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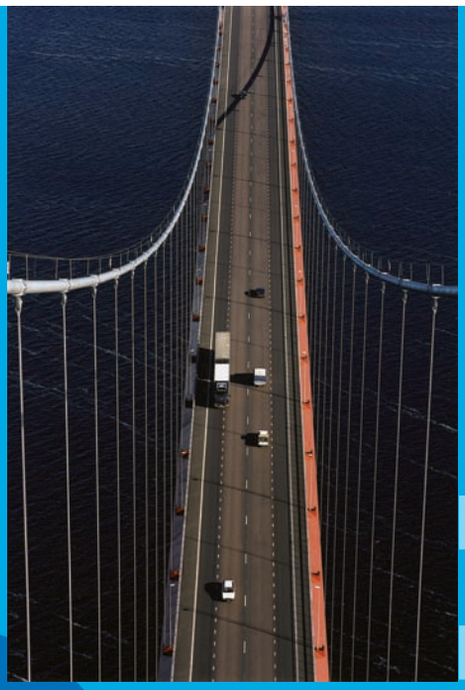

Coatings for bridges and steel structures

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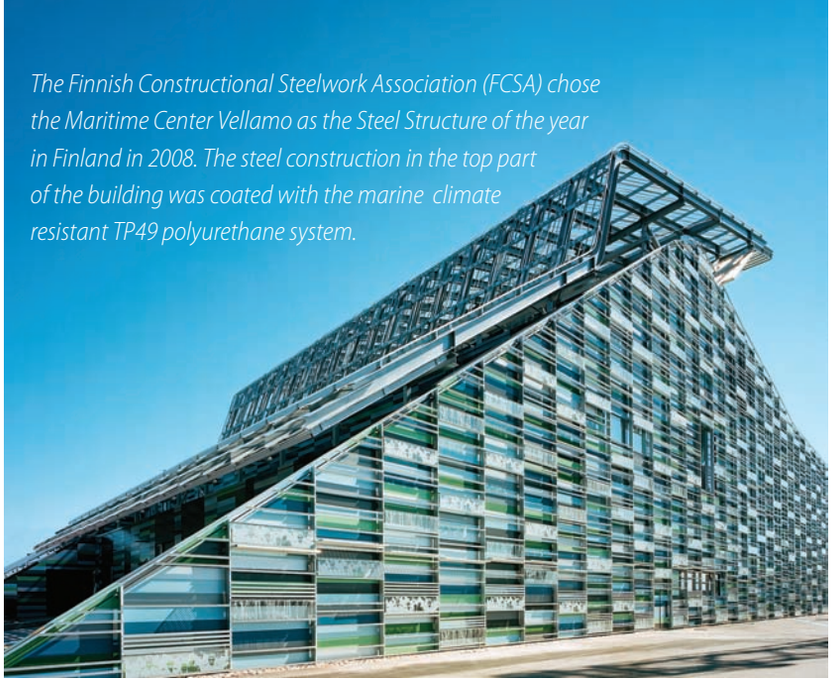
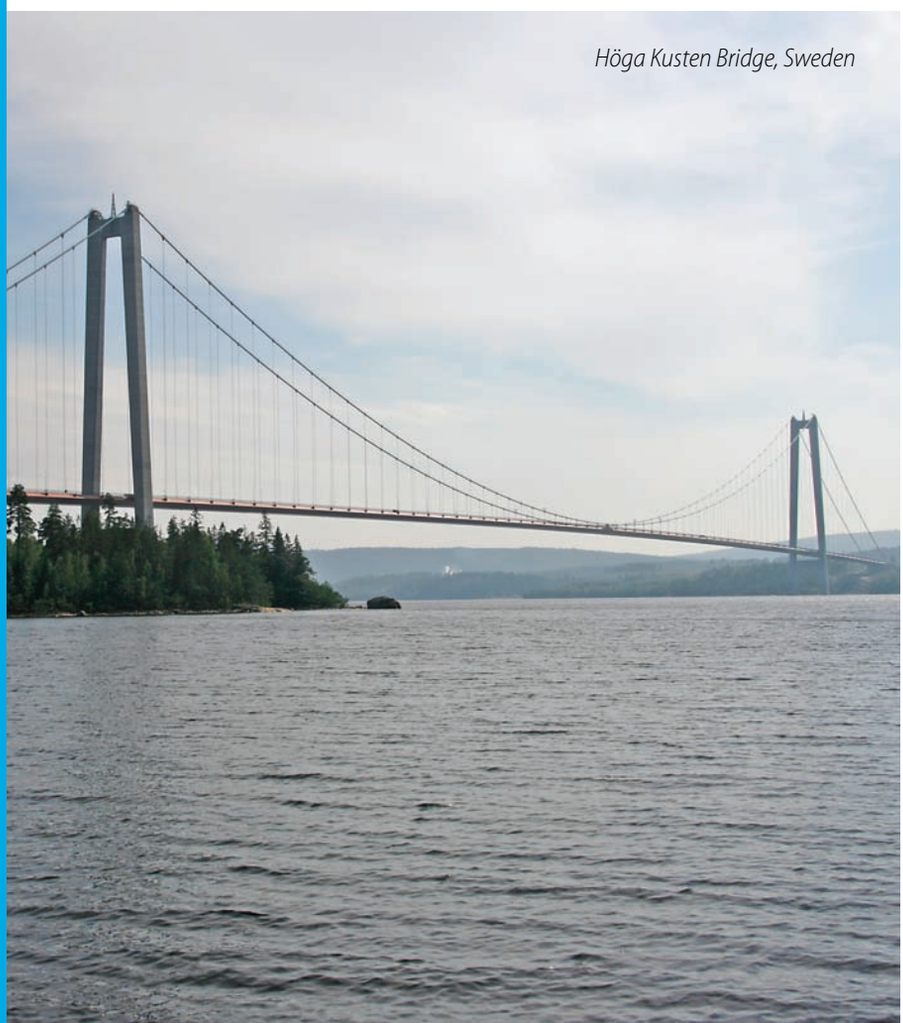


