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Issue 2, Second period

IAARC Newsletter

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President's message

Dear reader,

It's a pleasure to contact you again through our Newsletter. During this last period our organization structure, centred in the IAARC Secretariat, has grown more efficient and clearer. The association web page has also been redefined to increase the members utilities. Also, during this period new members from new countries have joined us, specially our colleges from Korea, the venue of the ISARC in 2004.

During September the most important event of the association is the ISARC which is going to be held in Eindhoven. The organizers worked very hard during the past year and I'm sure that the success of the symposium is guaranteed. The expected participation and industry interest in the ISARC'2003 are very high. Best success to Eindhoven!

Carlos Balaguer



The 20th IAARC-sponsored symposium in the field of automation and robotics in the construction industry is part of a successful series of annual ISARC symposia that have been organised in various locations: Asia, America and Europe since 1984. The 20th ISARC symposium provides a forum for the worlds leading researchers, developers and end-users to present and discuss the latest research and development activities with respect to 'the site of the future'.

This symposium is also a platform to discuss the ways in which these activities are transforming the construction process and how opportunities to collaborate in these areas can be explored. This year the symposium is addressed to "Future Site".

Keynote Addresses

- The Future Site (Prof. Frits Scheublin, Technical University of Eindhoven, The Netherlands).
- Intelligent Lifting Technologies (Mr. Van Seumeren, Mammoet Europe B.V., The Netherlands)
- The Wester Schelde tunnel -60 meters under sea level- (Mr. Rob de Leeuw, Royal BAM group, The Netherlands).
- The IF7 Results, (Dr. Mr. Junichi Yagi, Shimuzi Corporation, Japan).
- The FutureHome results (Prof. Carlos Balaguer, University Madrid, Spain)
- Construction Management System (Prof. Ronie Navon, Technion, Israel)

<http://www.isarc2003.bwk.tue.nl>



*Prof. Ger J. Mass
General chair ISARC'03*



ISARC'2003 in Eindhoven

Technical program



*Technical University
of Eindhoven*



The technical program of the ISARC'2003 covers three days, September 22, 23 and 24, going over specific thematic each day: The Future Site, Industrial Construction and Projects (performance) Control. Every day two or three technical sessions will run in parallel, together with several Key Note speeches.

The 2nd day will be an international theme day on Industrial Construction, featuring backgrounds and successful examples, organised in collaboration with the Steering Committee for Housing Experiments (SEV) of the Dutch Ministry of Housing, Spatial Planning and the Environment. On this day, three backgrounds and successful examples will be presented: IF7 Japanese project, FutureHome European Union project and Industrial, Flexible and Demountable Construction (IFD) in the Netherlands.

The location of the symposium will be the Technical University of Eindhoven. The symposium will be held at the university's on-campus Conference Centre. All university buildings are situated in a park-like environment and located a short walk distance from the centre of Eindhoven, hotel accommodations and railway station. The train ride from Amsterdam Airport Schiphol to Eindhoven takes about 90 minutes.

Technical tours

"Utrecht Boog", Movable Scaffolding System (MSS)

The project to double the number of rail tracks between Amsterdam and Utrecht is one of the largest and most complex rail-infrastructure project in

the Netherlands. An important part of the project is the construction of the Utrechtboog (Utrecht Arch) around the Amsterdam Arena stadium. The building consortium, consisting of Dura Vermeer, BAM NBM Infra and Philip Holzmann, is responsible for working out the technical details of the Utrechtboog and its construction.



Social events

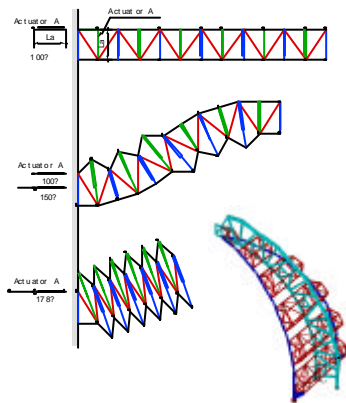
ISARC'2003 banquet will be held in the unique Van Abbe Museum located in Eindhoven. The museum's building was officially reopened in 2003 after a period of radical renovation and expansion. With the renovation of the old museum building, which dates from 1936, and its integration into the spectacular new section designed by the Amsterdam architect Abel Cahen, the Van Abbemuseum is visibly responding to the ongoing changes in museum culture, and to the public's growing expectations.



