing. As with many outdoor activities, participants have varying degrees of skill and experience and the risks for beginners and experienced climbers alike are significantly worsened if the selected equipment is incapable of maintaining the specified load bearing capacity. The environments in which climbers are active are often quite hostile, particularly closer to the sea or in hot and humid conditions.

Climbers need specialist equipment which must be carried and which therefore needs to be as light as possible while still retaining the necessary strength and reliability in all weather conditions. A high-strength to weight ratio is therefore a critical consideration in equipment selection, particularly for those items which have metal components, such as cables, fasteners, anchors, mailfins, carabiners, ice axes, crampons, belay and ascension gear, ladders, rungs and climbing shoes.

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Treetop Adventure Parks

These parks consist of a number of platforms linked through the trees by bridges, ropes and, importantly, ziplines, which enable the participants to glide across routes of varying degrees of difficulty and generally combined with elements of scenic beauty. A network of platforms provides staging points from which participants can make their descent. The equipment for such ziplines is often made from stainless steel because of its extended service life and its ability to counter the effects of corrosion and weathering.

Scuba Diving

Scuba diving allows people to enjoy the beauty and diversity of the underwater world. Spending extended periods of time underwater is, however, something for which human beings are not well equipped and it is therefore a hazardous activity. Safety requires that certain procedures should be followed, not only to reduce the risk of drowning, but also to avoid barotrauma and decompression sickness. Because of the dangers inherent in any activity underwater, specific training is recommended. Furthermore, the availability of reliable equipment is a given. Sea water is very corrosive but there are stainless steel grades available which provide extended life cycles even in sea water conditions. Typically, EN 1.4404 and AISI 316 and a range of duplex grades

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Photo courtesy of Soaring Colorado

Photo courtesy of Raumer

Photo courtesy of Scuba Canada

Photo courtesy of Selfie Sport
are widely used for specialist equipment, including bases for holding the air bottles and, in some cases, the air bottles themselves and parts of the valve and breathing gear.

Sailing

The thrill of sailing has attracted men and women throughout the ages. The sea has always been seen as a character, a God, a setting for adventure and for discovery, an image touching all the human senses, a metaphor for the unseen world beyond the senses. Significant technical advances have been made in the development of sailing boats and equipment, but one basic principle stands out – the ability to resist the corrosive effect of the water, especially sea water, and provide an extended service life with a combination of high strength and low maintenance. Stainless steel has become the reference material for moving and fixed hardware items and in its highly polished state it adds a touch of class to the boats.

Rowing

With its ancient origins rooted primarily in transportation, rowing is mainly practiced today for competition, fitness and leisure. This is one of the few non-weight bearing sports that exercise all of the major muscle groups, as anyone who may have tried it for a few minutes on the stationary rowing machine in a gym can attest. Competitive rowing is practiced with different classes of boats, from individual shells to bigger craft with multiple crews. Rowing for fitness has also become a standard indoor feature in fitness gyms. Once again, stainless steel is used for the high-strength metal parts.

Fishing

In any type of fishing, whether it may be commercial, recreational or sporting, the primary challenge is self-evidently to find and catch fish, the quantity of which will vary according to the category of fishing, and, frustratingly, the luck, skill and experience of the fisherman. Concerns about fish stocks have resulted in many recreational and sport fisherman having to release their catches to preserve livestock, sometimes after fitting identification tags, recording their details to aid fisheries research. In normal fishing, the only equipment used by these fishermen is a hook, a rod and a reel, and a landing net. The hooks are made from stainless steel as are reels and ancillary equipment, especially for sea water fishing.

Cycling

The increase in popularity of cycling in recent years has been extraordinary – not only for sporting purposes, but also for cycling to and from work. Cycling has developed into a multi-faceted activity, with specialised equipment available for on-road, off-road, all-terrain, BMX-type acrobatic events and for all types of racing. A wide range of designs and materials is used with an equally wide range of prices. Stainless steel is used in most bikes for cables, fasteners, brake disks and spoked wheels. It is also used less frequently for frames, forks, wheel rims and chain links. Although it adds more weight than some competing materials, especially on the high-end bikes, it brings benefits through its non-rusting life in all conditions and its strength.

