KYRIOM GROUP

Facilities Service



www.kyriomgroup.com

PULTRUSION TECHNOLOGY

COMPOSITE MATERIALS FOR TELECOMMUNICATIONS AND AIRPORTS

SOLUTIONS FOR TELECOMMUNICATION

Advanced solutions for industrial applications :

Kyriom Group is a leader in designing, manufacturing and marketing composite solutions for industrial applications.
Kyriom Group has various applications of its products in telecommunications.
Kyriom Group is a partner of the leading providers of the world mobile phone leaders.

We provide the highest quality solutions with the highest global and local production capabilities.

We offer complete support for design and production and the best knowledge of composite and chemical composition and then we develop the winning solutions that offer our customers a leadership position in their business.

In telecommunication applications composites provide perfect solution through features like **weather resistance** (low CME and CTE), **stiffness**, **weight savings** (30-80% lighter than AL) and **good di-electric properties** (low loss tangent). These features allow antenna manufacturers to feel safe and confident that antennas performance is constantly on the level that network operators need.

Our typical products for BSS (Base Station System) Antennas include :

- Pultruded antenna radomes
- Tubes
- Flat profiles and rods



Other telecommunication applications are :

- Conical antennas for military networks, gas pipes and ships
- Radar profiles for ship radars and airport radars
- Service platforms



Strong in telecommunication sector :

Kyriom Group has a know-how in products for RF transparent applications, antennas and solutions for telecom infrastructure

Antennas :



Conical antennas :

• Military networks
• Ships

Radar Profiles :

• Airport Radar
• Ships Radar

Antenna Masts :

• Lattice mast structures for roof top antenna masts
• Telescopic structures

Telecom Platforms :

• Modular structure that is easy to dismantle
• Provides a suitable working height and safe platform for maintenance



provides conical tubes for military antennas

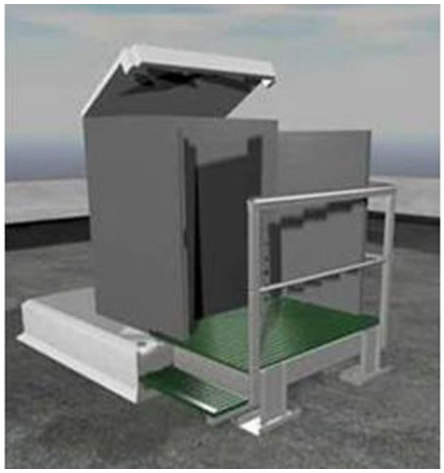
Superior product features with composite materials :

• Excellent electromagnetic properties
• Low thermal sensitivity
• High strength and stiffness
• Low weight
• Good resistance to weathering and U.V. Ray
• Excellent surface quality
• Low maintenance

Continuous manufacturing technologies :

Kyriom Group utilizes continuous manufacturing technologies: pultrusion, pullwinding and co-winding. Pultrusion is based on fibers that are impregnated with a thermosetting resin and pulled through a heated die where curing takes place. Different laminate lay-ups are possible with reinforcements of mats, fabrics and multiaxials. The finished profiles are cut to length by a saw at the end of the line.

Kyriom Group pullwinding process enables the reduction of wall thickness and weight while retaining and improving stiffness and strength.
Each product is carefully optimized according to application and requirements by combining suitable fibres and resin systems and utilizing certain amount of lengthwise and crosswise layers.



platform for safe maintenance

Antenna Radomes and Tubes :

An antenna cover must provide protection of the antenna from the environment, without impairing its ability to operate radio waves. For modern antennas the cover must also carry mechanical loads.

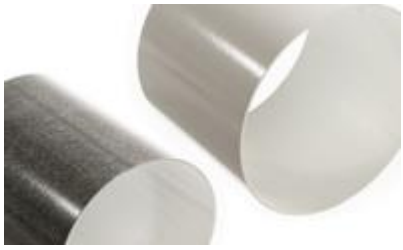
The excellent electromagnetic properties and mechanical strength of glass fibre composites is the perfect choice. Kyriom Group produce antenna profiles and tubes utilizing both pultrusion and pullwinding methods, achieving lightweight, strong and stiff antenna covers.

Applications :



- GSM and UMTS antennas and other new advanced antenna solutions
- Sector and Omni-antennas
- Antenna tubes (cylindric and conical tubes)
- Flat profiles and solid rods for tilt rods
- Machining facilities, e.g. drilling
- Post treatment and marking

Important Properties include :



- Excellent electromagnetic properties
- Low thermal sensitivity
- High strength and stiffness
- Low weight
- Good resistance to weathering and U.V. Ray
- Excellent surface quality
- Low maintenance

Tension Members :

Fibre optic cables contain load sensitive light signaling glass filaments vital for the high speed communication requirements of our modern world.

