

# One stop supply chain for Wind Turbines



# What we can do for you . . .

We can share with you more than 30 years of experience in the wind industry and supply you locally with solid customer solutions for all tower builders, turbine manufacturers, nacelle providers and windpark maintenance.

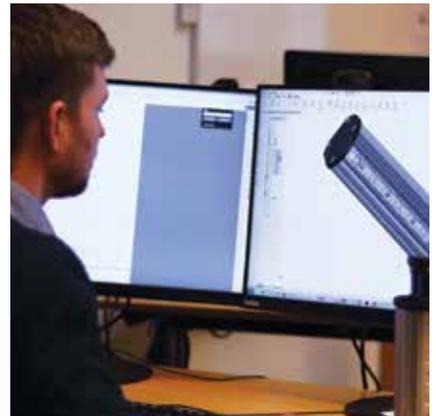
Customer Spec. and Technology Capability



Global Sourcing and Project Management



R & D - VA/VE



Products for your Production



Quality Control in entire value chain



Just in time Delivery and Total Cost of Ownership (TCO)



“ Our first responsibility is to our customers with whom we want to build a long term sustainable relationship by providing products and services that meet or exceed their expectations. Whilst striving to do so, we will follow our customers around the world so we may assist, support and supply them global and local according to international norms and specifications.

# Tower Internals

We design and manufactures tower internals and light kits for wind turbines worldwide. We supply you with easy to use complete solutions, fit to your needs and incorporating unique technical features, competitive pricing and just in-time delivery.

## Platform



- Platforms in aluminum, steel & wood

## Brackets



- All kinds of brackets

## Hoist and Elevator



- Hoist · Elevator · Climb assist

## Electrical Cabinet



- Junction box
- Enclosures
- Control Cabinet

## Internal Parts



- Fasteners · Cable ties · Lugs
- Rubbers · Adhesives
- Plugs and receptacles
- Junction box
- Ladders · Cable Trays
- Conduits · Brackets

## VMI Kit Set, Kanban and Vending Machines



On POU locations for Nacelle, Tower and Blade Productions

- Production Kits
- Repair Kits
- Installation Kits
- Field Support Kits
- Electrical Kits
- Customizable Kits

# Kits for Tower, Nacelle and Blades

We custom design kit sets with focus on high quality, emphasis on technical properties and competitive pricing. Our goal is to always create the best possible solution for our customers. We are driven by challenges.

## B & C Class parts and Fasteners



- ISO and DIN fasteners, Inch fasteners, Hardwares
- Standard and customer specific brackets
- Metal parts built to specs
- Catalogue parts

## Plug and Play



- Reduced installation time
- Complete system tested before delivery
- Easy and simple installation

## Control Box and Cabling



- Test of emergency function
- Service receptacles
- Connectors · Junction Box · Through wiring

## Outlets and Receptacles



- Compliance to International Standards
- Service receptacles
- Plugs and sockets for portable appliances

## Blade Protection



- Lightning Protection Systems, Receptors
- Tarps

## Blade Hardware



- Blade bolts M+65
- Barrel nuts, Threaded inserts

# Lights for Tower and Nacelle

Resolux being a manufacturer technical lighting, we have a solid know-how, experience, the products, the facilities and last but not least the staff with essential expertise for developing and producing specific customer solutions.

## LED Kit Set



- Very high lumen output
- Cost efficient solution · Excellent color rendering

## Emergency and UPS



- 60 or 90 minutes emergency back-up light
- Designed specifically for Wind Turbines
- Conform to EN 50308 (Wind turbines - Design, operation and maintenance)

## Heat Element



- Cold climate operation. Down to -40°C
- Build in thermostat
- Full lumen output at low ambient temperature

## Power Connection and Cable harness



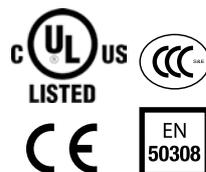
- Build-in terminal block
- Connecting Box
- Plug and Play Connectors

## Quality & Environment



Comply to :  
CE, UL, CSA, CCC  
standards

100% tested, safety  
and function



ISO9001:2015 certified  
Quality Management System

ISO14001:2015 certified  
Environmental Management



# Cables and Cable Management

Wherever, whatever your demands and challenges may be, we will meet with you locally and solve your task in a timely and flexible manner.