Adaptive Roof Structure Japanese project

Foldable structures have been used for drawbridges and all-weather stadiums with retractable roofs. These structures move with truck on the rail or turn around the hinge. These actions are monotonous and simple. However, in the near future building technics, new functions, that vary the building's shape to harmonize with its surroundings, may be needed.

To perform the new function, the *Obayashi Corporation* found Variable Geometry Truss (VGT) which has been developed for foldable dish antennas of artificial satellites. VGT structure contains telescopic members, fixed members and hinges. When telescopic members extend, the truss can adapt its configuration to any mission.



Experiment model of a flower type roof verified the adaptability of VGT structure. In this model, the hemispheric roof was divided in 10 sectors. A VGT was built for each sector in order to control them independently.

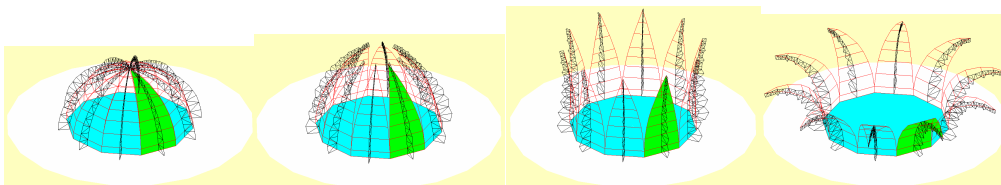
The roof structure contains VGT structure and space frame and side truss and roof finish. Only one line of VGT structure was built in the center part of the roof. Five hydraulic actuators were built in each VGT structure. The test model was reduced to about 1/6, and 2 frames between the hemispheric roof division were made. The following tables show specifications of the test model and the actuators.

Specification of Test model

Size		H4.5m×W1.78m×D0.57m
Material	General part	SS400
	Hinge	S45C
	Roof finish	Acrylic
Self-weight		0.6t

Specification of hydraulic actuators

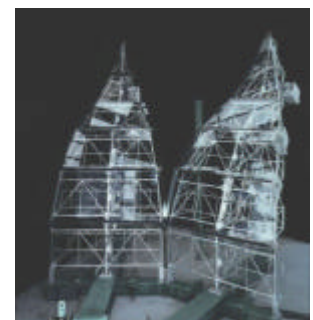
Power	Push 560N Pull 450N
Pressure	Max 7 Mpa
Stroke	450mm (telescopic rate 1.88)
Speed	Push 1.7mm/s Pull 2.1mm/s
Self-weight	100kg (cylinder & pump one body)



Different roof configurations



Close roof prototype



Open roof prototype
(after 3 minutes)



The European Union OSYRIS project

Key issues and philosophy

OSYRIS ("Open System for Road Information Support") is a European-Union-funded project focused to develop information infrastructure for road construction and maintenance processes. It is intended to enable both contractors and road owners to generate their own knowledge bases and quality assurance systems, which it's now expected from them, one of the key challenges facing the new century is to access critical information in real time .

The OSYRIS philosophy consists of building openness and modularity into a system by using compliant components. OSYRIS data storage and management is based on a product model of the road especially designed to be: compatible with the latest road management databases, object-oriented and located within a 3D geographical reference.

The OSYRIS project was launched in February 2000 and will last until February 2003. The Consortium is made up of partners from: the University of Karlsruhe (TMB) - Germany; LCPC - France; Moba - Germany; Tekla Corp. - Finland; and Skanska - Sweden. The project is funded under the European Union Program "Growth" (Contract No.: G1RD-CT1999-00080).

