Reinforced Concrete is a common building material for construction of water tanks in treatment plants. While concrete does have high compressive strength, it has limited tensile strength and requires reinforcing bars to overcome this limitation. Concrete tanks exposed to certain conditions like constant humidity combined with mild temperature and aggressive chemicals, become susceptible to oxidation. As corrosion of the rebar occurs, large volume oxides are created (Fe₃O₄, Fe(OH)₂, Fe(OH)₃ and Fe(OH)₃·3H₂O), generating a tensile load that the concrete cannot sustain. Therefore, concrete eventually cracks and spalls, leading to further deterioration of the steel. The combination of ongoing deterioration and loss of reinforcement properties ultimately requires potentially significant and expensive outlays for repair and maintenance.

**1 History of reinforcement**

Reinforced Concrete is a common building material for construction of water tanks in treatment plants. While concrete does have high compressive strength, it has limited tensile strength and requires reinforcing bars to overcome this limitation. Concrete tanks exposed to certain conditions like constant humidity combined with mild temperature and aggressive chemicals, become susceptible to oxidation. As corrosion of the rebar occurs, large volume oxides are created (Fe₃O₄, Fe(OH)₂, Fe(OH)₃ and Fe(OH)₃·3H₂O), generating a tensile load that the concrete cannot sustain. Therefore, concrete eventually cracks and spalls, leading to further deterioration of the steel. The combination of ongoing deterioration and loss of reinforcement properties ultimately requires potentially significant and expensive outlays for repair and maintenance.

**2 Why Composite Rebar**

Studies on the effectiveness and durability of some rebar protection methods (increased concrete cover, high-performance concrete, cathodic protection, watertight membranes) have shown that they do not solve the corrosion problem. In some cases, it even gets accelerated. (Benmokrane)

**V-ROD** offers many advantages to fully eliminate the corrosion problem. In addition, lab studies and field testing have shown that **V-ROD** could offer a life expectancy of over 100 years in service conditions.

**3 Advantages**

**Corrosion resistance:**

Not affected by corrosion, **V-ROD** is ideal for any type of concrete tank, especially in chlorination tanks. FRP reinforcement can triple the service-life of your structures. The high corrosion resistance of **V-ROD** eliminates the need for costly silica fumes, galvanized or epoxy-coated steel, expensive membranes, cathodic protection and an increased concrete cover.

**Higher tensile strength than steel:**

The **V-ROD** HM FRP reinforcing bar offers a tensile strength almost three (3) times greater than steel. This high tensile strength is fully utilized by the incredible bond strength between the concrete and **V-ROD**.

**Lightweight:**

**V-ROD** is approximately one-quarter the weight of an equivalent size steel bar, thus reducing freight and placement costs.

**Approved material**

**V-ROD** is included in the CAN CSA S806-02, CAN CSA S06-06, AASHTO LRFD and ACI 440 1R-06.
4 Field Applications

Projet : Thetford Mines Water Treatment Plant
THETFORD MINES, QC, CANADA – 2012
Engineering Firm: Roche Groupe-Conseil
General Contractor: Wilfrid Allen Company
Owner: City of Thetford Mines
Area: 620 m² (6,700 ft²)
Qty. of bars: 68,000 linear meters (223,000 linear feet)
Product used: V-ROD HM and Standard [10M (#3), 15M (#5), 20M(#6)]

5 Design and Training

Your steel reinforcement design is already done? Submit it to us and our team of civil engineers will convert it to V-ROD at absolutely no charge and provide an economical evaluation of your project. Also available, custom tailored training in engineering design of concrete structures reinforced with composite materials to fit your needs.
Contact: service@pultrall.com

A WORD ABOUT PULTRALL:
Established in 1987, Pultrall Inc. is the pioneer of non-metallic concrete reinforcement solutions in North America. Pultrall’s achievements include some of the most prestigious projects in North America and around the world. The company serves clients through a network of Authorized Distributors throughout North America, Latin America, Europe, Australia and the Middle East.

AT PULTRALL, WE BELIEVE IN CHALLENGING THE STATUS QUO.
We are convinced that safe and durable concrete structures are achieved by eliminating the corrosion problem at its roots. Our solution, a stronger, well tested, widely used and corrosion proof reinforcement that advantageously replaces the easily corroded steel rebar. Our solution, V-ROD!