## Power Cables



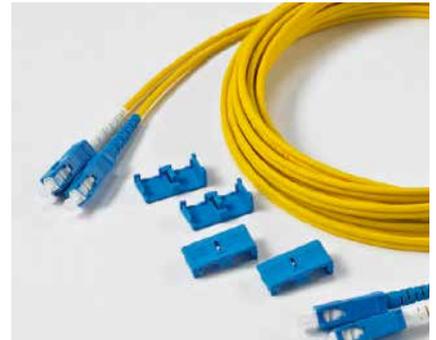
- Compliance to international Cable Standards and Special purpose
- Shielded or non-shielded
- Cut to length

## Control Cables



- Tray cables
- Flexible cables
- Unarmored/Armored
- Low smoke, Halogen free

## Optical Communication



- Data cables, Fiber optic cables,
- Cat5, Cat5e, Cat6, Cat6a, Cat7 application cables

## Conduits and Trays



## Cable and wire protection

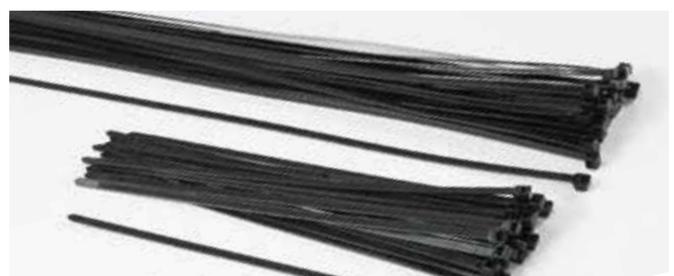


## Termination



- Cut to length
- Customer specific termination
- Customer specific marking

## Cable Ties



# Mechanical Parts

We think in terms of whole and complete solutions and we are constantly trying to develop methods which will save time and money for our customers.

Steel, Aluminum & Wooden Platforms



Mechanical Tower Internals (MTI)



Tower Access Staircases



Ladders



Cable Trays



Fasteners and Various Hardware



Gasket, Seals, O-rings etc



Oil, Lubrication, Filters and cooling liquids



# In-House Design and Manufacturing

A leader in production of high-quality precision components with dedication to quality, timely delivery, competitive pricing, and outstanding customer service.

## Machining and Fabrication



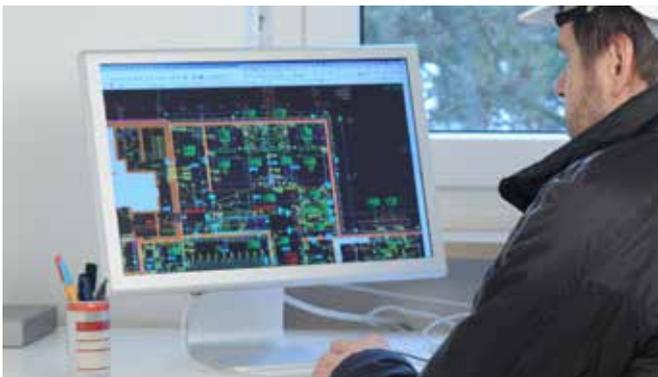
- Laser Processing of Steel and Aluminum, Plasma Cutting to 3M x 8M and 80mm Thickness (Steel, 25mm SS)
- Forming of materials up to 30mm thickness and 3.5M in length. (500T Cap)
- Machining to 800mm x 1100mm x 2000mm Milling.
- Turning to 1200mm Diameter
- Weldments to 15 tons and to 50mm sections

## Factories



- App. 200K sq ft. factories over 2 30+ acre campuses in USA
- 30T lifting capacity, 12 Crane hooks, 6m clear of hook
- Non-Destructive Testing  
UT / MT / PT in-house. Level II on staff
- Blasting / Paint / Powder Coat to NACE Standards
- NIST traceable Proof Loads and Certifications
- Fully-owned fleet of heavy haul trucks and trailers

## Design



- Full scale engineering of components and sub-assemblies
- Optimize product design to reduce logistic costs
- APQP4Wind quality system
- Introduction of sustainable raw material (ex. Woods vs. Metals)

# Value added Services & Repair capabilities

We offer Value Add and Value Engineering Services. Line Walk's identify cost saving opportunities, potential alternate solutions and provide needed application and customers CTQ details to support LEAN manufacturing. Rework, Repair, Refurbishment offered for entire Life Cycle.

