



WIND TOWER CABLE SYSTEM



POST TENSIONING & STRUCTURAL
SOLUTIONS (PTY) LTD





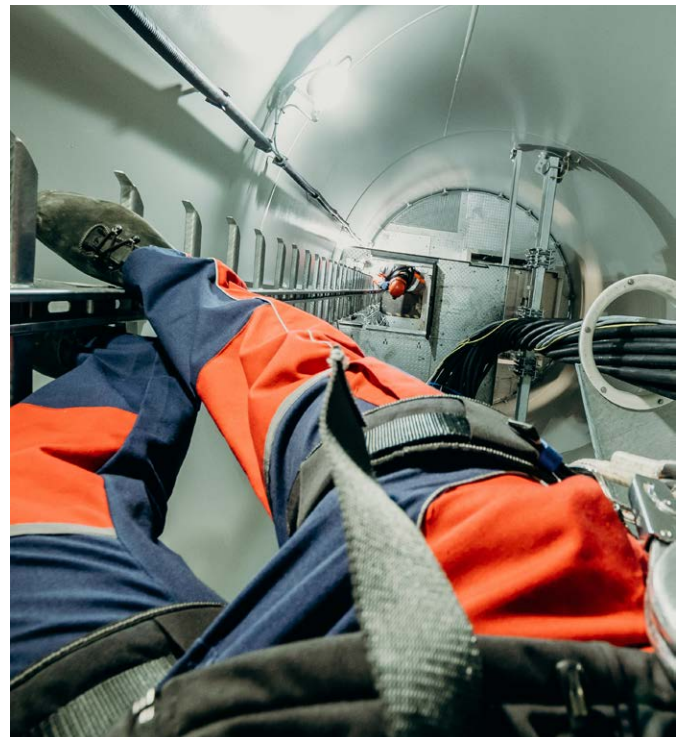
OVM AND PTS-S
TOGETHER
PROVIDE A
COMPETITIVE
WORLD-CLASS
**WIND TOWER
CABLE SYSTEM**

OVERVIEW

Defined as 'working together to achieve a common goal,' collaboration is a vital component in engineering.

Collaborative engineering has emerged as a response to the growing complexity of engineering problems and systems. The increasing level of difficulty and intricacy necessitates multiple engineering teams working together to develop a feasible and practical solution.

Encompassing two highly specialized companies involved in various aspects of post-tensioning engineering, including design, documentation, construction, and construction monitoring, the collaboration between PTS Solutions and OVM aims to offer a comprehensive 'one-stop-shop' solution for your wind tower project requirements.



OVM PROFILE

- Located in Liuzhou, China.
- Employs 2,000 individuals, including 200 engineers and technicians.
- Operates 4 manufacturing bases in China..
- Maintains 30 marketing offices in China and 31 agents overseas.
- Possesses 1 national technical center and 1 postdoctoral workstation.



PTS-S PROFILE

Post Tensioning & Structural Solutions (Pty) Ltd is a privately owned South African company specializing in post-tensioning, construction hydraulics (including lifting and launching), and the repair and rehabilitation of structures. Our team consists of engineers and contracting professionals who have extensive experience in the post-tensioning industry and various systems over many years.



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CABLE SYSTEM FOR WINDMILL TOWERS

SPECIFICATION OF STRAND OR WIRE

The cable consists of anchorages at two ends and free length. Anchorage varies with cable type, the following materials are mostly used for cable free length regardless of the cable type.

- Bare strand (Ø15.2mm, grade 1860MPa)
- Galvanized strand with PE sheath (Ø15.7mm, grade 1860MPa)
- Epoxy coated strand with PE sheath (Ø15.2mm or Ø15.7mm)
- Galvanized steel wires (Ø5mm or Ø7mm)

SPECIFICATION OF CABLE SYSTEM

- Static load performance
- Comply with ETAG013
- Fatigue load performance
- Comply with ETAG013
- Replaceable
- Health monitoring system

TEST OF CABLE SYSTEM



Static load test



Load test witnessed by main contractor

According to the position of the cable in the structure, the cable is divided into two types:

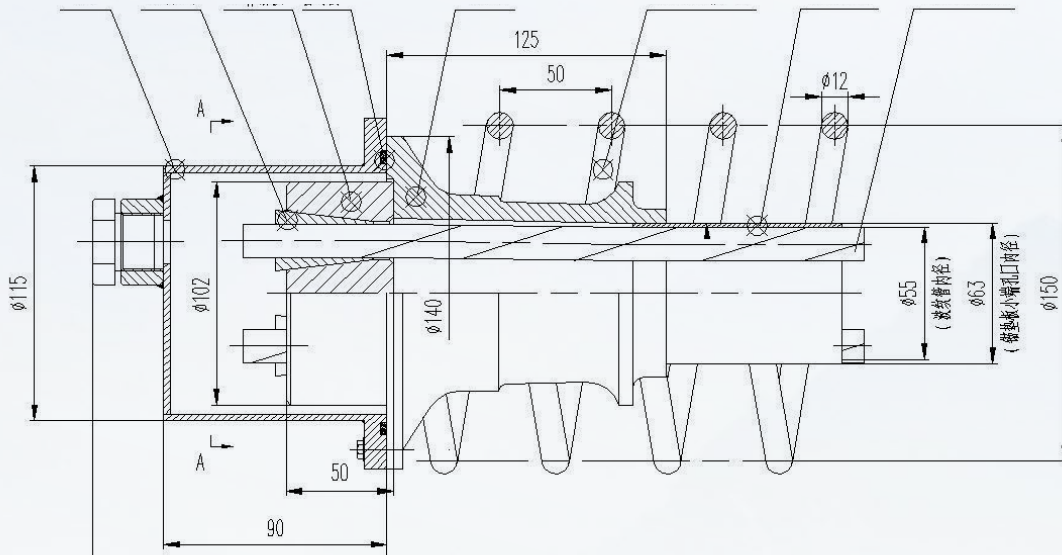
**INTERNAL
CABLE**

**EXTERNAL
CABLE**

The external cable can be either preassembled at site before installation or be premanufactured in the factory before delivery.

TYPE 1: INTERNAL CABLE

Cables are threaded through ducts inside the tower wall.



Anchorage assembly



Grouting kit



Anchorage with ETA

APPLICATION: HAMI WIND POWER PLANT

Hami Jingxia wind power plant is located in Xinjiang province, China. OVM supplied cable system and provided engineering service for the whole 100 concrete towers. Each tower is 120m high consisting of 30 pieces of 4m high sections, and is anchored with 40 internal cables.



Hami Wind Power Plant



Example of tower section



Tower model

Brief construction sequence of tower:

- Cast tower sections
- Lift and install sections 1 to 23
- Install and stress internal cables
- lift and install sections 24 to 30
- Install and stress internal cables
- Grout internal tendons





Install ducts



Cast tower section



Thread strands



Install anchorage



Stress Cables



Grout tendons



TYPE 2: EXTERNAL CABLE

Cables consists of strands are assembled at site, both ends of strands are anchored with wedges

APPLICATION: HAIZHUANG WIND POWER PLANT

OVM provided the cable system and engineering service for the 54 towers. The steel-concrete composite towers were 138m high, with the lower concrete section being 65m high and upper steel section 73m high. Each tower is anchored with 12 tendons consisting of 22No 15,7 diameter strands each.

GENERAL INSTALLATION SEQUENCE OF EXTERNAL CABLE



Cut strands



Manufacture cable coil



Lift cables



Prepare anticorrosion protection



Install anchorage



Stress



Prepare anticorrosion protection

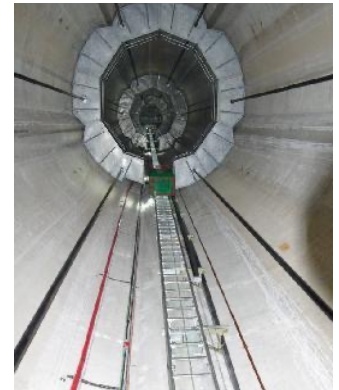


The cables consist of premanufactured strands that are produced in the factory. One end of the strands is anchored by extruding them to achieve a smaller anchor head, while the other ends are anchored using wedges.

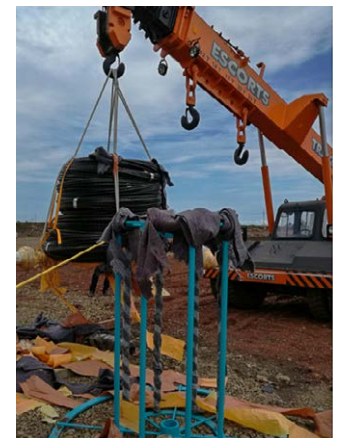


APPLICATION: MULANUR WIND POWER PLANT, INDIA

The CONTRACTOR for this project is NORDEX INDIA PVT LTD . The Project is located in the south of India and consist of 100No 3MW Wind Towers to deliver a total annual capacity of 300MW over a period of 25 years. OVM provided the cable system and engineering services for the 100 towers. Each concrete tower is 120m high and anchored with 6 tendons consisting of 17No 15,7mm strands each, totalling 1500tons of post tensioning strand installed and tensioned over a period of 10 months



GENERAL INSTALLATION SEQUENCE OF EXTERNAL CABLE



Manufacturing cable in the factory and deliver to site



Install and stress cables

STRUCTURE HEALTH MONITORING SYSTEM

SPECIFICATION OF STRAND OR WIRE

The OVM structure health monitoring system is widely used on various types of bridges and structures. On FAST track projects, 14 different types of sensors are installed on more than 6000 monitoring points.

For wind towers, the following aspects are typically monitored:

- **Environment:** This includes parameters such as wind speed and wind direction.

- **Stress:** Monitoring stress levels on critical sections.
- **Cable force:** Keeping track of the forces acting on the cables.
- **Vibration:** Monitoring vibrations occurring within the tower structure.
- **Deformation:** Tracking any inclination or settling down.



DATA ACQUISITION OF THE MONITORING SYSTEM ON HAMI WIND POWER PLANT





**POST TENSIONING & STRUCTURAL
SOLUTIONS (PTY) LTD**

HEAD OFFICE

Unit C, 13 Malone Road, Maxmead, Pinetown, 3631

P O Box 1055, Kloof, 3640

Tel.: +27 (76) 888 1313

Email: info@pts-solutions.co.za

website: www.pts-solutions.co.za



HEAD OFFICE

No. 1, Yanghui Road, Yang He New Industrial Area,

Liuzhou, