

BRIEFLY ABOUT FIBER-REINFORCED POLYMER REINFORCEMENT

Composite Materials constitute an integral part of the modern world. Ease of use, financial benefit and durability provide ever-growing demand in lots of countries all over the world.

Starting from 80's of last century, we can see practical application of Polymer Composite Materials in construction in USA (Potter County Bridge and Bettendorf Bridge) and in Soviet Union.

Moreover, composite reinforcement, due to electroinsulating characteristics, was widely used during the construction of medical facilities (National Institute of Health, Bethesda, USA; Mayo Hospital building, Rochester, USA), Electronics Laboratories, Power Stations and Harbor Facilities.



Composite reinforcement was used for construction of several pilot projects of Highway Bridges in Canada. Here, in the second part of 90's were put into commission 4 Highway Bridges with composite reinforcement applied during the construction (Manitoba Bridge, Saint-François Bridge, etc.).

Currently Canada is holding leading position in application of FRP reinforcement in construction of bridge decking.

Japan was widely using composite materials already in 90's (hospital in Isedzaki City, Guama Prefecture), and in China composite reinforcement is used in the most various segments of construction industry – from road construction to underground works:

- Highway between cities Shijiazhuang and Taiyuan;
- Construction of underground railway between cities Guangzhou and Foshan;
- Underground subway in Fuxing and railway stations in Yishan, Shanghai.

In 2003, London, England, was laid the railway tunnel under the Thames river using tunnel drilling machines. Fiberglass rebar was applied at the construction of the tunnel as it could be easily assembled when drilling machines were passing and did not blunt the daggers, unlike steel reinforcement

In Switzerland, 2009-2010, fiberglass reinforcement was used in casing



runway strip at Zurich airport. Fiberglass provided protection against electromagnetic interference.

According to estimates of the USA Federal Highways Agency, annual losses due to the destruction of concrete structures caused by corrosion of the metal reinforcement constitute up to

\$ 57 billion. These losses can be significantly reduced when composite fiberglass materials are used.



USA have long time ago developed and implemented standards for the application of composite materials in reinforcing concrete structures, construction of bridges and roads:

American Concrete Institution

- **440.1R-06**: Guide for the Design and Construction of Structural Concrete Reinforced with FRP Bars

- **440.5-08**: Specification for

Construction with Fiber-Reinforced Polymer Reinforcing Bars

- **440.6-08**: Specification for Carbon and Glass Fiber-Reinforced Polymer Bar Materials for Concrete Reinforcement

- **440.3R-12**: Guide Test Methods for Fiber-Reinforced Polymer (FRP) Composites for Reinforcing or Strengthening Concrete Masonry Structures

- **440.2R-08**: Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures

- **440.7R-10**: Guide for the Design and Construction of Externally Bonded Fiber-Reinforced Polymer Systems for Strengthening Unreinforced Masonry Structures

American Association of State Highway & Transportation Officials

- **AASHTO GFRP-1**: AASHTO LRFD Bridge Design Guide Specifications for GFRP- Reinforced Concrete Bridge Decks and Traffic Railing

International Organization for Standardization also adopted standards for fiber-reinforced polymer reinforcement and its application in constructions

- **ISO 14484:2013(en)**: Performance guidelines for design of concrete structures using fibre-reinforced polymer (FRP) materials
- **ISO 10406-1:2015(en)**: Fibre-reinforced polymer (FRP) reinforcement of concrete — Test methods — Part 1: FRP bars and grids
- **ISO 25762:2009(en)**: Plastics — Guidance on the assessment of the fire characteristics and fire performance of fibre-reinforced polymer composites

Currently United States and Canada collectively have already built more than 400 bridges with composite reinforcement. About 40% of the composite products are applied in American construction market, Asian countries – about 25%, Europe – 30%.

With a view to the assimilate new technology and implement composite materials in Africa, in 2017 at Pram-Pram region, Republic of Ghana, was launched the first in West Africa factory producing composite rebar – Viva Fiberglass

Reinforcement. The factory is manufacturing the product in accordance with American standards ACI and is open to negotiations with distributors from neighboring countries.

For more information about our product, please visit our website – www.vivafiberglass.com

Our managers will be glad to contact you and discuss the possibilities of further cooperation.