The Finnish Constructional Steelwork Association (FCSA) chose the Maritime Center Vellamo as the Steel Structure of the year in Finland in 2008. The steel construction in the top part of the building was coated with the marine climate resistant TP49 polyurethane system.

Coatings for bridges and steel structures

Tikkurila supplies paint systems for bridges and steel structures, both for new construction and maintenance. Our track record in steel bridges and steel structures includes hundreds of projects in several countries throughout Europe, Russia and the CIS countries.



Höga Kusten Bridge, Sweden

Over the years, several million square meters of steel bridges and steel structures have been painted with Tikkurila products to ensure cost-effective, long-term protection against corrosion and wear. Another benefit has been ease of maintenance and the long-term preservation of the structures' cosmetic appearance, even under the most severe conditions.

Tikkurila has coating systems for all kinds of metal structures, equipment and machinery, pipelines, conveyors, storage tanks and cisterns, whether interior or exterior. These systems' performance has been tested both in the laboratory and in real-life conditions, with outstanding results. Tikkurila´s products and coating systems have been officially approved for highway and rail bridges in many countries, including Sweden, Finland, Norway, Ireland, Russia, Hungary, Poland and Baltic countries.

The main railway station in Helsinki, Finland

The selection of an appropriate painting system for steel structures, or for steel bridges, involves consideration of a range of factors:

- the corrosion category of the environment
- the material (substrate) to be painted
- the condition of the structure itself
- possible mechanical or chemical stress
- UV exposure
- the feasibility of different methods of surface preparation
- the application methods
- the painting conditions
- the coating costs over the whole life time of the object. If parts of the construction cannot later be maintained, it will be necessary to choose a system which will last the design life of the stucture.

The Ollinsalmi Bridge in Joutsa, Finland

This bridge over the Okhta River, constructed during 2004-2008, is part of the ring road around Saint Petersburg. The total length of the bridge is 333.7 m, with a painted area of 250,000 m² including bridge and bypass pipes. Paintwork was performed in accordance with the Russian standard for bridges, STO-001-2006.

Temazinc 99	40 µm
Temacoat GPL-S MIO	2 x 75 µm
Temadur 50	50 µm
Total DFT	240 µm

Bridges - new constructions

The majority of new bridges are constructed of modular, prefabricated elements which can be painted in controlled workshop conditions. The parts are then transported to site by land or sea for final assembly.

Constructed in 2007, the Danube Bridge at Dunaújváros in Hungary is one of the biggest public bridges in Central-Eastern Europe, with a length of 1,677 m and a width of 32.3 m. The construction work required 24,000 tons of steel structures and the use of unique technical solutions.

This method of construction minimises the need for site painting and allows the use of high technology paint systems which would be difficult or too costly to apply on site. Normally, only the repair of transport damage and the coating of site-welded areas are required thereafter. Depending on the coating system, topcoat can also be applied on site.

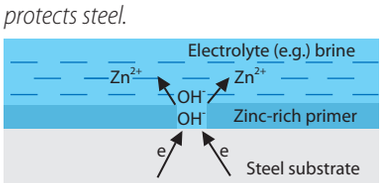
A typical anticorrosive system for bridges utilises the cathodic protection properties of zinc, in the form of a zinc-rich primer. **Temazinc** zinc-rich epoxy primer cathodically protects the underlying steel structure from corrosion, through the mechanism shown in the adjacent illustration.

The corrosion products of zinc fill any scratches or damage points in the paint layer, preventing direct contact between electrolyte and steel, which would otherwise result in corrosion. This reaction continues as long as there is enough zinc in the primer.

TP22	
Temazinc 99	1 x 40 µm
Temacoat GPL-S MIO	2 x 80 µm
Temadur 50	2 x 60 µm
Total DFT	320 µm

Bridge Strömstad, constructed in 2007, Sweden

Mechanism by which zinc-rich primer protects steel.



Anode reaction: Zn -> Zn^{2+} + 2e
Cathode reaction: H2O + ½O2 + 2e -> $2OH^-$

References

Sweden

Bridge Smista Allé, 2008

Höga Kusten, 1997

Russia

Lieutenant Schmidt bridge, 2004-2005

Obuhovskij bridge over the Oktjabrskaja railway station, 2004-2007

Poland

Railway bridge, Odygowice, 2003

Railway bridge, Mikoów, 2000

Hungary

Dunaújváros Danube bridge, 2007

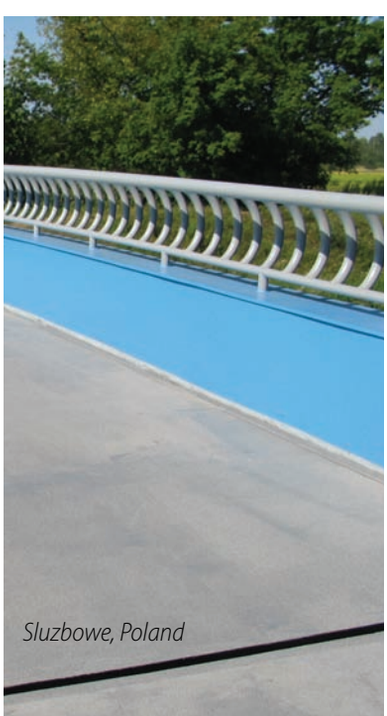
Lajita Railway Bridge, Lajita,1997

Finland

Raippaluoto bridge, 1997

Star of Heinola, Tähtiniemi, 1993

A complete list of references is available from Tikkurila.



Sluzbowe, Poland

Side walks

Temafloor 6 coating system can be used as an insulating and topcoat layer applied on concrete or steel surfaces to structures, such as footbridges, road bridges and bridge sidewalks, subject to dynamic loads due to pedestrians and vehicle traffic. The Temafloor 6 polyurethane coating system has good abrasion, impact resistance and anti-slip properties.

Temafloor 6 coating system contains following products

Temafloor 200 Primer (Temabond ST 200 for steel surfaces)

Temafloor PU + non-slip sand

Temafloor PU - UV topcoat

Temafloor 6 coating system has Polish approval "Aprobata Techniczna IBDiM Nr AT/2006-03-2084".

Hammersmith Bridge in London, England.

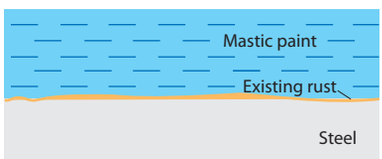
Bridges - maintenance and repair

Surface tolerant epoxies have the ability to penetrate rust and adhere to the underlying steel surface, effectively preventing further corrosion. Surface tolerant epoxy is the first choice especially for surfaces where the complete removal of rust by blast cleaning is impracticable.

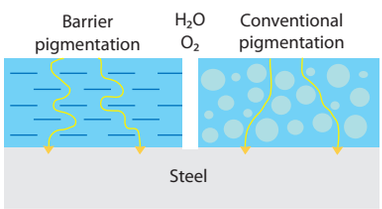
The Millennium Bridge in Budapest, Hungary.

Temabond- surface tolerant epoxies

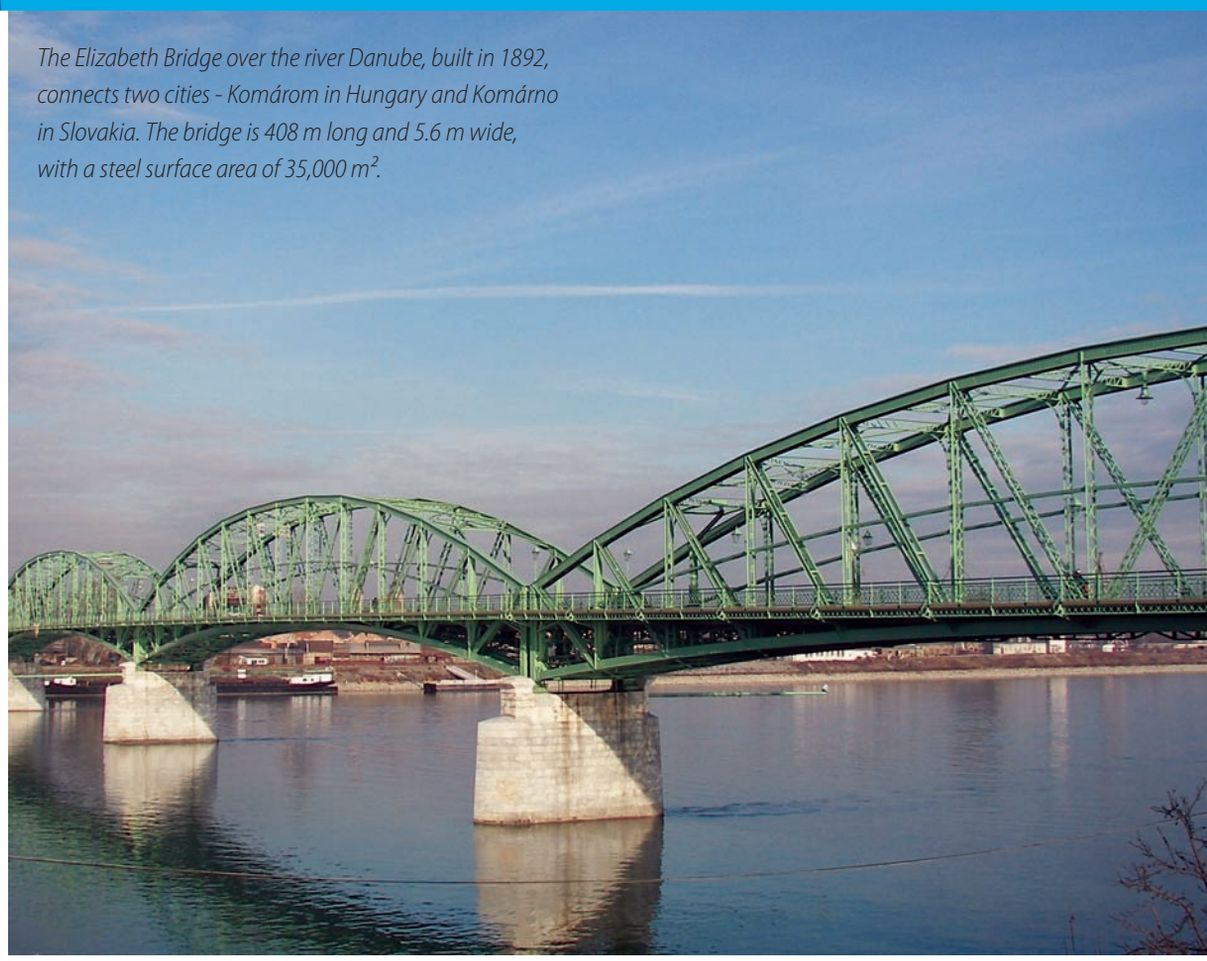
A barrier pigmented **Temabond** epoxy paint functions as a protective shield against moisture and oxygen, preventing their corrosive effect on steel. Furthermore, a layer of interlaced flakes of e.g. micaceous iron oxide or aluminium multiplies the distance across which corrosive molecules must migrate in order to reach the steel surface.



Mastic paints penetrate through rust into steel.



Barrier pigmentation protects steel from moisture and oxygen.



The Elizabeth Bridge over the river Danube, built in 1892, connects two cities - Komárom in Hungary and Komárno in Slovakia. The bridge is 408 m long and 5.6 m wide, with a steel surface area of 35,000 m².

Fewer layers in the future

There is a need for more economical, officially approved coating systems for bridges. In Finland, the three-coat paint system shown here has been approved for both new and maintenance painting fulfilling corrosivity category C5, when a high-level cosmetic appearance is important.

TP95-EPZn(R)EPPUR280/3-FeSa2½

Temazinc 99	60 µm
Temacoat SPA Primer MIO	140 µm
Temathane PC 50	80 µm
Total	280 µm

Since Temacoat SPA Primer MIO epoxy paint and Temathane PC 50 polyurethane topcoat have a high solid content, it is possible to apply these paints in thicker layers and to achieve easily the required film thickness. Their use also significantly reduces levels of volatile organic compounds, as well as saves costs.

Temabond ST 200	1 x 100 µm
Temacoat GPL-S MIO	2 x 80 µm
Temadur 50	1 x 60 µm
Total DFT	320 µm

References

Russia

Grenaderskij bridge, built 1975, maintenance painting 2003-2004

Poland

Bridge, Opole, 2005

Railway bridge, Częstochowa, 2003

Highway bridge, Nowa Sól, 2003

Hungary

Liget Tér Railway Bridge, Budapest, 1998

Millennium Bridge, Budapest, 2005

Györ Pinnyédi bridge, 2006

UK

Fulham Railway Bridge, London,1997/98

Transporter Bridge, Middlesborough,1995

Hammersmith Bridge, London,1995

Sweden

Lidingö Railway Bridge, Stockholm, 1987

Finland

Ylivieska Railway Bridge, Ylivieska

A complete list of references is available from Tikkurila.

Lighthouse, Valassaari, Finland.

Steel constructions

Products and coating systems for new construction and maintenance of steel surfaces are made for conditions that vary from mild to heavy stress. The outstanding performance of these systems has been proven both in laboratories and in practice.

Terminal of public transport, Hradec Kralove, Czech Republic.

Tikkurila supplies materials and systems which comply with ISO 12944, a global corrosion protection standard.
Part 5 of this standard determines protective coating systems for different corrosive environments: C2, C3, C4, C5-I and C5-M.
The standard also determines durability ranges, which affects the time to the first major maintenance round. These ranges are as follows:

- High Durability > 15-year design life
- Medium Durability 5-15 year design life
- Low Durability < 5-year design life.

Tikkurila´s coating systems also comply with Norwegian NORSOK approvals. The requirements underlying the NORSOK standard for protective paint systems are known to be among the most demanding on the market. NORSOK tests are performed in accordance with the ISO 20340 standard.

Shopping center Skanssi, Turku, Finland.

Modern high-solids coatings

Using modern high-solids coatings even as a single-coat system often provide the structure all the protection needed for a long design life. Tikkurila offers a wide range of high-solids products which at the same time have a very low VOC content, thus helping to reduce harmful solvent emissions.