Expected outputs

The Four following commercial OSYRIS products have been foreseen:

- *Standards*: a set of several pre-standards describing the format and contents of information exchanges;
- *Machine*: a set of on-machine components developed to accomplish the contractor's basic needs in supporting paving and asphalt compaction work;
- *Machine Extensions*: a set of options to extend the basic OSYRIS machine configuration, bringing additional functionality;
- *Design and Documentation*: on-line software to plan, analysis, documentation and long-term storage of roadwork parameters.

In December 2002, the project was close to the end. The development of the expected prototype products was achieved and tested at the beginning of November 2002 on a real work site in Sweden. The partners are currently exploiting the results of the field trials to solve the remaining problems and they are writing the final technical reports and user manuals. After the completion of the project, the office products will be marketed by the partner Tekla and the on-machine products will be marketed by the partner Moba.

www.osyris.org



Fig. 1 Paver MMI showing speed, core temperature of the laid asphalt at 3 different points, layer thickness left and right, traveled distance and a temperature map with the position of the paver and the 2 rollers working on the site

Fig. 2 Roller MMI showing speed, core temperature of the asphalt, number of passes, time remaining to compact, rolling resistance correlated to the degree of compaction of the material and number of passes map with color codes

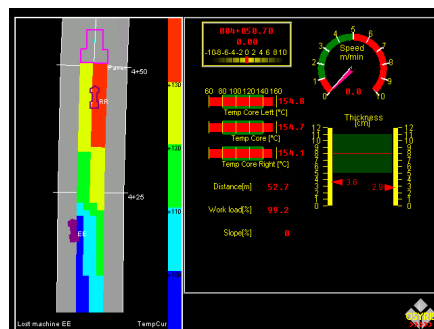


Fig. 1

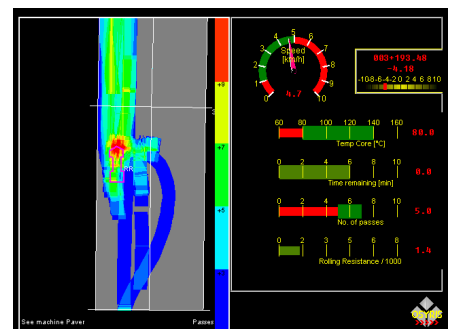


Fig. 2

Dr. William C. Stone, 2002 T-H award

Dr. William C. "Bill" Stone is the leader of the Construction Metrology and Automation group at NIST (National Institute of Standards and Technology) in Gaithersburg, Maryland. He has 20 years of professional research, design, development, and deployment experience in structures, dynamics, scientific software, data visualization, sensing systems, 3D laser radar and sonar data processing; and was the main architect for a number of novel autonomous systems containing fault tolerant embedded control systems. Current major program management at NIST includes the development of real-time field sensing systems to support the CONSIAT Program (Construction Integration and Automation Technologies).



The 2002 Tucker-Hasegawa award has been assigned to Dr. Stone for his long term international contribution for development and dissemination of automation in his field. This award is the highest distinguished award of our Association.



Results of the ISARC'2002 in Washington

The ISARC'2002 was successfully held in Washington DC during September 2002. The number of papers presented was 88 from 15 different countries (USA, Germany, Taiwan, Japan, Canada, France, UK, Singapore, Israel, Poland, Finland, The Netherlands, Spain, Italy and Russia). The number of attendance was very high from 16 countries all over the world.

Several plenary sessions were lectured during the symposium. The opening session was "Autonomous Systems in Unstructured Environments: Lessons Learned and Paths to the Future" presented by Dr. James S. Albus, (NIST, USA).

A number of live demonstrations involving advanced automation and robotics were presented during the ISARC'2002. The demonstrations were staffed so that conference participants

would be able to choose among the topics of greatest interest to them.

General Discussion on Technology Transfer in Construction was moderated by Prof. Leonhard Bernold, North Carolina State University.

