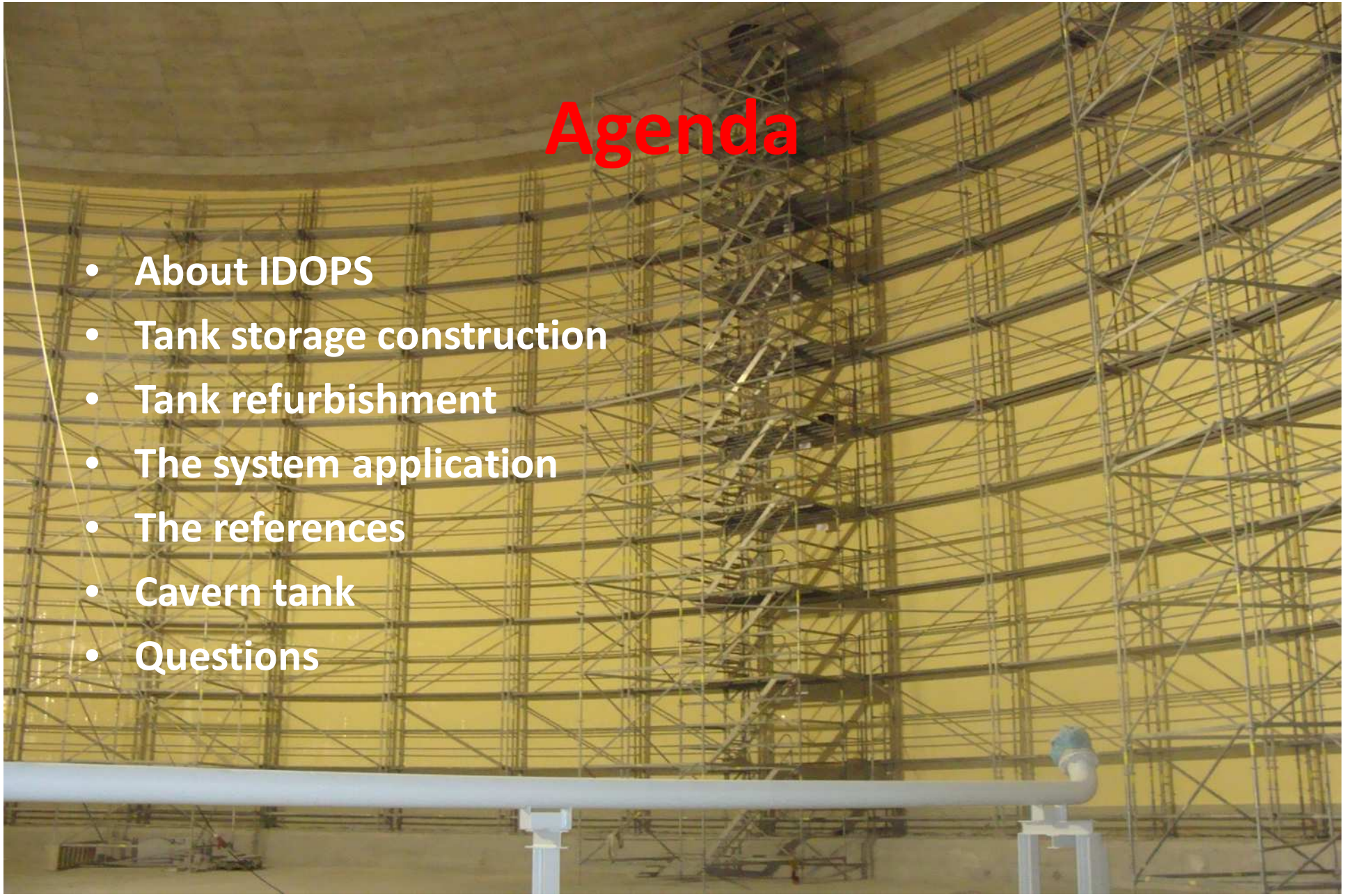
NEW TECHNOLOGIES FOR TANK BUILD AND RECONSTRUCTIONS

IDOPS CZ, s.r.o.
Dipl. Ing. Peter Vodička
Head of Sales and Marketing Department



Agenda

- About IDOPS
- Tank storage construction
- Tank refurbishment
- The system application
- The references
- Cavern tank
- Questions

About IDOPS

Foundation

- The company IDOPS, cooperative (Engineering, Supply and Consultation Services) was founded on 09.05.1990 in Bratislava, Slovak republic with a focus on engineering, investment, development and consultation

Specialization

- Construction, repair and reconstruction of storage tanks for water, chemical and petrochemical products (gasoline, diesel, ethanol, ...)

Strategy

- To offer an optimized complex solution, comprehensive services and high quality products for the customers

Tank storage construction

- **Standards for the Steel or Concrete tanks design**

  Tanks are designed and engineered based on guidelines and standards for the construction, material selection, design and management of storage tanks and related facilities.

- **Common codes & rules for tank engineering and design** (EUROCODE-7, Building and static structural requirements)

  Tanks must withstand product load, roof load, wind load, corrosion impacts or other impacts

Tank storage construction

General requirements:

- **Commonly accepted recommendation -** improved based on experiences from accidents investigations of the tank failures
- Tank leakage prevention (Water law)
- Health & safety requirements
- Hazard prevention [Seveso Directive]
- Fire requirements
- Insurance requirements

Tank storage construction

General requirements:

- Emission controls [IPPC BREF on Storage]
- Several policies(e.g. European Port Policies, etc.)
- Excise & customs matters
- REACH applied for tank storage
- Strategic/ emergency energy stocks
- GHS

There are no global specific tank storage laws - the relevance for the tank storage business is derived from another bodies of the law.

Tank storage construction

New requirements:

- Pollution control (Vapour leakage prevention)
- Energy footprint reduction & CO2 emissions reduction (the last years trend against greenhouse gases)

Tank storage construction

- **Design** of the tanks varies based on **construction material used** (steel or concrete)
- Basement construction (concrete, sand oil mixture basement used e.g. in Holland, etc.)
- Wall construction
- Roof construction
- Technologies

Tanks refurbishment

INVESTIGATION

Preparation for successful tank refurbishment or reconstruction includes:

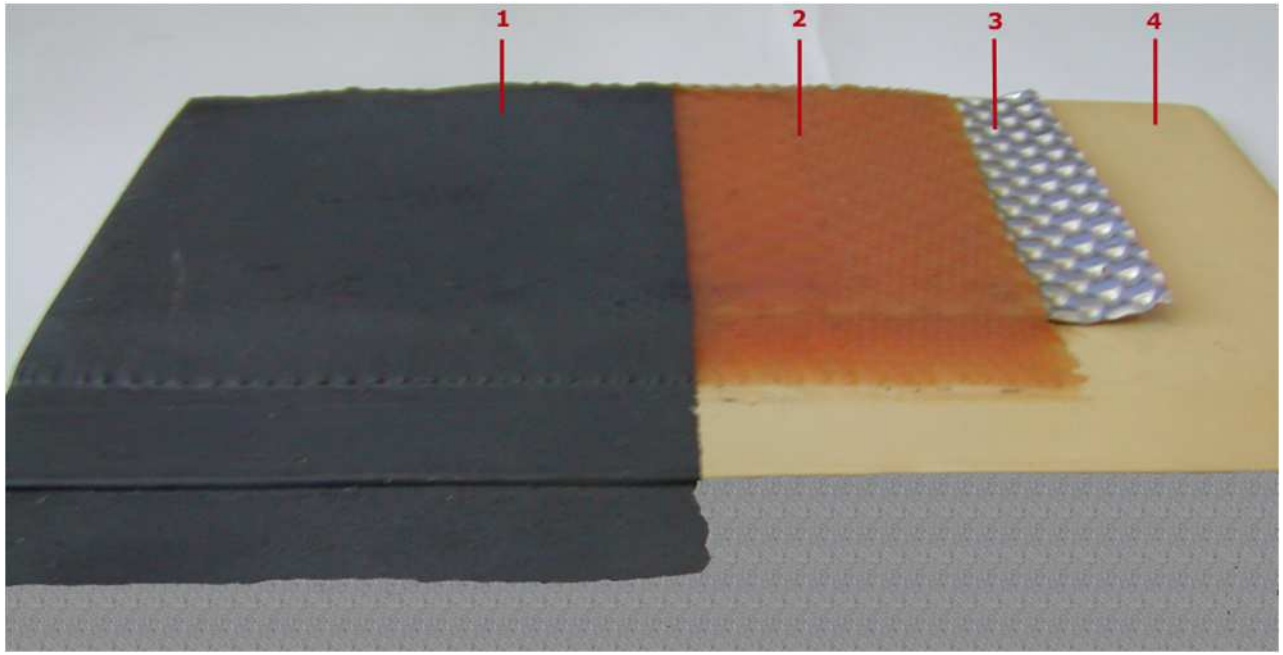
- knowledge about actual codes & rules
- to be familiar with technical & building status and knowledge about the problems of the existing tank(s)
- application of the technical requirements including the new global trends to achieve **acceptable result**

The Technology

DOPA 1 system and DOPA 6N systems

- Patented technology of the Swiss company ADISA.
- Technology to create a **double-walled indication system** on the existing internal tank surface, which in fact acts as a **double wall tank with a leak detection**.
- Between the two gas tight layers of the system is about 1 liter of air on each m2 in the interstitial space. After avaporation of the air – the vacuum is crated around the whole monitored surface. Through to vacuum meassuring it is possible to continuously monitor the vacum presence in the interstitial space – what means the tightness of the system.

