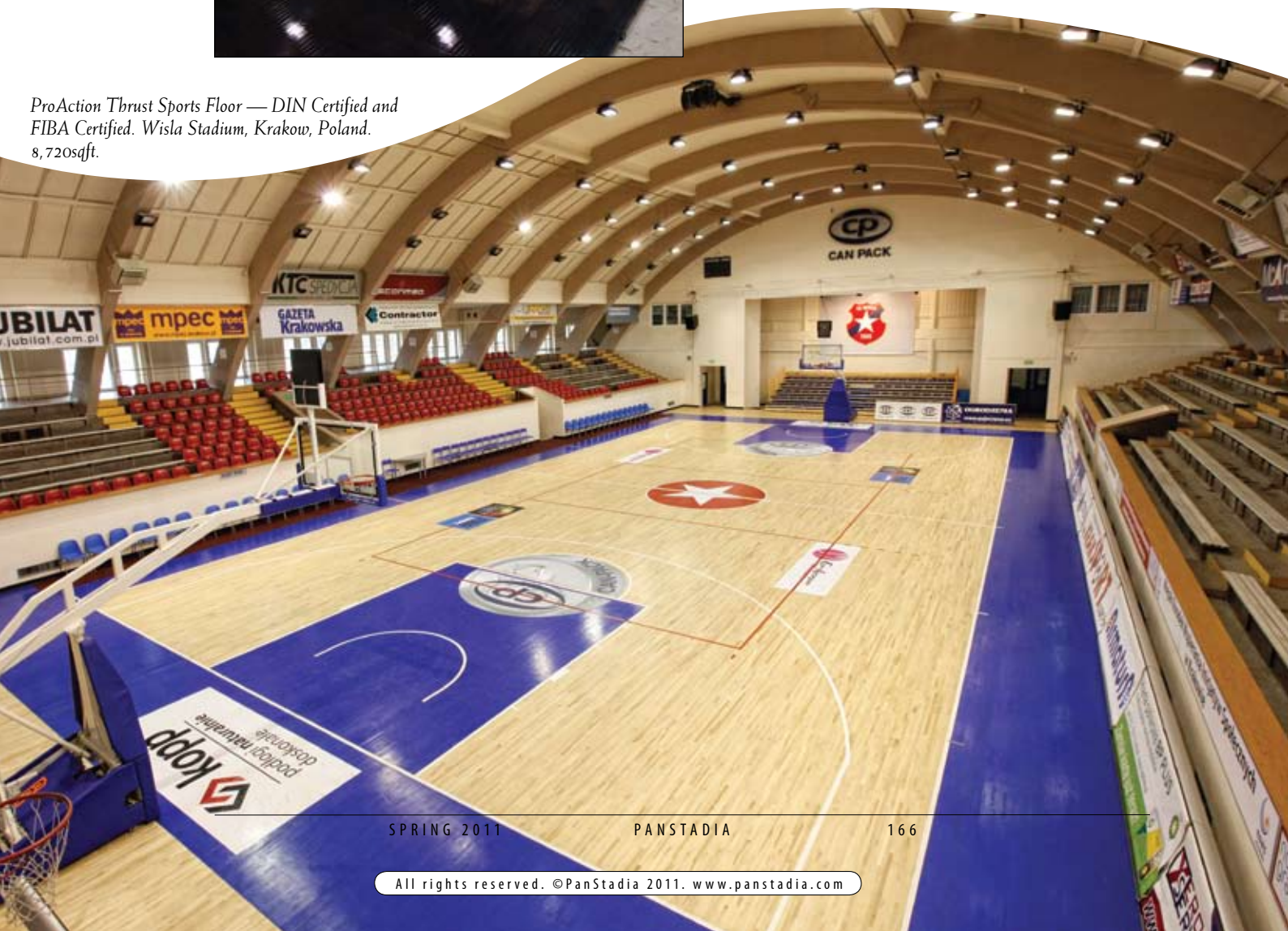
Tom Abendroth, President, Action Floor Systems, LLC, discusses how the right Sports Flooring system can offer a competitive advantage.

competitive

Action NitroPanel Portable Sports Floor — FIBA Certified. Southeast Texas Mavericks Basketball Team, Winnie, Texas, USA — Reigning ABA National Champions. 6,720sqft.

Competitive advantage is defined as the ability gained through attributes and resources to perform at a higher level than others in the same industry or market. For example, successfully implemented strategies can lift a team to superior performance by facilitating players with the competitive advantage to outperform rival players. To gain competitive advantage, coaches manipulate the various resources over which they have direct control within their team



ProAction Thrust Sports Floor — DIN Certified and FIBA Certified. Wisla Stadium, Krakow, Poland. 8,720sqft.

advantage

and these resources have the ability to generate competitive advantage.

For years, the world's best coaches have used motivational and inspirational speeches to elevate their players mentally to achieve the highest levels of competitiveness. These speeches are very effective in achieving a competitive advantage as they focus, motivate, and inspire an athlete to new heights.