Tikkurila´s high-solids products for steel structures

Alkyd topcoats	Temalac SC-F 20, Temalac SC-F 40, Temalac SC-F 80
Epoxy primer	Temacoat SPA Primer
Epoxy topcoats	Temacoat RM 40, Temacoat SPA 50
Epoxy mastics	Temabond ST 200, Temabond ST 300, Temabond WG 200, Temabond WG 300
Polyurethane paints	Temadur SC 50, Temadur SC 80, Temathane PC 50, Temathane PC 80
Polyurea paints	Temasolid SC 60, Temasolid SC-F 80

Tikkurila´s two-component water-borne paints for steel structures

Epoxy primer	Fontecoat EP Primer
Epoxy topcoat	Fontecoat EP 50
Polyurethane topcoat	Fontedur HB 80

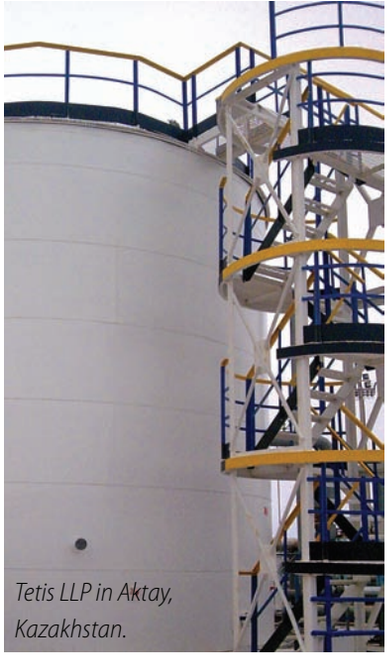
Elstar Oils in Poland.

The water-borne Fonte range

The water-borne Fonte product range has been developed by Tikkurila for the protective coating of industrial products, such as machinery, equipment and steel structures.

The durability and effectiveness of water-borne anticorrosive paint systems has been proven in both accelerated laboratory testing and normal industrial use. Water-borne paints are as resistant to chemical attack as comparable solvent-borne technologies like alkyds, acrylics, polyurethanes and epoxies.
Water-borne Fonte topcoats for exterior use have excellent gloss and colour retention. They withstand natural weathering, temperature changes and UV radiation just as well as comparable solvent-borne products.

Using water-borne Fonte products brings along environmental advantages, as they contain significantly less VOC's than solvent-borne products. Water-borne products in general mean less risk to the workers in the paintshop, as they cause less irritation and other harmful effects to health.



Tetis LLP in Aktay, Kazakhstan.

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Diesel rolling stock, from 2000 onwards
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The main railway station, Helsinki
Meripori windmill park, Pori
Sanomatalo, steel frames, Helsinki
Shopping centre Vuosaari, Helsinki
Stora Enso paper mill, Valmet paper machine, Oulu
Shopping centre Sello, Espoo
Lighthouse, Valassaari

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Norway
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Germany
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Hungary
Lehel market hall
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Uniteam Kft, reservoirs, tanks

Czech Republic
Holiday Inn, Brno
Noise barrier, Hradec Kralove
Kodanska Palace, Prague

UK
Millennium Dome, London

Poland
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Coal mine, Bogatynia
Shaft mining Louise, Historic coal mine, Shaft Louise
Silesia City Center, steel constructions
ZGB, steel structures

Latvia
Belmast SIA, steel constructions for the telecom sector- communication towers and masts

Ukraine
TOV BF-Zavod, steel structures

A complete list of references is available from Tikkurila.

Scandinavium hall in Gothenburg, Sweden.

Anti noise barrier, Hradec Kralove, Czech Republic.