## Value Added Services



- Rework, Repair and Refurbishment Services of class A components including Gearboxes, Hubs, and Bedplates
- Stocking Warehouse and Logistics
- JIT and Complex Assembly Capability
- Vendor Managed Inventory
- Value Engineering and NPI Components

## Assembly , Harness & Kitting



- Wire cutting: cut to length with tom labeling
- In-house integration of electromechanical assemblies
- C4/C5 environmental requirements
- Kit sets, Wire harness and cable assemblies
- Customized Cable Trays and Ladders
- Export compliant Customer packaging

## Inspection



- Yaw and Pitch Bearing inspection
- Weld Inspection – NDT Level 3

## Repair



- Casting repair: Hubs & Towers
- Painting to full restoration

## Quality



- QMS (ISO 9001, ISO14001, AS9100D)
- Supplier Audit & Qualification incl. APQ4Wind/PPAP
- Customer Quality incl. smooth NCR handling with 8D
- Non-Destructive Lab Testing and Inspection Plans
- UT/MT/PT in-house. Level II on staff

## Calibration



- Blade lifting devices
- NIST traceable Proof Loads and Certifications
- Inspection plans & Document management

# Field Services Support

We can manage your parts and logistical parts services, aiming to support your installation, preventive and corrective service and maintenance in its entire Life Cycle.



## Material Shipped Direct (MSD)

- Tower Entry Stairs
- Tower Flange Bolts
- Windvane Assemblies
- FAA Lighting
- Down Tower Assembly (DTA) Platforms
- Site Container for Commissioning
- Hoists / Winches
- Blade Mounting Hardware
- Spare Parts



## Field Upgrades & Overhauls

- Gearbox replacement kits
- Tension Measurement devices
- Bolt extenders
- Blade stiffeners
- Power Cable kits
- Parts Recycling with Lifetime
- Management and Cost Reduction

## EHS & Safety Equipment

- Arch flash protection equipment
- Spill containment
- Tower rescue devices
- Fall protection harnesses
- Warning Labels



## Tools & MRO Supplies

- Hand Tools
- Torque wrenches
- Extension cords
- Wrench sets
- Cleaning supplies



