

## **Sport Systems Unlimited Technical Information Pieces (TIP's)**

### Q+A ON STEEL VS. ALUMINUM CONSTRUCTION IN HOCKEY BOARD SYSTEMS

Dr. Robert Audas, is the Director of Research & Development for Sport Systems Unlimited Corp. He holds a Masters Degree from the University of Waterloo and earned his Doctorate at Simon Fraser University in Solid State Physics. Dr. Audas answers some commonly asked questions about the differences between Steel and Aluminum framed hockey boards below.

*Q. Is a Steel-Frame Dasher Board system stronger than an Aluminum-Frame system?*

A. "It's true, that by volume, steel is stronger than aluminum – so, a set of dasher boards that are a under 2 inches high and a 1/4 of an inch deep would be stronger if made by steel than if by aluminum. However, for larger, real life applications – full-size dasher boards – aluminum can be extruded to the correct size, tempered, and made to be as strong as needed. Pound for pound, aluminum is stronger than steel, and unlike steel, anodized aluminum will not corrode."

*Q. It is said that aluminum "fatigues" over time. Is that true?*

A. "The truth is that aluminum hockey board frames made the old way, by welding the horizontal and vertical stringers together, might be thought of as 'fatiguing' because welded aluminum joints are brittle and may be susceptible to breakage.

"However, mechanically-fastened aluminum is NOT BRITTLE and is not susceptible to breakage. In point of fact, the complete opposite is true: by mechanically fastening the vertical and horizontal pieces, we allow the aluminum to flex elastically upon significant impact - a much more suitable reaction for high-impact sports applications."

*Q. Is there a track record for aluminum frames constructed this way?*

A. "The design we use for our dasher board frames stems directly from the science behind commercial glass and glazing. Almost all commercial buildings erected since the 1970's have window systems (curtain walls) constructed of mechanically fastened aluminum extrusions. This is proven technology that we've incorporated into our dasher board systems, and put to work for hundreds of satisfied clients.

"In addition, the design of our system puts the anchors right next to the vertical members where they attach to the bottom horizontal stringers. Physics tell us that forces from an impact on the boards is sent directly to the anchors through the vertical members for greatest strength.

"Further, since our inception in 1996, we have sold more than 350 dasher board systems around the world, and as an indication of growing market acceptance, nearly half of that total has been in the past 3 years."

*Q. How does galvanized steel compare to anodized aluminum?*

A. “The **galvanizing process** deposits a layer of zinc over the entire surface of the steel object, wherein the zinc will oxidize instead of the steel. Steel can be galvanized using electroplating (a thin coat) or hot dip (a thick rough coat). If any steel remains exposed, it will begin to rust immediately.

“For protection, the zinc oxidizes and ultimately forms a layer of soft Zinc Carbonate (a process known as a “sacrificial” type of protection) which adheres to the surface of the zinc (and steel) and protects it from further oxidation. This layer, if electroplated, is usually not thick enough to protect the steel over extended periods of time or in hostile humid environments.

“The galvanizing process has an “Achilles Heel”: galvanizing is not self-healing. Any place where the galvanization is disturbed (such as scratches from skate blades, or where dasher board manufacturers drill all those holes for all those screws) there is no protection at all and the rusting process starts immediately. A look at older galvanized steel barn roofs shows rust is inevitable.

“**Aluminum anodizing** is self-healing: a scratch or hole in the aluminum will then create its own layer of protective aluminum oxide.

“With aluminum, the anodizing process is simply a controlled oxidation of the aluminum surface to produce  $Al_2O_3$  which is a strong protective layer (the same material used as cutting grit on sandpaper). The aluminum oxide is so hard – a hardness approaching that of diamond – that only a thin layer is required. If unanodized aluminum is exposed to air and/or humidity then natural oxidation occurs. This produces a protective layer that is not as uniform or aesthetic looking as anodizing but still prevents further oxidation. This means that skate-blade scratches or screw holes drilled in anodized aluminum boards are self-healing.”

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