





plastics for longer life®

When Costa Rica and Ecuador, two of the German soccer team's World Cup opponents, play against each other on 15th June, the German state-owned TV broadcaster ZDF plans to dedicate its airwaves during halftime to robot soccer. In addition to covering the actual World Cup, the Mainz-based TV station as an official media partner will also provide indepth reports on "RoboCup", this year's top technological event!

The robot world championship will take place at the Bremen trade fair from 14th to 20th June. Several hundred teams from about 50 countries will fight for the cup with their autonomous, mobile robots in five different leagues: Simulation, Small-Size, Middle-Size, Sony-Legged and large Humanoid. igus[®] is an official sponsor of this design and construction highlight in

ZDF present with 18 cameras!

the world of sports. As vice world champion, the B-Smart team will, indeed, appear in igus[®] colors. Already during the development phase, igus[®] had offered all RoboCup participants plastic plain bearings and pivot bearings. These are used on the robot players' moving parts such as feet, knees, hips, elbows and shoulders. As an Energy Chain specialist, too, igus[®] possesses many years of knowhow on humanoids and industrial robotic systems.

Vacuum cleaning, lawn mowing, soccer playing

Unlike the 'real' soccer World Cup, the winner at the end of the RoboCup is the entire international community, whose future research profits from the competition's results. The findings help further improve the lives of human beings through a use of robots. The robot games will be accompanied by high-level conferences and high-caliber exhibitions, including the "International IT Society's Conference on Artificial Intelligence" and forums on the sub-

> ject titled "Service Robots: A New Market". The first robots capable of independent vacuum cleaning, lawn mowing and b u i l d i n g maintenance

are already

available as commercial products.

On soccer again: RoboCup's organizers have the ambitious objective of pitting robots against humans according to official FIFA rules by the year 2050 – and winning.

igus® is an official sponsor of the RoboCup 2006 soccer tournament in Germany.

EXCLUSIVE: Balack online World cup journal at www.igus.de/robocup



RoboCup's "Michael Ballack": Florian Penguitt, captain of the "B-Smart" team.

Actually, he's not Michael Ballack, but Florian Penguitt, a 25-year old student of information technology in his 8th semester at the University of Bremen. However, his comparison with Ballack stems from his function as one of the controllers of the "B-Smart" robot team, whose 15 autonomous, mobile robots will be playing for the world championship in Bremen soon. Equipped with igus® plastic bearings, the "B-Smart" robots belong to the smallest but nevertheless tricky Small-Size league, alone

comprising 25 teams from all over the world.

Florian Penquitt's exclusive online journal at www.igus.de/robocup describes how his team - the current vice European champion - fares at the world cup in Bremen. It provides behind-the-scenes reports on advancements in robotics and artificial intelligence making their appearance in Bremen.

Similar to Klinsmann's squad, B-Smart at the robot world championship comprises a large team of 18 students plus four assistants. The robot's names are, well, somewhat different: Instead of Lehmann, Klose or Podolski, they read Bulldozer, Digital Bitch, Back Burner, Electric Funeral, and so on.

World cup rucksacks



at the igus[®] Stand!

artificial intelligence **Plastics for** "RoboCup" is much more than just a soccer bearings on the moving

world championship for robots. Founded in Japan in 1995, it is an international initiative meant to specifically promote research on artificial intelligence and autonomous, mobile robots. High-performance plastics are playing an increasingly important role here, as in the case of igus® plain bearings and pivot

parts of robots.

experiences gathered by igus® in applications involving artificial limbs and knees, for instance. Plastics are excellent for achieving smooth, uniform movements under load and impact.

Constructors were able to draw on the A prototype comprising igus® plastic bearings was used already in 2005 at the European robot championship in Paderborn. Students of mechanical engineering from the University of Graz had decided to employ a plain bearing instead of a needle bearing.



Already at the Hanover trade fair in 2004, the igus[®] stand presented the first household robot developed by the Fraunhofer Institute's robotics department and equipped with an igus® Energy Chain.





Compact, low-maintenance design students of mechanical engineering at the University of Graz furnish their soccer-playing robots with plain bearings.

The wheel rotating units forming part of the drive are mounted in a plastic bearing integrated into the robot frame. According to the young researchers, the plastic bearing resulted in an extremely compact, lowmaintenance design.

In the area of plastic Energy Chains, too, igus[®] is a partner of robot designers and operators. At the Hanover trade fair two years ago, igus[®] in cooperation with the Fraunhofer Institute presented Germany's

first household robot equipped with an igus® Energy Chain. Hundreds of robots furnished with movable. 3-dimensional Triflex® R Energy Chains now operate in tough industrial environments. As a lifeline for ultramodern machines forming part of robotic systems, Triflex[®] R reliably transmits data and power for the automotive, packaging, chemical/pharmaceutical and semiconductor industries, as well as sophisticated automation and handling systems in general.

Tickets still available at short notice!

It is only right at the edge of the playing field that the distinctive atmosphere of the robot world championship can be experienced in its true essence. For this reason, igus® is providing those who still want to see the "RoboCup" games live in Bremen with a last-minute service for ordering free entrance tickets. At

www.igus.de/robocup

you can obtain your world cup ticket quickly and easily in just a few mouse clicks.

Voucher

polymer bearings and E-Chains[®] from igus[®].

iqus.de

A special service is available at igus[®] stand E12 in hall 5 at the "RoboCup" tournament. The Cologne-based company is offering every RoboCup team a free rucksack full of gadgets for inventors. Items include a variety of high-performance polymer plain bearings for putting players "into shape", the "xigus" and "xiglidur" CD-ROM expert systems permitting precise calculations of the life cycles of polymer plain bearings and forecasts of robot service life during games, as well as Energy Chains such as the specially developed, movable, multi-dimensional Triflex[®] which powers the players while ensuring their full freedom of movement. The list goes on and on.

A welcome package for each world cup participant at the Bremen trade fair includes a voucher which can be exchanged for this kit at igus[®] stand E12 in hall 5.

Plastic for artificial intelligence



igus[®] is an official sponsor of the football RoboCup 2006 in Germany.

RoboCup Bremen, hall 5 booth E12





80,000 products ex stock: E-Chains[®], Chainflex[®], iglidur[®], igubal[®] and DryLin[®]

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Continual research

Every year, igus[®] engineers develop more than 100 new plastic compounds which undergo more than 4000 tests of suitability for zero-maintenance, self-lubricating plain bearings at the company's own laboratory. All results on the tribological properties of polymers are saved in a large and steadily expanding database, permitting a plain-bearing application's



service life to calcube lated on the basis of empirically determined values. igus® in Cologne offers more than 7500 different plastic plain bearings ex warehouse.

FireWire cable for **GOal**

The world's first FireWire cable was developed by igus[®] for powering continuously moving components in the automation industry. The Chainflex[®] CFBUS.055 FireWire cable permits transmission rates of up to 400 Mbit/s for Energy Chains forming part of imaging applications. What is used for quality monitoring during production processes also helps speedy outsideleft players score goals at the RoboCup world championship in Bremen.