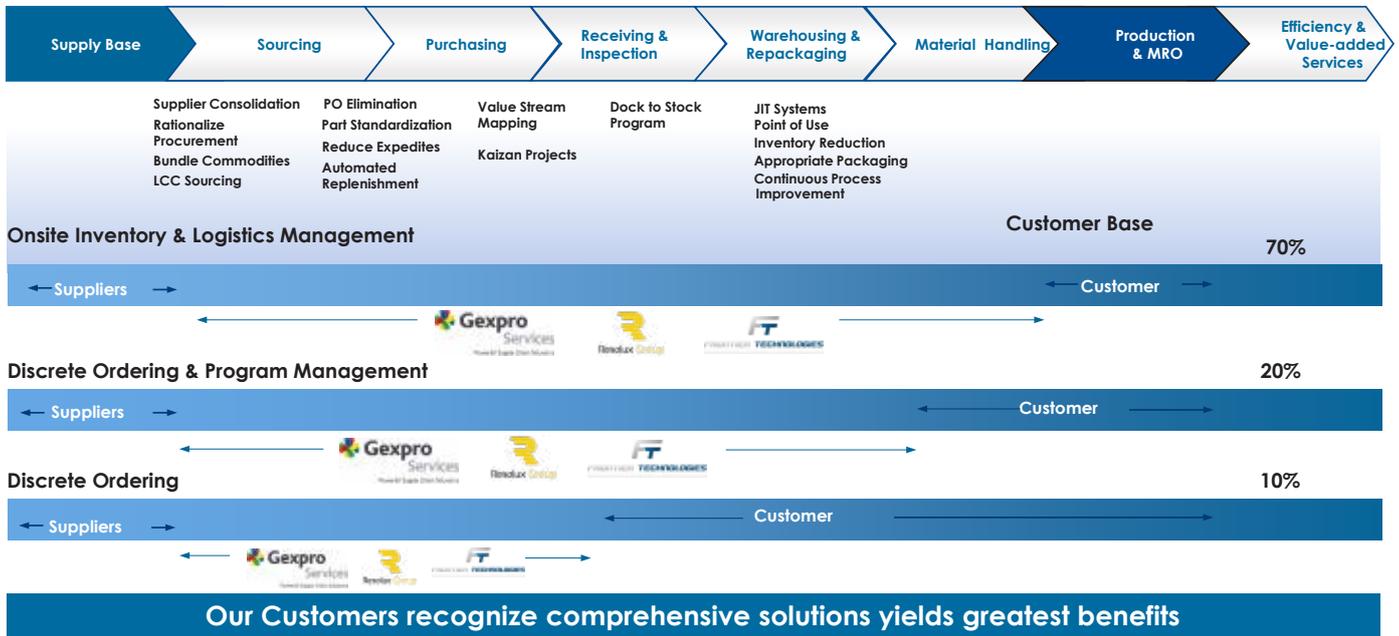
## Why partner with us ?

- Scope of Supply
- Global Footprint
- Supply Chain Management
- Quality Control
- Onsite Material Inspection
- Management Logistics A to Z
- In-house Engineering and Manufacturing
- Sustainable long term Partnership



# Supply Chain Programs

A toll gate Implementation Methodology with a proven track record help streamline your business, making you more productive and competitive in your marketplace.



## Total Cost of Ownership (TCO) Reduction

Our dedication to TCO reduction and customer success in the entire Value Chain, will bring you reduced stock-outs and reduced cost, getting what you need, when and where you need it.

### Cost Savings Opportunities

Labor Productivity	Transactional Productivity & Indirect Expenses	Trade Working Capital
<ul style="list-style-type: none"> <li>Receiving</li> <li>Material</li> <li>Stockroom</li> <li>Packaging</li> <li>Operating schedule</li> </ul>	<ul style="list-style-type: none"> <li>Sourcing &amp; Inventory planning</li> <li>PO management</li> <li>3-way match</li> <li>Finance</li> <li>Transportation</li> <li>Premium freight</li> </ul>	<ul style="list-style-type: none"> <li>ILM-consignment</li> <li>Summary billing</li> <li>Inventory optimization</li> <li>Bins &amp; turns analysis</li> </ul>
Global Sourcing & Value Engineering	Supplier Rationalization	Deflation Management & Business Partnership
<ul style="list-style-type: none"> <li>Best cost sourcing</li> <li>Bill of Material simplification</li> <li>Part &amp; process standardization</li> <li>NPI design &amp; support</li> <li>Line walks</li> <li>Product tear down</li> </ul>	<ul style="list-style-type: none"> <li>Supplier consolidation</li> <li>Kitting</li> <li>Sub-assemblies</li> </ul>	<ul style="list-style-type: none"> <li>Direct material productivity</li> <li>Joint strategic cost saving initiatives</li> <li>Business partnership</li> <li>Long-term agreements</li> <li>Volume rebates</li> </ul>
	Cost of Quality	
	<ul style="list-style-type: none"> <li>Quality inspection</li> <li>Supplier surveillance</li> <li>Product testing</li> </ul>	