High strength and high modulus composite tension members provide the essential load protection to these vital signaling elements during the manufacturing, installation and service life of the fibre optic cable.

Typical Diameters :



- 2mm
- 2.5mm
- 2.7mm
- 3.1mm
- 4mm
- 4.5mm

Tension members can be jointed to provide lengths up to 160km or supplied in lengths typically in the range 10km to 26km on single winding drums.

Important Properties :

- Is insulating thus not attracting lightning to the cables
- Is not affected by induced currents when cables are located near power conductors.
- High strength
- High modulus
- Lightweight

- Low coefficient of expansion
- Provides resistance to birds and rodents when FRP profiles are used over the signal elements.

Conduit Rods :



The range of conduit rods are essentially tools designed to assist feeding and installation of electrical cables and telecommunication lines through conduits either underground or at the customer premises. The products vary in diameter and length pending flexibility and length required.

Common rod sizes include :



- 4,5 mm OD @ 80 m suitable on small dispenser
- 6,0 mm OD @ 125 m suitable on midi dispenser
- 8,0 mm OD @ 125-150 m suitable on medium dispenser
- 8,0 mm OD @ 200 m suitable on large dispenser
- 10,0 mm OD @ 150-200 m suitable on large dispenser

AIRPORT SOLUTIONS

Products and Systems :

Kyriom Groups provides many products and solutions for various applications, appreciated for the perfect transparency of electromagnetic signals.



Kyriom Group is supplier of frangible support structures to airports.

The ultra rigid and rigid composite structures of Kyriom Group are the optimal choice for airport security.
Kyriom Group products meet the needs of frangibility, rigidity and low mass in airport structures.

Composite structures ensure airport security :

The airport environment has many needs

Frangibility
Low mass
Rigidity
Transparency to electromagnetic signals
Low maintenance



They are high value features. With more than 15 years of experience at Kyriom Group airports, these requirements can be met with composite structures, poles, grating trees, fencing, and so on.

Maximum safety with minimum mass :

The access lighting trees do not have to resist to the impact of the aircraft that continue its landing or take-off performance. As specified by ICAO, some airport equipment and installations, because of their function, must be in an operational area. ICAO also states that all equipment and installations as well as their media should be minimal and frangibility to ensure that the impact does not lead to a loss of aircraft control.

Frangible Masts and Towers for Approach Lighting:

The Kyriom Group masts can be tested at full scale to verify compatibility with the ICAO's frangibility requirements as specified in Annex 14 Volume I and Aerodrome Design Manual, Part 6, Frangibility.

Upon impact, the tower may fragment into several components.
The mass of these components and their manner of release should not cause a secondary hazard to the aircraft (e.g. enter through the windscreen, fuselage, tail surfaces).

Kyriom Group masts are to be designed to pass the entire test programme according to the requirements of the US Federal Aviation Authority (FAA) AC 150-5345-45C, and they appear on the Certified Equipment and Manufacturers List of the FAA.

ICAO defines furthermore the operational and testing requirements:

- A frangible structure should be designed to withstand the static and operational wind or jet blast loads with a suitable factor of safety
- Brake, distort or yield when subjected to the sudden collision forces of a 3000-kg aircraft airborne and travelling at 140 km/h (75 kt) or moving on the ground at 50 km/h (27 kt).
  ICAO recommends dynamic tests for verification of frangibility of navigational aids having an **overall height in excess of 1.2 m** and located in positions where they are likely to be impacted by an aircraft in flight.

Product range :

- Poles for single lights
- Lattice masts for single and multiple lights
- Extra tall lattice masts up to 35 m
- Standard colours Aviation Yellow, FAA-orange
- Scope of supply is complete from foundation bolts to cable way up to luminaires



Main advantages offered by EMS Group :

- Fully compliant with ICAO and FAA requirements
- Project design support, foundation load calculations, pre-installation instructions
- Straight forward installation, detailed manual included
- U.V. Ray-protected, long service life
- Tiltable from the base or mid height, quick and easy maintenance of luminaires
- Practically maintenance free

Frangible Masts for WDI and Weather Observation :

ADM6 :

- Support structures for wind direction indicators, transmissometers and forward scatter meters should be tested for frangibility in accordance with procedures for approach lighting towers.
  Kyriom Group poles and lattice masts have been full scale impact tested to verify compliance with frangibility ruling.