ISARC is not only an academic research symposium, but also the crossroad for the industry. Numerous companies from the most industrialized countries regularly participate in the activities of the IAARC and assist to the ISARCs. The most active companies, among others, during the ISARC'2002 in Washington D.C. were: A&L (USA), Construction Robotics (UK), Council of Construction Robots (Japan), Construction Federation (Sweden), Corus (UK, NL), Dragados (Spain), Fujita (Japan), Mammoet (D), Obayashi (Japan), Rautaruukki (Finland), Royal BAM (NL), Takenaka (Japan), Tractel (F), Shimizu (Japan).





Highlights of Current Research in US

Rapid Human-Assisted Workspace Models in Construction

The Field Systems and Construction Automation Lab. (FSCAL) at The University of Austin, Texas is developing interactive modeling methods that exploit a human operator's skill to quickly recognize objects in a scene. The operator directs a laser range finder to gather range points on objects through the workspace. These sparse range point clouds are then used to create planes, boxes, cylinders, and generalized convex hulls to be displayed graphically and used as control objects during the equipment operation. Experimental results show that bounding models can be created rapidly and with enough accuracy for obstacle avoidance and automation functions with the aid of human intelligence.

Haas, C., Sreenivasan, S.V., Liapi, K., Kwon S., McLaughlin, J. "Collaborative Site Modeling, project NBR: NA1341-02-W-0742" progress report, The University of Texas at Austin

Developing iRoom Visualization Technologies to Balance Cross-Disciplinary Decision Factors

The Center for Integrated Facility Engineering (CIFE) at the University of Stanford is conducting research on "iRoom" visualization technologies to elicit the implicit knowledge in uncovering interdisciplinary impacts of architectural alternatives. It can be useful for evaluating rework, coordination, and life-cycle impacts. The deliverables of this research are: iRoom decision-support views, application scenarios, and a guideline for decision-support application. This research study will project risks.

<http://www.stanford.edu/group/CIFE/Research/index.html>

FIATECH (Fully Integrated and Automated Technology) Roadmap

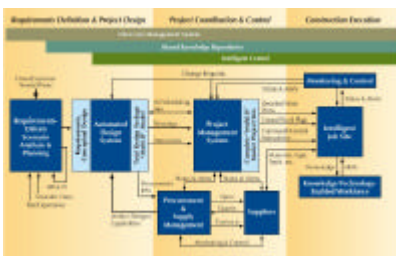
FIATECH suggested the roadmap of new technologies which are advancing the capacity to build large-scale facilities rapidly and more cost efficiently, with far less rework and delays. Focusing on the four basic "functional elements" of the capital projects enterprise -Project Definition & Planning, Construction Execution, Life-Cycle Support, and Project Management - the roadmap provides: 1) "provides a situational analysis of the current state of the industry", 2) "defines a sweeping set of "stretch" visions for the desired future state of the industry", 3) "identifies more than 50 goals and 200 supporting requirements for R&D."

<http://www.fiatech.org/projects/execovrw.pdf>

Advanced Sensor Based Defect Management at Construction Sites

Carnegie Mellon University's new research investigates detection defects at construction sites. This research is focused on a combination and extension of generated integrated 3D environments using laser scanners and monitoring quality information about built environments by embedded sensors. The research objectives consist of: (1) "formulating strategies/mechanisms to use laser scanning and embedded sensor systems", (2) "developing mechanisms to integrate and interpret data acquired from these systems with the project model", (3) "developing a general, flexible and integrated representation scheme to model product, process and as-built information", and (4) "formalizing mechanisms for automated defect detection and management."

<http://www.ce.cmu.edu/~bakinci/ASDMCon/index.htm>



FIATECH roadmap



iRoom of the CIFE



The ISARC'2004 will held in Korea

The 21st International Symposium on Automation and Robotics in Construction (ISARC 2004) is slated for September 22 to 25, 2004 in Jeju Island, Korea. The symposium's General Co-Chairmen are Dr. Moon-Young Cho, at the Korea Institute of Construction Technology (KICT). and Dr. Sang-Rok Oh, at the Korean Institute of Science and Technology (KIST). Program Co-Chairs of the symposium are Prof. Wan Kyun Chung (POSTECH) and Prof. Young-Suk Kim (Inha University)

The updated information on the symposium will be soon available at the official ISARC'2004 website <http://www.isarc2004.org>.