Wide range of colour shades – RAL EFFECT, an attractive tool for designers

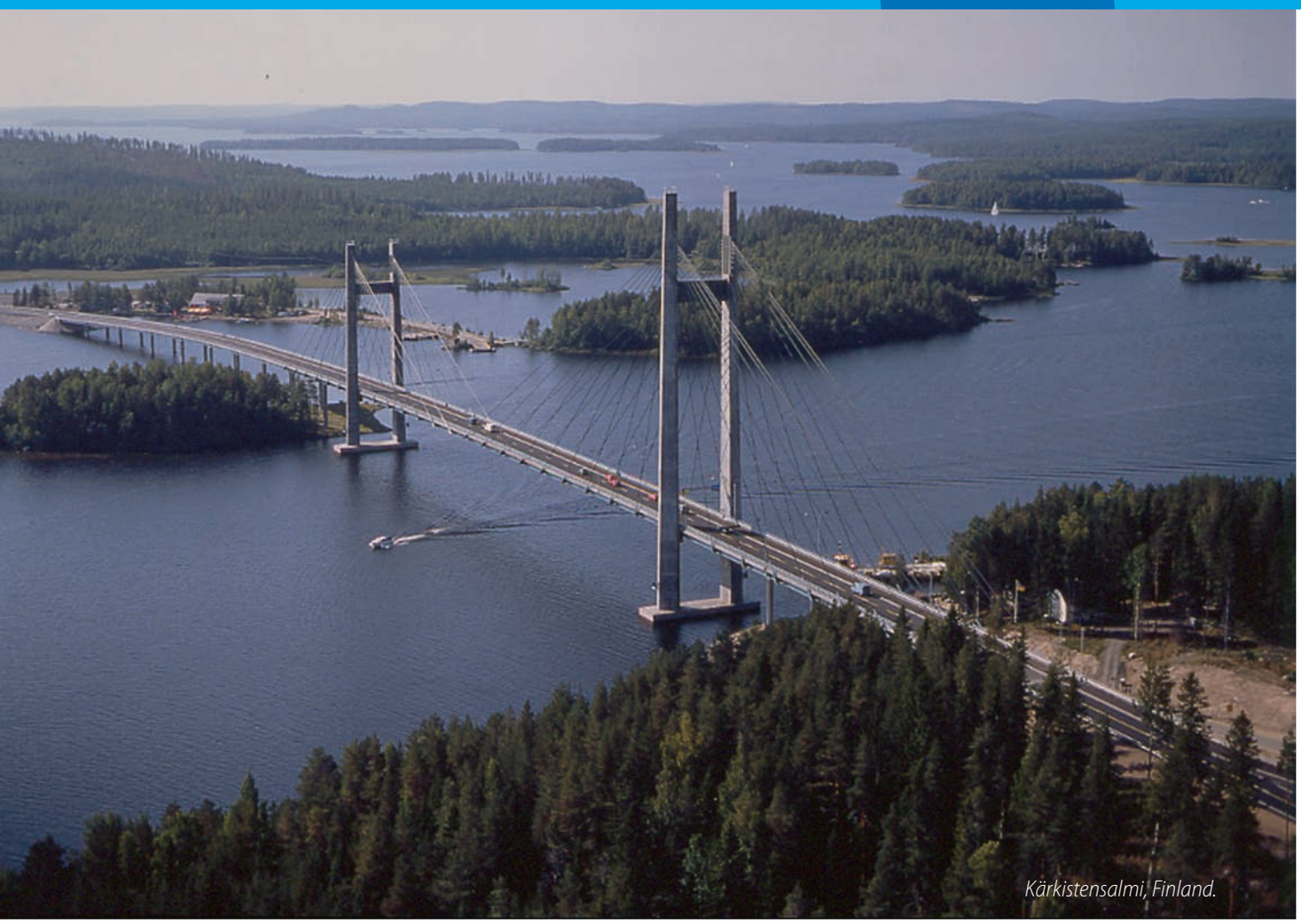
The power of colour is growing in industrial applications such as steel structures, machinery and equipment. Different colour shades can be cost-effectively produced by tinting, including water-borne, high-solids and solvent-based products.

Through Tikkurila`s unique Temaspeed distributor network, a wide range of colours, including RAL EFFECT, RAL Classic, NCS and BS can be easily and quickly produced and delivered to customers.

Tikkurila has chosen RAL EFFECT as its standard for industrial coatings. The RAL EFFECT colour range comprises a harmonious selection of 490 colour shades, of which 70 are metallic colours. This trendy collection, with its metallic colours, provides new ideas and possibilities for colour designers and architects with respect to a wide range of industrial applications. In addition to the colours in the RAL EFFECT collection, Tikkurila and Temaspeed distributors can supply thousands of other colour shades in a variety of products.

RAL EFFECT also includes gloss comparison sheets, for the easy visualisation of different levels of gloss and the effect of glosses on colour shades.

Kodanska Palace, Czech Republic.



Kärkistensalmi, Finland.

Tikkurila Technical Service makes a difference

Our experienced technical service personnel can provide complete back-up services for steel structure and bridge coating projects. Such projects include initial on-site assessment, detailed coating specification advice including pre-treatment and application methods, together with management and supervisory services for particular projects.

TIKKURILA
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