However, there is another angle to achieving a competitive advantage; through hard work and dedication. The professional athlete today practices longer and harder than any time in our history. Their commitment and dedication to their profession is unwavering. Athletes are employing personal trainers to focus on strength and agility training, and dietitians to make the best possible food choices to maintain health and maximise energy. But little is mentioned of the equipment used that gives athletes the competitive advantage. When we say 'equipment', the first thing that comes to mind might be the balls used, or the shoes worn, or even the uniform that features the latest aerodynamic technology.

But would you be surprised to know that the single, most expensive piece of athletic equipment is the gymnasium floor, which is seldom, if ever, mentioned as a critical piece of equipment for achieving competitive advantage.

Gymnasium Floors and Subfloors

Two types of gymnasium floors can be specified — synthetic (pad & pour) and wood — and both have advantages in specific situations. Synthetic (pad & pour) flooring is suitable for multipurpose facilities commonly found in K-12 schools or recreation centres where the flooring needs to withstand the wear and tear of athletic competitions, as well as a myriad of community events. Wood flooring is preferred for its durability, and preferred and acceptable for use at all levels of play, including higher-level or professional sports facilities where the wood floor and subfloor system can be customised to the particular sport that will be played.

Subfloor systems are now engineered to meet the specific needs of a particular sport, such as volleyball, squash, or handball, and cover a complete range of activities from dance and aerobics to basketball. A multi-purpose floor can be specified to accommodate several sports to satisfy the different needs of a particular facility. The combination floor, with a synthetic (pad & pour) running track around the perimeter and a maple floor in the middle, consisting of multiple courts over a uniform subfloor is the ultimate indoor multi-sports facility. This not only provides a competitive advantage for the athlete but also for the facility, thanks to its ability to generate revenue through hosting a plethora of events.

Constant running and jumping put great strain and stress on athletes' ankles, knees and hip joints. Reducing stress, strain and fatigue is accomplished by the use of these highly engineered subfloor systems upon which the flooring rests. These subfloors are designed to provide force reduction while maintaining ball rebound. The mission and driving force for athletic floor companies such as Action Floor Systems is to design and develop performance floors that not only enhance the sport but provide maximum comfort and safety for the athlete.

At the high end professional level, the athletes often train and practice on engineered performance maple floor systems and then have to accept playing the "big game" on an old dilapidated movable floor. However, it is now possible to maintain that competitive advantage within your floor in arena and coliseum venues thanks to newer generation padded precision-made maple portable sport floors for a Friday night basketball game nestled in between a Thursday night hockey game and a Saturday night rock concert.

Action Concorde II Sports Floor — DIN certified and FIBA Certified
Curry College — NCAA Division III, Milton, Massachusetts, USA.
13,014sqft.

Action Interloc II — DIN Certified and FIBA Certified
Ford Motor Plant Gym, Golcuk, Kocaeli, Turkey. 6,835sqft.

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Floor Testing and Athletic Performance

In 2006, the EN-14904 athletic floor performance standard was adopted by the European Union through the European Committee for Standardisation. This marked the end of more than twenty years of DIN criteria having been the performance benchmark in Europe and North America. The EN 14904 standard, which supersedes DIN 18032 Part 2, creates a wider spectrum of performance criteria with many of the familiar DIN criteria. This approach allows specific use floors, such as basketball and volleyball courts, to be designed with performance criteria that are more suitable for their intended use. Under DIN standards, the criteria had very narrow performance standards that eliminated known high-performance floor systems from the selection process. As an example, DIN's minimum deformation value is 2.3mm. A floor with 2.2mm deformation would not pass DIN. The 0.1mm difference equals 0.0039"…less than the thickness of a sheet of paper.

There is only one EN standard ensuring uniform testing for athletic floors. This will result in less confusion and a set of criteria that can evaluate floor performance in a more uniform manner and creates a larger selection of floors in the marketplace.

Much testing is conducted on these floors to best match performance to a particular sport. Widely used performance standards by EN 14904 and P.U.R. are broken into five categories: Shock Reduction; Ball Rebound; Area Deformation; Vertical Deflection; and Surface Friction. All test categories are important, but for the sake of this article, we will highlight three areas that directly affect an athlete's ability to reduce injury and fatigue:

1. SHOCK ABSORBENCY

Proper shock absorption should be considered as highly important. As an athlete impacts a sports surface, the impacting force is translated into two resultant forces: one absorbed by the floor; and the other returned to the athlete. While hard surfaces such as concrete and asphalt provide little or no force reduction for the athlete upon impact due to running or jumping, a safe sports floor system should absorb a certain amount of these forces and are rated by the percentage of force reduction they provide as compared to hard surfaces. For example, a sports floor with a force reduction value of 40 percent will absorb 40 percent of the impact force and return 60 percent of that force to the athlete. It is widely accepted in the indoor sports flooring industry that the minimal desired percentage is 50 percent. The general majority of wood gymnasium floors installed at high school level and above will meet this rating; however, there are exceptions.

Contrast this to the general majority of synthetic gym floors (rubber, urethane, PVC) installed over concrete, and their average is closer to 30 percent. This is why nearly every athlete, coach, participant, and official will acknowledge that synthetic floors are "harder" and "worse on my joints". This measurement is widely tested according to the German Institute of Normalisation or DIN standard. The harder the athletic floor (concrete or

ProAction Thrust Sports Floor — DIN Certified and FIBA Certified.
Colegio de Bachilleres, Cd Juarez Chihauhau, Mexico. 11,906sqft.

asphalt being the worst), the more prone participants are to overuse or repetition injuries.