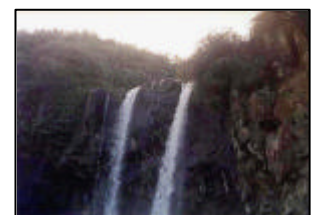
KIST is the first multi-disciplinary government supported research institute in Korea. It was established in 1965 to promote research in basic and applied sciences. Its aim is "to perform research to develop fundamental technology to ensure a place for Korea. Its main Divisions are: Future technology, Materials science and technology, System Engineering, Environment and process technology, Life sciences technologies.

In the symposium organization it will also be involved the Korean Institute of Construction Technology (KICT). Its main Departments are: Construction quality management, Structure research, Geotechnical engineering, Highway research, Water resources research, Construction environment, Building research, Fire & Facilities research, Construction management, GIS/LBS research project center.

The venue, Jeju Island, is full of historic remnants and attractions. It is a famous resort area and the largest island, located 500kms off the southwestern tip of the Korean Peninsula, with easy accessibility of one-hour flight from Seoul. It is a living folk village and the vacationers' paradise with sub-tropical vegetables, waterfalls, quaint thatched roof houses, fanciful lava and rock, and lovely white sand beaches. Located on the southwest seas off the Korean peninsula, Jeju Island is both a universal vacation spot and an important international meeting place that hosts summit international conferences.



The ISARC2004 conference will bring together researchers, engineers and practitioners to present the latest accomplishments, innovations and potential future directions in automation and robotic systems in construction and to enjoy the opportunities to facilitate the making of new acquaintances, strengthen the personal relationship with the participants, and feel exotic Korean culture.



Jeju Island, Korea



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Last minute

Contributors to this issue

The IAARC Secretariat wants to thank the following contributors to this issue of the Newsletter: Mr. John Ahman (IAARC webmaster), Prof. Tatsuo Arai (University of Osaka, Japan), Mari del Carmen Cassa (IAARC Secretariat),

Prof. Carl Haas (University of Austin, Texas, USA), Dr. Van Gassel and Prof. Ger Maas (Technical University of Eindhoven, The Netherlands), Dr. Francoise Peyret (LCPS, France), Dr. Sang-Rok Oh (KAIST, Korea).

IAARC Tucker-Hasegawa award

This award is the most prestigious one in the field of automation in construction. It was created in 80s by two pioneers in the field: Prof. Richard Tucker from the University of Austin, Texas (USA) and Prof. Yukio Hasegawa from the University of Waseda (Japan).

The last awarded people for its outstanding international contributions during the last years are:

2002 William C. Stone (NIST, USA)
2001 Eugeniusz Budny (IMGiS, Poland)
2000 A. Warszawski (Technion, Israel)
1999 Junichiro Maeda (Shimizu, Japan)

New Editor of the IAARC Newsletter

To increase the periodicity and quality of our Newsletter, new Editor Dr. Ernesto Gambao has been elected. His affiliation is the Polytechnic University of Madrid, Spain. He is an expert in robotics and automation in construction, and participated in several international R&D projects like ROCCO and HEROIC. For contributions to the next issues please contact him in gambao@etsii.upm.es.



Eindhoven, in the heart of The Netherlands



Eindhoven, the city of the ISARC'2003, is the fifth city of the Netherlands, differs from ordinary towns in many ways. From a small provincial town Eindhoven it has expanded to a modern, commercial, industrial and cultural centre of international standing. With everything to match: world famous (high tech) companies, high-level sports, design and technology, an airport, excellent hotels and conference centers.

Eindhoven is located in the heart of The Netherlands and very close to the main international airports like Amsterdam and Brussels. It is also very close by road to Maastricht, Rotterdam, Düsseldorf and Aachen.