To support wind cones both types can be applied :

To use pole or lattice type is subject to the size of the cone. Wind cone masts are supplied as complete assemblies with wind cone and obstruction light or as a frangible support only.
Two configurations are available.

- Externally illuminated wind cone
- Internally illuminated wind cone

For anemometers lattice masts are used in most cases:

- Standard height 10 m, supplied as centre or base hinged configuration
- Other heights are available upon request
- Standard colouring scheme is orange/white in seven sections, as specified in Annex 14. Other colouring schemes are available upon request.

ILS Glide Path Tower and Localizer Supports:

ADM6 :

- Structures located within the graded portion of the runway strip not meeting the frangibility requirement, such as an existing non-frangible ILS glide path antenna, should be replaced by a frangible structure, if practicable, and relocated within the non-graded portion of the runway strip.
- Existing structures located within a distance of 300 m from the runway end not meeting the frangibility requirement, such as an existing non-frangible ILS localizer antenna array, should be replaced by a frangible structure or relocated beyond a distance of 300 m from the runway end.

Composite GP-Tower:

Kyriom Group GP-tower follows the same lattice structure concept as the approach masts, but is made to cope with the demanding requirements of extremely high rigidity and frangibility. The tower is made of 5 m tall sections, with total height of 10 or 15 metres.

GP-Tower delivery includes

- Anchor bolts and casting template
- Sub-assemblies for on site assembly of tower sections
- Antenna brackets that allow adjustment of antennas both vertically and horizontally
- Cable conduits
- Ladder and safety rail
- Obstruction light



Frangible Localizer Supports:

Kyriom Group poles and lattice masts can be applied to support localizer antennas, subject to the height and the size of the antennas.

Delivery of Kyriom Group Supports includes:

- Calculation of stability (upon request)
- Calculation of foundation loads (upon request)
- Anchor bolts and templates
- Adapter flange for the antenna
- Height adjustment for the antenna that eliminates small deviations of the foundations
- Cover tube for cabling

Airport Fencing:

Annex 14 describes the intended function of airport fencing is to prevent entrance of unauthorized persons:

- Onto non-public areas of the aerodrome
- Into ground installations and facilities that are essential for the safety of civil aviation and are located outside of the aerodrome.

Fencing should also be provided to prevent the entrance into the movement area by animals large enough to be a hazard to aircraft.



ADM6 stipulates that:

- A lightweight frangible fence should be installed when located between frangible approach lighting towers or when located to protect the ILS critical and sensitive areas against unlawful interference.

Frangible fencing:

- Available for airport perimeter or individual ground installations
- Transparent to electro-magnetic signals
- Does not interfere with ILS or MLS systems
- Available in standard heights of 2,0 m or 2,5 m, with different spacing and coloring.
- Difficult to climb due to absence of cross bars in the panels and the sharp
- Saw-toothed top
- Designed and tested to withstand jet blasts
- UV-resistant and non-corrodible



REASONS FOR COMPOSITE MATERIALS

Composites, known also as fiber-reinforced plastics (FRP), are defined as materials which are a combination of reinforcements and matrix. Neither of these are well suited for construction purposes on their own , but when combined result in a very strong and rigid material.
Composites can be divided roughly into two groups: **synthetic materials reinforced with short fibers**, and **synthetic materials reinforced with long (continual) fibers**. In fiber reinforced plastic materials, the properties of the fibers are used to resist tensile and compressive loads, while the plastic – the matrix material – transfers shear.

Flexibility in design:

Composites offer many good qualities that cannot be gained with other materials.
The flexibility in design and the unique material properties give designers, engineers and architects totally new kind of possibilities to bring their ideas alive.

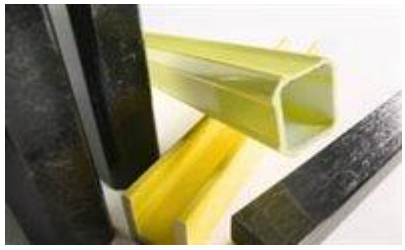
When using composite materials instead of traditional materials such as steel, for example, there are normally significant reductions in weight due, in part, to the specific properties of the individual components and low dead weight and partly because it is possible to produce composites for specific purposes.

Advantages with composites:

Because it is a combination of materials, a composite product can be combined and designed with a view to specific load-bearing capacities, while providing a number of advantages in relation to traditional materials, such as:

- resistance to chemicals
- electrical insulating properties
- thermal insulating properties
- high strength-to-weight ratio
- high fatigue resistance
- high impact strength





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