2. IMPACT ATTENUATION

For the sake of this article, impact attenuation refers to the impact of a part of an athlete's body part (head, shoulder, back, elbows, hands, and knees) with the surface. Athletic surfaces can be grouped into two general categories in how their measurements of impact attenuation (and to a lesser degree shock absorption) are determined: area elasticity; and point elasticity. Area elasticity refers to how well the floor surface will deform and absorb energy over the area of the impact. For example, a concrete floor would transmit zero area elasticity, and a trampoline would transmit tremendous area elasticity. The resulting impact attenuation would be very low for concrete (all of the impact goes right back to the athlete's body) and very high for a trampoline (the trampoline absorbs a substantial amount of the energy).

Cushioned wood athletic floors, like those found in most school gyms in the world, are area elastic. Most synthetic floors, namely those installed directly on concrete, are not very area elastic. Point elasticity refers to how well the floor absorbs and returns energy over a small area ("soft underfoot"). For floor safety, soft under head, elbow, and knee is more relevant. The challenge is that athletic surfaces need to be hard enough to dribble a ball, but soft enough to lessen the impact on athlete's bones and joints, and during falls. Wood gymnasium floors are less point elastic than synthetic floors. The resulting impact attenuation for wood versus synthetic floors is therefore very comparable.

Currently, indoor sports floors are not rated by any standard in the measurement of impact attenuation. Architects and decision makers must therefore make their best decision based on the information provided. Shock absorbency ratings are a good comparative measure. Additionally, the American Society of Testing and Materials (ASTM) has conducted studies on the impact attenuation of surfacing materials with playground equipment. This study more directly reflects fall impacts from playground equipment and is certainly not definitive for athletic floors, but it does bare some relevance.

3. SURFACE FRICTION

Surface friction, often called the coefficient of friction or sliding coefficient, is used to measure a floor's ability to control the sliding of athletes on its surface. For an indoor sports floor, the surface friction must be high enough to prevent premature and uncontrollable sliding of athletes on its surface, but also low enough to permit sliding off an extreme force.

Rotating and pivoting motions can create strain on an athlete's joints unless the floor has the proper friction coefficients. The measurement is in Newtons, and the range for the proper range is 0.5N to 0.7N. To contrast the ranges, ice equates to 0.1N and fly paper is 0.9N. Typically for wood floors, surface friction is a direct function of the finish on the surface. For most types of synthetic floors, the measurement is higher.

Action Anchor Flex, Herculan MF 7+2 and Herculan MF 9+2 — DIN Certified and FIBA Certified. Lake Forest College, Lake Forest, Illinois, USA. 18,354sqft.

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The maintenance of any of these floors is critical and can affect the measurements. This measurement is also tested according to the German Institute of Normalisation or DIN standard.

Cost Considerations

Beyond performance values of a particular floor system, cost considerations play a leading role in obtaining an edge. Architects and decision maker's alike struggle to balance performance with budget restrictions, but the gym floor usually accounts for less than 1% of a total project budget. The ROI (Return on Investment) over the life of a wooden gym floor is short, given the life expectancy of 38 years with minimal maintenance. The Maple Flooring Manufacturers Association (MFMA) conducted a life-cycle cost comparison to understand the real costs over a 30 year time frame. The entire report can be found on their website at: www.maplefloor.org.

Reflected below is the original installed price plus manufacturer-recommended maintenance (in US $):

- Northern hard maple $0.79 / sq. ft. / year
- Poured urethane $1.10 / sq. ft. / year
- PVC $1.15 / sq. ft. / year

A 20mm thick Maple floor will allow for up to six to eight sandings and based on use, the life expectancy could be far greater.

Rounding Off

The benefits of choosing the right sports flooring system are clear, and this article has proved that competitive advantage is more than just a mindset; with hard work and the right equipment playing a key role.

With over 100 years experience, the MFMA (Maple Flooring Manufacturers Association, www.maplefloor.org) and its members are a great resource when designing and constructing your next maple gym floor.

Herschel Walker once said; "If you train hard, you'll not only be hard, you'll be hard to beat".

In the end, all everyone wants is the competitive advantage to be champions! The gymnasium floor is yet another tool to that end.

Author's Credits: Tom Abendroth is President of Action Floor Systems, LLC, a company that specialises in high-performance sports floors constructed of hard maple timber grown exclusively in northern Wisconsin and Upper Michigan.

Action Floor Systems manufactures a wide variety of hardwood sports floor systems to accommodate any application and is proud to serve the global market place, with headquarters and wood floor manufacturing plant in Mercer, Wisconsin, USA. For more information, visit: www.actionfloors.com or contact Action Floor Systems LLC, 4781 North U.S. Highway 51, Mercer, WI 54547-9708 USA, via Phone: +1 715.476.3512, Fax: +1 715.476.3585, or e-mail: info@actionfloors.com