



## International Road Federation

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IRF was founded in 1948 to encourage better road and transportation systems worldwide. IRF is a non-profit, non-political service organisation which helps in the application of technology and management practices to produce the maximum economical and social return from national road investments. Some 500 governments, companies and associations around the world are members of IRF and provide financial support to the three offices in Geneva, Brussels and Washington DC. National and regional road associations around the world make up the Federation. IRF is an accredited transportation consultant to the United Nations, the Council of Europe, and the Organisation of American States, and works closely with other international institutions in the transportation field.

# Materials are key to better roads environment

Innovative and eco-friendly road construction materials are increasingly vital in the search for better, safer roads. IRF talked to 3M - and also highlights a new system from SCT Italia, a more recent member

**IRF:** *You have talked of the need for a balance between roads offering good mobility for economic development and social needs, while protecting users by offering a safe infrastructure. Where do materials enter the picture?*

**Rik Nuyttens, 3M:** Limited budgets must be used in an effective and efficient way. In developing countries the road safety approach tends to be reactive and remedial, but developed countries are moving towards a more system-based approach. As a responsible supplier, 3M tries to anticipate future needs and develop sustainable products and solutions. Historically, the focus has been on improved visibility and conspicuity of traffic signs and vehicles. Lately, technology innovations have been realised in the field of "All Weather" optics for pavement markings and sign post materials fully meeting the EN 12767 "Passive Safety" standard.

**IRF:** *So better safety can be had through choice of road materials?*

**Rik Nuyttens, 3M:** For many years road authorities have been looking at low cost measures for safe road infrastructure. Traffic signs and

road markings, sometimes the sole means of communication with drivers, have proven to be very efficient road safety investments. Safe road infrastructure investments have proven to provide an immediate return on investment. And traditional road infrastructure will continue to play a dominant role. Mr Niemann, US Federal Highway administrator, said during a recent congressional hearing: "If we cannot always physically protect the motorist from hazards, we must give him enough information to protect himself."

For many countries the primary focus is to change behaviour - through school education programmes, better driving training or traffic code enforcement programmes (e.g. on speed or use of seat belts). The elimination of high accident areas is another area of concentration. These aspects remain important but more advanced countries are moving to a more system-based approach, where preventive measures are integrated from the beginning.

**IRF:** *How has sign technology evolved?*

**Rik Nuyttens, 3M:** Effective signs and road markings continue to play a safety role from both remedial and preventive perspectives; 3M has researched both, continually. In order for a driver to clearly see and read a sign, the light emitted by the car head lights should be reflected back to the eyes of the driver - at a slightly different angle than it has entered the sign, the observation angle. The higher the driver is sitting above the car headlights and the closer the car is moving towards the sign, the higher the observation angle. The longer the driver can stay in the cone of light reflected by the sign, the longer the driver will have the time to read the sign. With the variety of signs, vehicles, and roads, experiments





have shown that people need up to 3 seconds and are able to read the text as far as 200 m away (based on 40 cm letters used for motorway signs - 5m for every cm letter height). Next to the observation angle, a wide range of entrance angle performance - when light is not hitting the sign head on - is another key parameter for sign sheeting materials. Brightness is another key factor.

**IRF:** *If that's established theory, what does it imply for choice of materials?*

**Rik Nuyttens, 3M:** The early generation of sign sheetings was based on glass bead technology. But the best performing glass bead sheeting cannot return more than 16% of the received light back to the driver. When micro-prismatic sheeting was developed, not only could more light be returned but, depending on the type of prisms used, the cone of light could be enhanced. Sheetting meeting ASTM type IX or DIN 3B today provides the best light distribution and widest cone of light for all vehicles from 150 m or closer to the sign (= critical reading distance). A representative product for the second generation micro-prismatic film was Diamond Grade™ VIP. With a third generation product, Diamond Grade™ DG<sup>3</sup>, 3M researchers succeeded in increasing the light return up to 58% by only replicating those parts of the prism that are 100% efficient in light return.

The amount of light visible to the eyes of a car driver approaching a right mounted sign (about 2.5m high) is shown in the figure. A comparison is made between the different ASTM classes, as well as a reference to the DIN 3A and DIN 3B. An exact comparison is not possible due to some differences in test methodology. But proposed ASTM type XI class clearly requires more light to be available for the critical

reading distance range.

On top of the benefits attributed to micro-prismatic sheeting, Diamond Grade™ DG<sup>3</sup> enabled the replacement of illuminated signs, without any negative impact on driver behaviour. Replacing illuminated signs by high performance retro-reflective signs has allowed authorities to reduce investment, maintenance and energy costs.

**IRF:** *Does that conclude the story?*

**Rik Nuyttens, 3M:** By no means. Three more examples, amongst others, deserve mention: passive safety for traffic signs (EN 12767), evolution in road markings, and increased road safety through making trucks more visible.

Recent technology developments by 3M in Europe have resulted in the marketing of posts for traffic signs and possibly other applications, which fully meet the EN 12767 standard. Official tests in the UK showed that, hit by a test car at different speeds, the sign posts scored in the NE (No Energy) class for almost all applications, and a dramatic difference between a steel post and the alternative system offered. Damage to the car is minor and the survival chances of vehicle occupants are substantially higher.

For many years 3M has been offering highly durable road marking tapes. When applied on and inlaid into fresh, hot asphalt, these products have demonstrated many years of high performance. Cities like Warsaw have taken advantage of the product benefits: roads are open to traffic when the new asphalt condition allows it. No additional time is needed to apply the marking. And the durable

performance reduces maintenance cost and lane closures dramatically. Durable, but easily removable, temporary tapes make work zones safer by offering high, around the clock visibility and conspicuity. They are easily removable, without damage or trace.

Recently 3M offered a new type of optics system - using high refractive (R.I.) index glass-ceramic beads. Elements made with 2.4 R.I. beads return light to the driver's eyes when the surface is immersed in water or subjected to continuous rain. The elements made with 1.9 R.I. beads, combined with the traditional glass beads, offer excellent performance when the road is dry. These technologies combined with well designed road marking, offer "All Weather" performance. The optics can be combined in paint systems, thermoplastics - and high performance tapes.

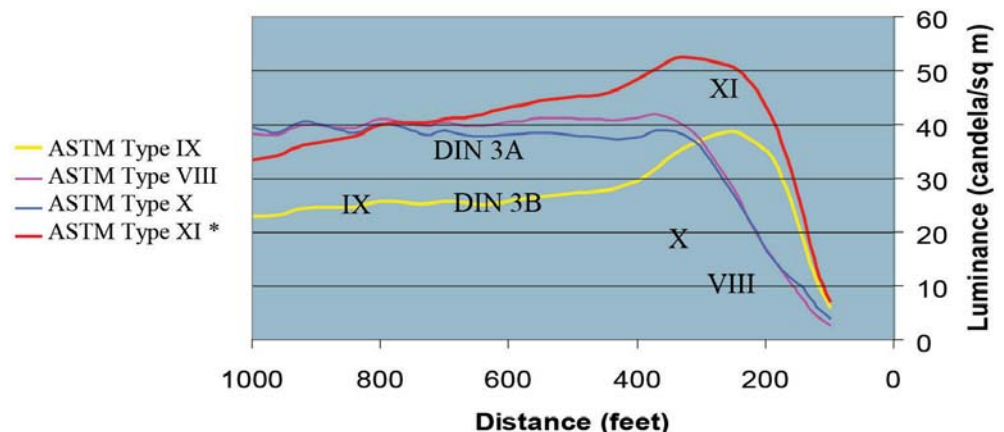
Following the latest amendments to UN ECE Regulation 48, trucks and trailers above 7.5tonnes requiring new type approval must be equipped with conspicuity markings, by November 2009. European Directive 76/756 has a similar urgency. The US has had similar regulations for 15 years.

Road safety benefits have been confirmed by a reduction of night time accidents involving trucks.

UN ECE 104 specifies the product requirements and describes how the marking can be combined with reflective advertisement on both sides of the truck. 3M products are there, to meet the need.

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## Luminance for RS sign, Std sedan, 0 Entr US 25% Headlight



Sign brightness experienced by an average car driver

(\*: ASTM Type XI is a proposed ASTM class)



Better materials depend on continuing research in both corporations and universities. If new materials are the result, sometimes new and old materials are combined in interesting ways. SCT Italia shows how

SCT has perfected its **Eridio** system, aimed at mitigating the effects of atmospheric pollution. It can be combined with older technologies such as acoustic panels made of wood to offer a dual protection. **Eridio** will be used to treat road asphalt, tunnels and photo-absorbing panels with TiO<sub>2</sub> (titanium dioxide). Anti-scratch solutions form part of the treatment. The guiding principle is a passive but constant lowering of air pollution without the need for generated energy - thanks to a solar powered system sufficient to light tunnels.

**Eridio** is based on a photo-catalytic process able to transform polluting elements in the air into organic elements. These get washed away through rainfall or are re-distributed by the air movements of passing vehicles. The photo-catalytic process is started by a range of ultraviolet rays hitting photo-absorbing panels and activating the TiO<sub>2</sub>. SCT makes its acoustic panels from wood - because it believes in products integrated with the natural environment, to improve a location's characteristics, without disfiguring them. This brings a parallel responsibility to obtain its raw materials from sustainable sources, and SCT benefits from the FSC certification for quality forest management. Its corporate theme is to achieve a natural harmony of new and traditional materials, new systems, continuous research and investment in the future.

[www.sctitalia.com](http://www.sctitalia.com)

## CALTRANS wins IRF GRAA research award for CA4PRS

Highway agencies face increasing pressure to meet growing transportation demands using cost-effective strategies that balance project constraints and produce minimal impacts on road users. This is a growing need because most of the heavily-trafficked highways in the US, built more than 40 years ago,

reached their 20-year nominal design lives long ago and have high maintenance, rehabilitation, and construction costs. Necessary highway work entails construction closures that increase delays and accidents in work zones. During 2004 alone, US freeway work zones accounted for nearly 12 percent of non-recurring delay for users, and work zone crashes resulted in 1,065 fatalities and more than 40,000 injuries.

"Rebuilding our transportation infrastructure is a global issue. Until recently, transportation professionals were challenged daily with the riddle of how to rebuild deteriorating highways economically, safely and with minimal public impact," said Randell Iwasaki, Chief Deputy Director, California DoT. "Now, thanks to innovative research, there is a software tool that allows design, traffic and construction engineers the decision-making ability to select schedules, costs, and determine impacts to deliver projects safely, quickly and affordably. It is **Construction Analysis for Pavement Rehabilitation Strategy (CA4PRS)**."

CA4PRS, already used successfully by State road agencies and contractors, is a scheduling and traffic analysis tool that helps planners and engineers select possible economical strategies for highway rehabilitation or

reconstruction projects with varying constraints. The software's scheduling module aids in this by calculating the duration of the highway project in terms of the total number of closures and the closure hours required for each strategy alternative. The traffic module quantifies the impact on the travelling public of work zone closures - in terms of time spent in the closure and road user cost, including local arterials and neighbouring freeways.

These capabilities were confirmed in California, Washington and Minnesota. CA4PRS played a crucial role in the rehabilitation of US Interstate 15 near Devore, California, helping reduce agency cost by US\$6 million and saving \$2 million in road user delays compared with repeated night traffic closures, the traditional approach. FHWA is in the process of arranging free group licenses for all States. AASHTO also endorses wider use of the software.

"CA4PRS has consistently demonstrated savings in time and money in the construction of roadway projects. To receive recognition by a global organisation such as the International Road Federation is a tribute to the value our communities and partners place on deploying research to create innovations that help us to get the job done," concluded Iwasaki ■

## European Institutions break Galileo stalemate

After months of stalemate the European institutions have reached a consensus with an informal agreement on the proposal for a regulation on the deployment and exploitation phases of Galileo ratified by the Council of Ministers (7 April) and the European Parliament's Industry Committee (8 April). The agreement offers a legal framework in which to finance the follow-up of Galileo operations and determination of rules and procedures to award public procurement contracts.

Galileo Open Service Signal-In-Space Interface Control Document, better known as Galileo OS SIS ICD, was then released. It complements the 2006 version by adding a description of the common signal (MBOC) modulation, agreed by the US and EU, on the Galileo E1 signal and a description of the structure of the Search-and Rescue (SAR) return link messages. The objective is an accurate description of Galileo user requirements for developing applications which make the most of Galileo system and signals.

Comments and remarks collected by the GSA during the public consultation are expected to help fine tune the ICD.

● Interested ERF-IRF BPC Members with expertise in GNSS applications in the road sector are invited to voice their thoughts by 6 June 2008. Go to: <http://www.gsa.europa.eu/>

# Australian Road Forum wins Advocacy Award for national peak body



In March 2005, the Australian Road Forum (ARF) was launched by the minister for roads as the official peak body for road transport stakeholders in Australia, with the support of State ministers. ARF now has 50 members (up from only 10 in 2005) and contributes significantly to policy debate. An email newsletter, ARF Insider, is distributed to 2,000 subscribers every two weeks. ARF is active internationally and is currently negotiating agreements with other governments on

personnel exchange. Membership covers all the major stakeholders - both private and public - in the Australian road industry, including road authorities, private construction companies, unions and road user associations. Last year, 1,200 participants representing 140 organisations attended ARF-organised industry events around the country. ARF's status has enabled it to contribute ideas and advice at the highest levels of government - where the organisation is today recognised

**Australian Road Forum is now making a big difference**

as a valued partner in the policy process. ARF has advised on key policy issues such as the Cross City Tunnel enquiry in Sydney and the national road network. The head of ARF meets regularly to review priorities with the head of the Australian DoT. ARF lead a delegation of State and Federal government representatives to China last November.

"The road network plays a vital and pre-eminent role in linking and servicing the needs of Australian communities," said Ian Heggie, ARF Chief Executive. "ARF champions this critical national asset, providing a forum for stakeholders to come together in a bipartisan way to share ideas and knowledge, debate the issues, and plan for the future of the network. The IRF Global Road Achievement Award will further enhance this role among both government and private sector stakeholders, ensuring the Forum remains relevant, vital and widely recognised as the national platform for communication and debate" ■

## IRF Second Latin America Regional Conference

The second of these conferences will be held in Lima, Peru from 28-30 August, in conjunction with the 7th Highway Infrastructure International Congress, conducted by the Construction Management Institute of Peru.

The theme of this year's congress is, Transcontinental Highway in Latin-America - Connecting Capitals, Connecting People.

The two events will bring together public and private organisations to share best practices and network with road industry experts from around the world. Attendees will be able to learn about new advances in technologies, hear from practitioners about road

infrastructure projects, and gain valuable insights on current research being done by leading experts from the region.

The IRF-Washington will present four training and education modules:

- Road Safety
- Road Financing
- Road Maintenance
- Pavement Technologies

More than 1,000 delegates are expected. All Congress activities and sessions will be held in Spanish.

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## 2nd Roads and Environment Conference



**INTERNATIONAL ROAD FEDERATION**  
FEDERATION ROUTIERE INTERNATIONALE  
[www.irfnet.org](http://www.irfnet.org)

**10th-11th November 2008**  
**Geneva, Switzerland**

**more information on [www.irfnet.org](http://www.irfnet.org)**

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