

SINBON Wind Energy Cable Solutions

Design, Manufacturing, Sourcing Solutions

SINBON

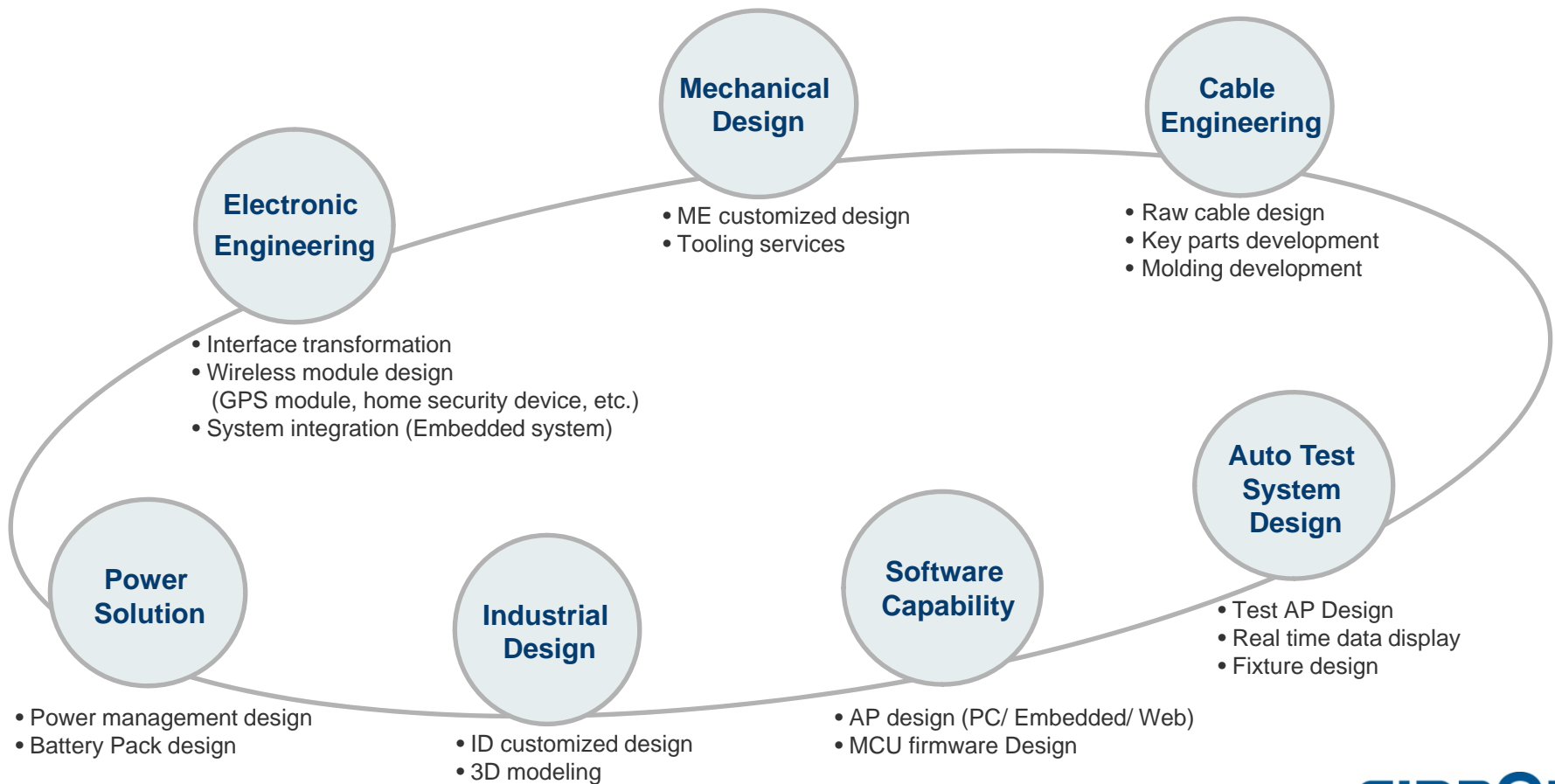
Synergy · Innovation · Quality

About SINBON



Engineering Services

SINBON delivers client-customized electronic engineering, mechanical engineering, industrial design, firmware design and software design and manufacturing solutions.



Wind Energy Experience





- SINBON has been providing client-customized Wind Energy cable assemblies, harnesses and connectors since 2002. We have extensive experience in cable product manufacturing and raw material sourcing.
- Our raw cable and connector experience has helped us establish strategic supplier relationships to guarantee reliable quality and competitive price.
- Our material localization and standardization allows us to deliver cable assembly services to wind energy customers based on their individual needs.



Cables used in ...



Control Signal & Data Cable

Nominal Voltage: 600V~1000V

Requirement: -40°C~+90°C

Fire resistance CSA FT4,
Low smoke, halogen-free,
Oil-resistance II,

Certification: UL758 & CSA 22.2, 230, IEC60502-1



Power Cable

Nominal Voltage: 600V~2,000V

Requirement: -50°C~+180°C, whilst SC Temp. 180°C/260°C,

Fire resistance CSA FT4,
Low smoke, halogen-free,
Oil-resistance II,

Ultraviolet- ray resistance,

O3 resistance IEC60811-2-1

Certification: UL758 & CSA 22.2, 230, IEC60502-1





Pitch Control System

Two types of cables assembled with different connectors are used in pitch control system.

600 volts signal & data cable

- Requirement: -40°C~+90°C
- Fire resistance UL VW-1, CSA FT4,
- Low smoke, halogen-free,
- Certification: UL758 & CSA 22.2, 230, CE

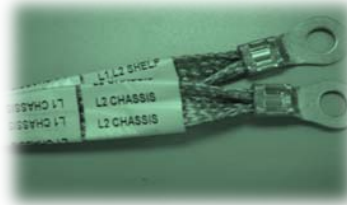
1,000 volts power cable

- Requirement: -50°C~+180°C, whilst SC Temp.+180°C ,
- Fire resistance UL VW-1 CSA FT4,
- Low smoke, halogen-free,
- Oil resistance II, O3 resistance IEC60811-2-1
- Certification: UL758 & CSA 22.2, 230 CE

SINBON has extensive experience in cable product manufacturing and raw material sourcing.

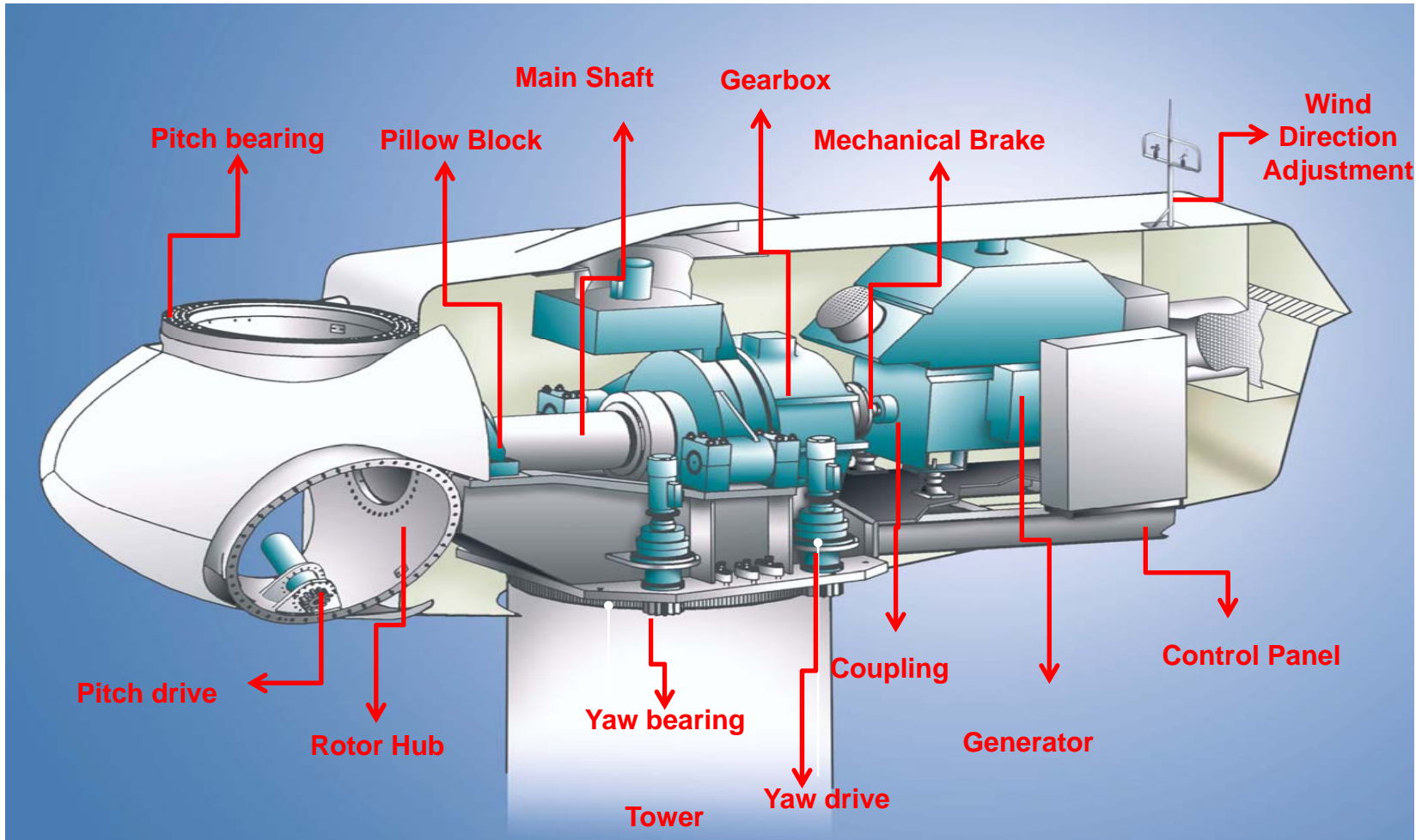


Sample Pitch Control System Cables



⚙️ Nacelle Control System

Nacelle Control System





Nacelle Control System

SINBON's customized cables include those for the top box control system, gear box control system, monitoring control system, lightning protection system, rotor revolution control system, and wind direction adjustment system.

SINBON is currently providing cable assembly service into Nacelle control system including: **Top Box inside cable, cables connecting from Top Box to Gear Box and Generator.**

SINBON has been providing Wind Energy cable assembly service since 2002. We have abundant experience in the cable product manufacturing and raw material sourcing.



Nacelle Control System

SINBON designs and manufactures Nacelle control signal and data cables with different connectors to accommodate different Nacelle systems to transfer different operating signals.

600 volts signal & data cable

Requirement: $-40^{\circ}\text{C}\sim+90^{\circ}\text{C}$

Fire resistance CSA FT4,

Low smoke, halogen-free, Oil resistance II,

Certification: UL758 & CSA 22.2, 230, IEC60502-1

600/1,000 volts power cable

Requirement: $-40^{\circ}\text{C}\sim+90^{\circ}\text{C}$, whilst short circuit $+180^{\circ}\text{C}$,

Fire resistance UL VW-1 CSA FT4,

Low smoke, halogen-free,

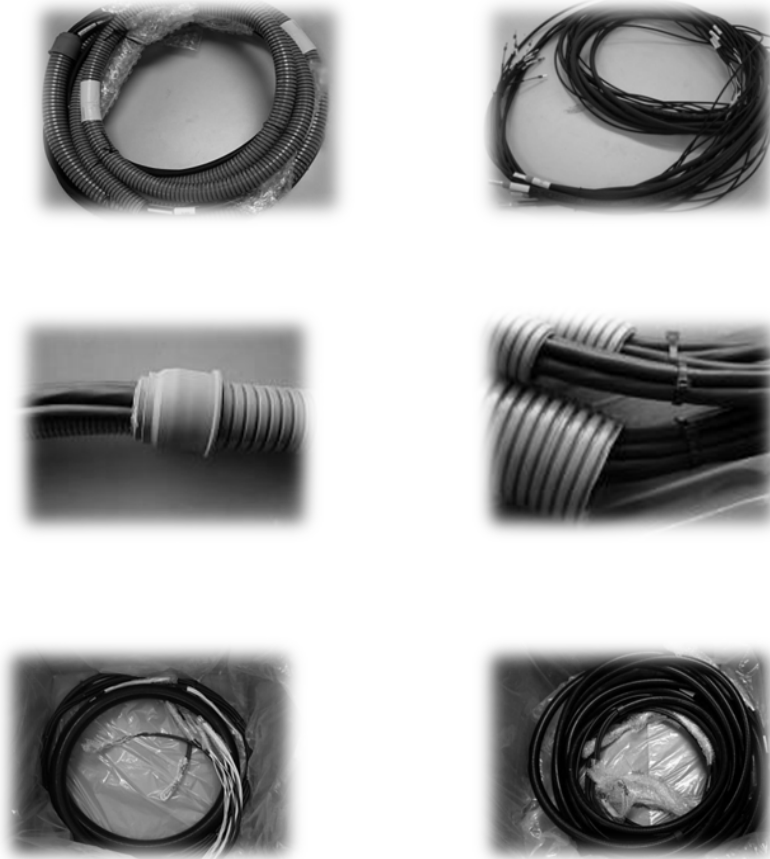
Oil resistance II, ultraviolet-ray resistance

O3 resistance IEC60811-2-1

Certification: UL758 & CSA 22.2, 230, IEC60502-1



Sample Nacelle Control System Cables





Tower Control System





Tower Control System

- The Tower is where power cables are largely used
- This often hostile environment requires cables that are sophisticated enough to maximize energy capture and reduce loads and rugged enough to control motion and operation and withstand in-the-field punishment.

600/1,000 volts torsion power cable

Requirement: -50°C ~ $+180^{\circ}\text{C}$, whilst short circuit $+260^{\circ}\text{C}$,

Fire resistance CSA FT4,

Low smoke, halogen-free,

Oil resistance II, O3 resistance IEC60811-2-1

Ultraviolet-ray resistance

Bending Radius: 4 rounds left to right and vice versa. when fixed laid

3 rounds when moving laid

Certification: UL758 & CSA 22.2, 230, IEC60502-1, CE



Tower Control System

750/1,200 volts power cable

Requirement: -50°C ~ $+180^{\circ}\text{C}$, whilst short circuit $+260^{\circ}\text{C}$,

Fire resistance CSA FT4,

Low smoke, halogen-free,

Oil resistance II, O3 resistance IEC60811-2-1

Ultraviolet-ray resistance

Bending Radius: 4 rounds left to right and vice versa. when fixed laid

3 rounds when moving

Certification: UL758 & CSA 22.2, 230, IEC60502-1, CE



Down Tower Control System

The turbine foundation is where DC is converted into AC, and the AC is transferred to the grid.

SINBON builds customized signal and data cables with different connectors for inside converters, converter connections from the Converter to LVMD (low voltage main distribution), and Generator connections.

600 volts signal & data cable

Requirement: $-40^{\circ}\text{C}\sim+90^{\circ}\text{C}$

Fire resistance CSA FT4,

Low smoke, halogen-free, Oil resistance II,

Certification: UL758 & CSA 22.2, 230, IEC60502-1, CE



Down Tower Control System

Torsion power cable is used to connect from the tower to the converter.

600/1,000 volts torsion power cable

Requirement: $-50^{\circ}\text{C}\sim+180^{\circ}\text{C}$, whilst short circuit $+260^{\circ}\text{C}$,

Fire resistance CSA FT4,

Low smoke, halogen-free,

Oil resistance II, O3 resistance IEC60811-2-1

Ultraviolet-ray resistance

Bending Radius: 4 rounds left to right and vice versa. when fixed laid

3 rounds when moving

Certification: UL758 & CSA 22.2, 230, IEC60502-1, CE

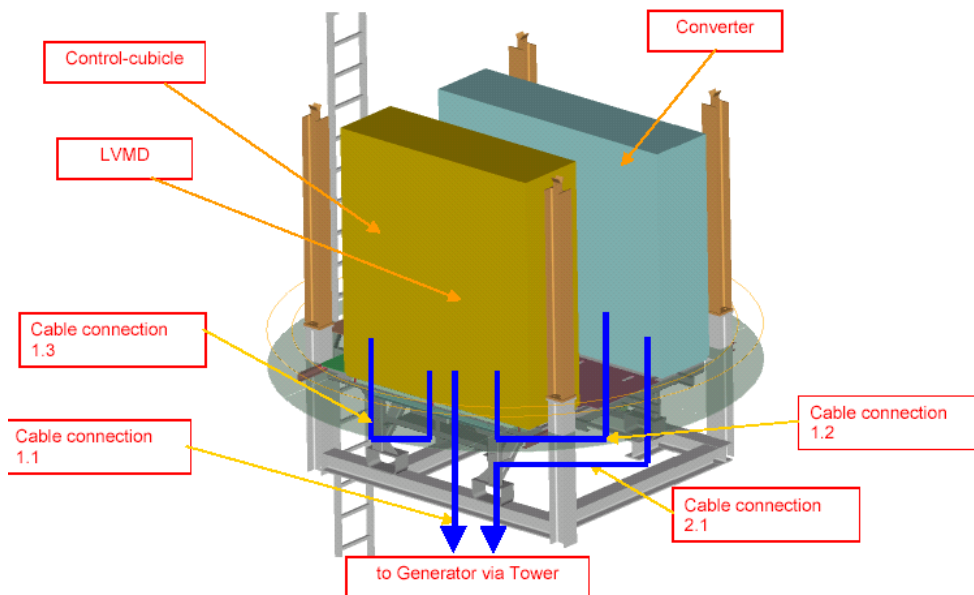


Down Tower Control System

Solution for 1.5MW Wind Turbine Converter

Solution for Converter, LVMD* connection and Generator connection

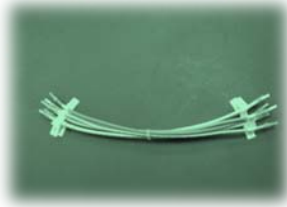
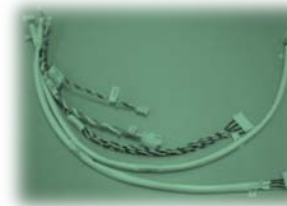
(Shown as the blue arrows below)



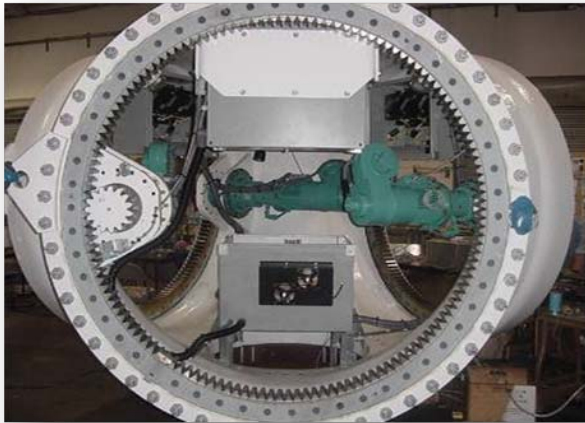
*Notes: LVMD=Low Voltage Main Distribution



Sample DTA Control System Cables



Pitch Control System Cable Harnesses



2009/5/21

Nacelle Cable Harnesses



2009/5/21

Nacelle Cable Harnesses



2009/5/21

Converter Cable Harnesses



Converter Cable Harnesses



2009/5/21

Quality Certifications





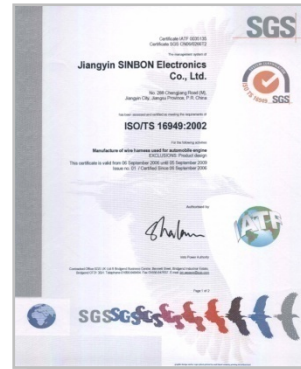
Quality Certifications



ISO 9001



ISO 13485



TS 16949



UN Global Compact

Green Partner Certificates



Samsung Eco- Partner



Sony Green Partner



Certifications



Location	Certification	File No.	Certified Date
Taiwan SINBON	UL	E131102	1999.08.27
	ISO 9001	A8794	2001.07.12
	ISO 14001	A10945	2002.02.06
	Green Partner-ASUS	C-GA4-P5033	2007.7.14
	IECQ	T1053	2001.07.12
Beijing SINBON	UL	E131102	2001.05.18
	ISO 9001	CN99/16161	1999.05.26
	ISO 14001	GB03/60589	2003.12.10
	ISO 13485	GB06/69882	2006.09.29
Jiangyin SINBON	UL	E226144	2004.01.19
	ISO 9001	0106Q120741RK/3200	2006.04.14
	ISO 14001	0105E10116ROM/3200	2005.03.31
	ISO 13485	GB06/68113	2006.04.20
	TS 16949	IATF0035135	2006.09.06
	Green Partner	Sony	2006.06.01
	Eco-Partner	Samsung	2005.11.22
Tongchen SINBON	UL	E226144□	2007.09.29
	ISO9001	CN08/20460	2008.03.12
Dongguan SINBON	UL	762132	2002.06.04
	ISO 9001	04607Q10309R1M	2007.08.07
	ISO 14001	04607E10048R1M	2007.08.07
	Green Partner	ASUS	2005.11.30
Dongguan Dachen	UL	E119393	1994.05.04
	CSA	LR96920	1993.03.20
	ISO 9001	TW06/03104QA	2006.07.05
	TS 16949	0036179	2006.09.26
	Green Partner	Sony	2004.12.13



SINBON's RoHS List



No.	Hazardous Substances	Limitation	Test Method	Test Equipment
1	Cadmium and its compounds	100 ppm	EN 1122-2001	ICP-AES
2	Lead and its compounds	1000 ppm	US EPA3050B	ICP-AES
3	Mercury and its compounds	1000 ppm	US EPA3052	ICP-AES
4	Hexavalent chromium and its compounds	1000 ppm	US EPA 3060A&7196A	UV-VIS
4-1	(Pb+Cd+Hg+Cr ⁶⁺) for packing material	100 ppm	94/62/EEC	ICP-AES & UV-VIS
5	Polybrominated biphenyls (PBB)	1000 ppm	83/264/EEC	GC-MS
6	Polybrominated diphenylethers (PBDE)	1000 ppm	83/264/EEC	GC-MS

The allowance of lead content in Alloy

No.	Hazardous Substances	Allowable content of lead
1	Steel	< 3,500 ppm
2	Aluminum alloy	< 4,000 ppm
3	Copper Alloys (including brass & phosphor bronze)	< 40,000 ppm
4	Solder	< 1,000 ppm

Design Capabilities





Design Tools

- Pro-E
- Cad
- Mold Flow analysis

Development Process:

- Utilize DFX Tools
 - Work with customer to offer alternate designs to optimize design:
 - Production Costs
 - Product Quality & Reliability
- Phase Review Process:
 - Define Scope & Schedule
 - Track project to milestones and key deliverables
 - Pre-established Customer reviews/checkpoints



Design Tools

- Pro-E and Cad
 - Work with customer to offer alternate designs to optimize design:
 - Production Costs
 - Product Quality & Reliability
- Phase Review Process:
 - Define Scope & Schedule
 - Track project milestones and key deliverables
 - Pre-established Customer reviews/checkpoints
 - Define Qualification Plan
 - Track Budget

Engineering Capabilities



Key Part Development

- Raw cable design
- Integration of multiple cables
- Sourcing & verification of alternative materials (connector, raw cable)
- Cooperation with customers to meet technical requirements

Molding Development

- Over-mold Design
 - Custom design according to the specific shape of the product
 - Design fulfilling customers testing criteria
- Knowledge & Control of Compound
 - Selection of compound most suitable for the product's environment & standards



Assembly Development

- Custom assembling to suit special mechanical & interface requests
- Design of cable assemblies with embedded PCB assemblies
 - Housing stability enhancement
 - Water resistance assurance
- Fixture Design & Manufacturing
 - Crimping Fixture
 - Assembly Fixture
- Elevation of the production efficiency by process refinement



FMEA Evaluation

- SINBON complies with TS16949 & ISO 13485 and can offer FMEA upon requests.
- When adopting FMEA, time efficiency can be a major issue in volume production
- By studying the potential failure mode, SINBON ensures quality, and is focused on improving the production upgrading

FMEA: Failure Mode and Effects Analysis



Customized Project Management...

- **Experienced personnel** from engineering, sales, customer service, sourcing, purchasing, custom, manufacturing, QA
- Teams led by engineer or sales, **familiar with customer requirements**
- **Knowledge Management (KM)database** built to accumulate experience & knowledge.
- **Lean production** guarantees higher efficiency in work, more savings in manufacturing & inventory (time, manpower, space).
- On-site Sales, Engineering, Logistical support



Quick Response Capability for Wind Energy

Wind Energy Sales & Engineering Support Team...



Able to provide local and quick support!



Wind Energy Engineering Support ...

- **Raw Cable Engineering Support**

- 20 years of raw cable sourcing experience
- Familiar with UL, CSA, MIL and other cable specs
- Provide professional designing & sourcing services

- **USA Engineering Support**

- 20 years of cable assembly experience
- Deliver onsite customer support



Wind Energy Logistical Support...

- **China (Beijing Site)**

- Customer service officers, Product material control officers, Sourcing, Purchasing, and Customs officers
- Ship by sea, air, to insure on-time delivery

- **USA Warehouse & HUB**

- Existing warehouse in Orlando, Florida (3400 Sq ft)
- Additional HUB services available

Manufacturing & Sourcing Capabilities

Depth of global manufacturing experience...

- SINBON-owned operations in Taiwan and multiple sites in China
- Experienced in subcontracting and supply-chain management
- Core competency in cable design and manufacturing
- Experienced in “Box Builds” for wide variety of electro-mechanical assemblies.
- Experienced in PCBA assembly
- Complete staffing for manufacturing operations:
 - Electrical & Mechanical Engineers
 - Process Engineering
 - Quality Engineering
 - Production Management

Global Sourcing Capabilities



- **Global sourcing** team enables SINBON to leverage best pricing and lead times
- **Centralized procurement system** ensures accurate and timely costing
- Network of **preferred suppliers** with established relationships
- **Database and IT infrastructure** increase efficiencies



Depth of Global Sourcing experience...

- Timely shipping of raw materials
- Cost competitiveness
- High percentage lead time control
- Able to offer alternative materials
- Quick material localization and standardization processes



Wind Energy Global Sourcing capabilities...

- Secure required materials and offer replacement alternatives
- Guaranteed lead times
- Follow-up on shipment and purchasing of materials
- Established partnership with reliable suppliers
- High quality and reliability and low cost

Suppliers...

Long-term relationships with global connector & terminal manufacturers such as: **Tyco, Molex, JST, PANDUIT, ITT CANNON, AMPHNOL, LEMO, INTERCONTEC, WELDUMULLER, T&B, FCL.**

Established relationships with raw cable manufacturers, including: **BELDEN** (bands like: BRANDREX, ALPHA THERMAX), **GENERAL CABLE, LAPPKABLE, HELUKABLE etc.**

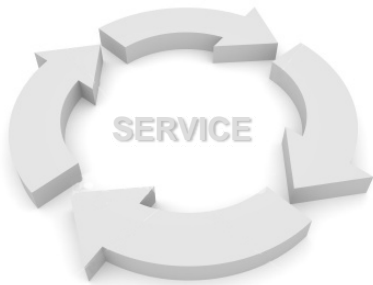
Our commitment is to quality throughout every phase of design, manufacture and delivery



Why SINBON?



Integrated Services



- Cable assembly, PCB assembly & box build capability
- Prompt engineering support (EE, ME, FW)
- End-to-end services

➔ Save time for supplier management

Flexible Production



- High mix/Low volume OK

➔ Flexibility to accommodate low-volume orders

Customer Focused



- Detailed working attitude
- Quick response
- Customer-oriented service

➔ Committed to being a trusted partner



Thank You!...

- If you have questions about SINBON's wind energy design and manufacturing capabilities:
 - Please call our sales representative at: **877-974-6266**
 - Email us at: sales@sinbontech.com
 - Email Field Sales Engineering: jsmith@sinbontech.com
 - Please visit our website: www.sinbontech.com