The Technology



Top layer (shifts1, 2 and 3)

1 - Conductive Layer

2 – Lamination + covering layer

3 – ALU foil (creates interstitial space)

Bottom layer (shift 4)

4 – Tank bottom

Surface preparation

a) Corrosion protection layer on the steel, or

b) Epoxy mortar covered with lamination on the concrete

The Technology

- Designed for the new, or for damaged concrete and steel tanks
- System can be used to store **oil, gasoline, kerosene, diesel fuel, fuel oil, hazard class** grade I - IV (EN 92 0800:2002), but also the pure **ethanol** (see the remark for hazard classes)
- It is a **composite system** based on epoxy and fiberglass. The material prevents the corrosion of tanks, it is resistant to chemicals and withstands the biofuels
- Guaranteed **lifetime 25 years**, expected lifetime is about 100 years
- Early warning allows to locate the damaged area rapidly and perform a local repair
- **Minimizes maintenance costs (OPEX)** in comparison with classical tanks and reservoirs

The Technology

Remark:

Hazard Class A:

Liquids having a flash point <100 ° C, which because of its solubility in water does not show the properties of liquids included in Class

Hazard Class A I:

Liquids with a flashpoint <21 ° C

Hazard Class A II:

Liquids with a flashpoint of 21 ° C to 55 ° C.

Hazard Class B:

Liquids having a flash point <21 ° C, which at 15 ° C are water solvable or liquid combustible components to a temperature of 15 ° C dissolved in the water.

Flashpoint - the lowest temperature at which the fluid tested by out under certain conditions in a closed vessel formed pairs in such a quantity that is an explosive mixture with air

The Application

The description of the DOPA system application:

- Tank emptying
- Tank cleaning
- Rubbish removal
- Defectoscopy of the surface, surface analysis (in case of the steel tanks) or visual surface analysis (in case of the concrete tanks)

First layer

- Surface treatment (The application of corrosion protection or lamination protection for the steel tank, lamination protection for the concrete tank

Second layer

- Aluminium foil (creating the interstitial space)
- Lamination ADAFLEG BG 450 gr/m2
- Tests and measurements, the first vacuum test
- Applying the final layer, EPOFLEX 2 or EPOFLEX 6N
- The final vacuum test (7 days continual test)
- Protocol about application

The Application

Leak detection method used based on tank built

Tank leakage observation method	Construction material for the tank shell	
	STEEL	CONCRETE
Above ground tanks		
Open top	not used	not used
Floating roof	not used	not used
Fixed roof	not used	not used
Walls	visual check	visual check
Bottom	**detection system**	**detection system**
Below ground tanks		
Open top		not used
Floating roof		not used
Fixed roof		**detection system**
Walls		**detection system**
Bottom		**detection system**

Before

After

Steel tank refurbishment, before and after refurbishment

IDOPS

Your reliable partner

Another type of steel tank refurbishment, filling up to canopy

The Application – new concrete tanks for strategic reserves

- Storage tanks for fuels (diesel, gasoline, bio-fuels), as part of the total storage capacity of 1.8 mil.m3
- The total volume of 140 000 m3 (4x35 000 m3)
- 4 underground doublewall concrete tank with a diameter of 48 m and a height of 22 m
- Rigid roof covered with soil and grass
- Concrete wall thickness 0.6 m
- Application of double-walled compossite lining technology ADISA was completed on 30.05.2011

Built of a new tank, Tank foundation (concrete)

Concrete tank walls

IDOPS

Your reliable partner

Finished concrete tank bodies

IDOPS®

Your reliable partner

Finished tanks with concrete roofs

IDOPS®

Your reliable partner

Scaffolding built and walls preparation

Application of conductive layer on the walls

Application of the Dopa system on the tank bottom

Final check of the tank before filling

The References

The references od IDOPS cooperative with the DOPA 1 system within EUROPE:

IDOPS has realized more than **100.000 m2** of DOPA 1 system.

Tank storage terminals:

- ČEPRO Šlapanov – refurbishment of Tank object 235 and 236, 8 x 9,000 m^3
- ČEPRO Potěhy – refurbishment of Tank object 236, 4 x 9,000 m^3
- ČEPRO Roudnice – refurbishment of Tank object 236, 237 and 238, 6 x 17,500 m^3
- ČEPRO Loukov - new concrete underground storage tanks, 4 x 35.000 m^3, total capacity 140.000 m3, diameter 48m, height 22m

Petrol stations:

- Several cylindrical underground tanks refurbishment on the petrol stations in Austria, Czech republic, France, Slovak republic, Switzerland

Cavern, Underground and Overground tanks

- The DOPA 1 technology could be used also for the refurbishment of cavern tanks or for the building of the new undergroun or overground tanks.
- Company IDOPS cooperative with our partner engineering companies has power, know-how and appropriate application knowledge and experiences to realize any types of the storrage tanks.

Thank You!

IDOPS CZ, s.r.o.

Dipl. Ing. Peter Vodička,
e-mail: vodicka@idops.sk

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Tel: 00421 917 734 792
www.idops.com