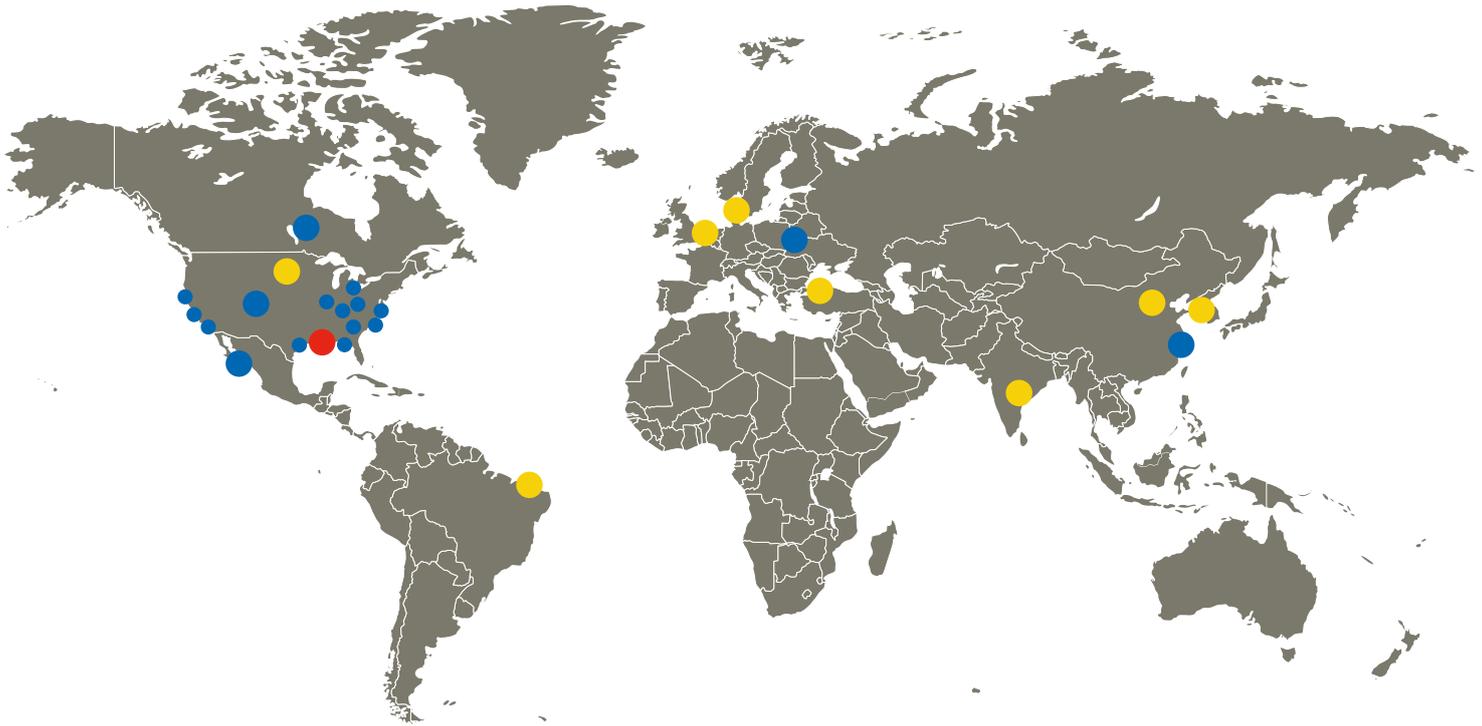
### Manufacturing Uptime Opportunities

Program Management	Lean Principles
<ul style="list-style-type: none"> <li>SKU management</li> <li>Reporting</li> <li>Scorecards</li> <li>Supplier portal</li> </ul>	<ul style="list-style-type: none"> <li>Facility space</li> <li>Cycle / lead time</li> <li>POU / material flow</li> <li>Process productivity</li> </ul>
Integrated Technology	
<ul style="list-style-type: none"> <li>Barcode scanning system</li> <li>Warehouse management system</li> <li>QCinspection system</li> <li>Smart bins</li> <li>Big data analytics</li> <li>Electronic data interchange</li> <li>Vending Machines</li> </ul>	

**Our Value Proposition for Customers Extend Beyond Material Cost Savings**

# We supply Globally - Locally

Pursuing our efforts of worldwide representation, being close to customers wherever they may be.



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We work for the major tower builders: GRI, CS Wind, Trinity, Marmen, Ten, Kenertec, Win & P, Ambau, Titan etc



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