

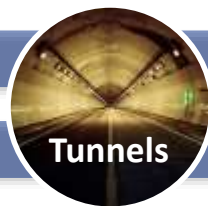
TRAFSYS

Solution created by knowledge and needs

Experiences with security equipment & technologies

- TRAFSYS is a Nordic knowledge company that designs and delivers Intelligent Transportation Systems with special focus on tunnels.
- Bergen (HQ), Oslo and Stockholm
- More than 25 years in the industry with a broad range of products and services
- Delivered equipment and solutions to more than 300 tunnels
- Participates in all phases: design, supply, installation, integration, commissioning and maintenance
- Considerable investments in R&D for next-generation ITS
- 40 employees
- > 80% academic background of which 10 MSC and 4 PhD

Vehicles



Tunnels

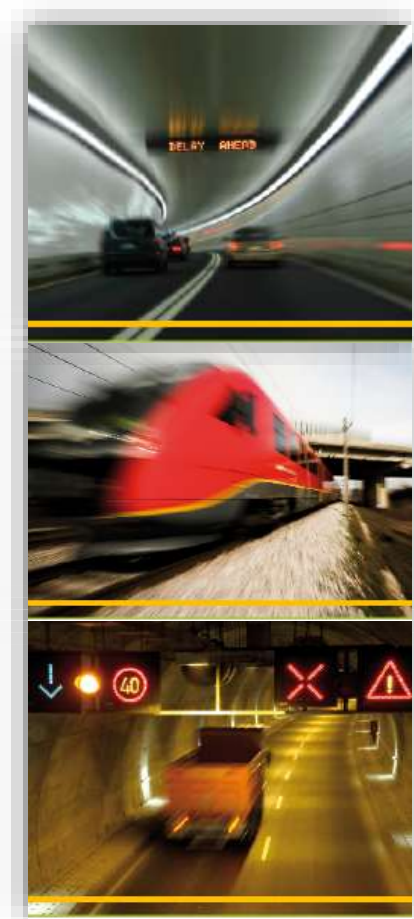


Roads



Bridges

Trains



Some references

Tunnels

	Lenght (km)	Below sea level (m)	SCADA	Control system	Emergency telephones	Radio	ITV	AID (video/radar)	Network/communication
	The Jondal Tunnel	10,4	Prevision	✓	✓	✓			✓
	The Byfjord/Mastrafjord Tunnel	5,9 /4,4	223/133	Prevision	✓	✓	✓	✓	✓
	The Hardanger bro/Vallavik Tunnel	1,4/7/1,7		Prevision	✓	✓	✓		✓
	The Ulricehamn Tunnel (Sweden)	0,4		WinnCC OA	✓	✓	✓	✓	✓
	The Granfoss Tunnel	2,2			✓	✓	✓	✓	✓
	The Knappe/Lyderhorn Tunnel	6,4/1,1		Prevision	✓	✓			✓
The world's longest road tunnel →	The Lærdal Tunnel	24		Prevision	✓	✓	✓		✓
	The Fløyfjell Tunnel	3,8		Prevision	✓		✓		✓
	The Ørgenvik Tunnel	3,7			✓	✓	✓	✓	✓
Norway's longest underwater tunnel →	T Conn.: Karmøy/Husafjell Tunnel	8,9/0,7	139	Prevision	✓	✓	✓	✓	✓
	The Fannefjord Tunnel	2,7	101		✓	✓	✓	✓	✓

Ongoing delivery to Ryfast

- Norway's largest road project

TRAFSYS

- **The Ryfylketunnel:** 2 x 14,4 km, subsea
 - Subsupplier to Roxel
- **The Eiganestunnel:** 2 x 3,7 km
 - Subsupplier to Bravida
- **The Hundvågtunnel:** 2 x 5,5 km, partly subsea
 - Subsupplier to Bravida
- **Trafsys' scope:**
 - Control system (with 550 PLCs)
 - Video surveillance (ITV)
 - Automatic Incident Detection (Eiganes and Hundvågtunnel)
 - Emergencyphones
 - Radio system
 - TRAFVISION Top-system (PREVISION)

The world's longest subsea tunnel!



Source: Municipality of Stavanger

- **Different tunnels, different Challenges**
- **Standardizing of functionality**
- **Robustness and Reliability**
- **Summary**
- **Final**

Different tunnels, different Challenges

- **Norway**
 - > 1100 tunnels
 - > 30 subsea
 - AADT \approx 5000 (average among all)
 - Oslo until 100.000 AADT (Annual average daily traffic)
- **Subsea**
 - Gradient
 - Environment
- **One tube (two way traffic)**
 - Emergency exits
 - Ventilation
 - Maintenance access
- **Multitube (one way traffic)**
 - Traffic management
 - Traffic density

Standardizing of functionality

- **Basis for design of security equipment (Norway)**
 - Guideline N500 Road tunnels
 - Guideline N601 Electrical installation
- **Importance of standardization**
 - Easier to operate (Same kind of tunnels same kind of functionality)
 - Easier to inform users how to behave
 - Cheaper (reuse solution)
 - Reliability (ennoble solution)
- **Today's situation**
 - Different consulting companies, different solutions
 - Different projects, different people, different solutions
 - Different regions, different solutions

Standardizing of functionality

- **Challenge**
 - **Lifetime of tunnels and the continuous development of safety equipment**
 - **How to upgrade existing tunnel**
 - **New and better solution versus user knowledge of existing solution**

Robustness and Reliability

- Life cycle cost
 - Investment
 - Management operation and maintenance
 - Development cost (Net present value of replacement cost)
- Other Consequences
 - Reduced security
 - Capacity reduction and traffic delays
 - increased pollution
- Registration of experience
 - What works and what does not work
 - Data exchange between Plania and Vegvokteren (Region North and West)

Summary

- Standardization
 - Increases the number of installations with same functionality
 - Reduces software bugs
 - cheaper engineering due to reuse of solutions
 - Easier operation
- Higher quality
 - Increases uptime and reduces the negative impact on traffic flow
 - Lower maintenance cost
 - Increases safety

Daniele Gerundino

Director, Research and Education, International Organization for Standardization (ISO)

A common and widely held view, on the contrary, assumes that standards and innovation are at odds with each other. But is this true? An increasing number of people, including of course standardizers, but also researchers, business leaders, entrepreneurs, academics and policy makers, believe that this is a misperception – which may have significant negative implications on innovation management and innovation policy.

I think it is useful to recall that one of the strategic objectives of the last ISO Strategic Plan (2011-2015) is: “ISO standards promote innovation and provide solutions to address global challenges”.

Thank you for your attention

***Meet you at ITS World congress in Copenhagen 17 – 21
September at Stand Number C1-110!***

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