Golf

Stainless steel is a well-established material for the forging of golf club heads, and in many cases also for the shafts. AISI 431 Grade (EN 1.4057) is a softer stainless steel commonly used in the higher quality ranges of heads for sets of irons. It is said to provide the most forgiving iron, with the smoothest feeling available today. F1E AISI 17-4PH (EN 1.4542) and 15-5PH (UNS15500) grades are harder and used in many professional iron and wood heads. Although the harder material sacrifices some of the soft feel provided by grade 431, it makes up for it by creating better ball compression, thereby generating more distance.

Pétanque

As something of a combination between Lawn Bowls, Les Boules, Curling and Croquet, the game of pétanque, the object is to throw hollow metal balls weighing between 650 and 800 grams as close as possible to a small wooden ball known as the cochenet (literally ‘piglet’), or jack. Popular among people of all ages, this is a relaxing sport, mostly played outdoors during summer vacations. The steel balls are made of steel, sometimes chromiun-plated, or of stainless steel. Martensitic stainless steel is chosen for top-quality sets. Depending upon the hardness specified for the material, balls are available with a ‘soft touch’ or a ‘medium hard touch’. Stainless steel balls will last indefinitely and do not require any precaution against the weather.

Fencing

Fencing evolved into a sport during the 18th century, with sophisticated electronic scoring systems introduced in the middle of the 20th century. The sport improves coordination, agility, balance, strength and aerobic endurance. It also requires strategic thinking and an excellent focus. Typically, the lame jackets, which are designed to have a high level of electrical conductivity as well as the high strength required for protection, are manufactured from finely woven stainless steel wire. They are extremely durable and are machine washable. The face masks, which are similarly designed for protection as well as electrical conductivity, are made from a heavier-duty stainless steel mesh. FIE competition masks are required to sustain a thrust pressure of 1,600 newtons, and, for that level of strength as well as flexibility, stainless steel provides the most competitive solution.

Indoor Fitness

Indoor fitness centres are typically equipped with an extensive variety of equipment which is often purpose-built to exercise specific parts of the body, separately, with increasingly sophisticated measurement devices to monitor calories, distances, weights, steps, time and even heart rates. This type of equipment mainly uses coated carbon steel or cast iron (for weights), but aluminium and stainless steel are also increasingly in use. Stainless steel is more hygienic and, of course, durable.

Outdoor Fitness

Outdoor fitness areas have become a familiar sight in city parks and squares. A wide variety of aids and machines is typically available, including stepping platforms, elliptical trainers, parallel bars, abdominal and leg lifts and pull-up bars. This type of equipment must be able to withstand all weather conditions and also capable of resisting accidental damage and vandalism that is unfortunately commonplace in public areas. For the combination of strength, durability and resistance to corrosion which it provides, as well as the aesthetics which it offers to designers, stainless steel is an obvious choice for such heavy-duty service conditions.

Horseback Riding

Stainless steel is used for the metal parts of high-quality horse tack, including horsehoes, stirrups, bits and over-check snaps. The modern glue-on steel horse-shoes require stainless steel tabs for optimal adhesion to the hoof.

Ice Sports

Stainless steel is an ideal material for the runners on ice sports equipment, where hardness, resistance to corrosion and aesthetics are all essential. Stainless steel ice skating blades are usually made from AISI 420C (EN 1.4028) grade, but better-quality blades, made from the higher grade AISI 440C (EN 1.4125), are capable of holding their edge for much longer. Re-sharpening stainless steel runners is relatively simple and does not require any precautions against rusting. Stainless steel runners are also used for luge skeletons and bobsleigh racing, but the precise specifications can often be a closely guarded secret.

Walking

The illustration shows an innovative running shoe made from stainless steel wire chausses. These shoes are designed for all surfaces and can even be used to wade through water.

Water Skiing

Stainless steel tow hooks and eyes and quick release connectors are manufactured from 316 stainless steel for their superior strength and longer life. As with any water related activity, stainless steel provides the added assurance of protection against weathering and corrosion. These are just some examples of how stainless steel can usefully add value to our sporting activities. In some cases, it is an essential material, for which there is no economically competitive alternative; in other cases, it provides the assurance of a longer working life and added protection from the rigours of corrosion; in yet others, it is used just because it looks so good, as in the fittings on the deck of a luxury yacht; but in many cases it is used because it is the best available material. So, if you need a metal part in the equipment which you are using for your sporting activities, make sure it is stainless. For more on this topic, visit www.worldstainless.org

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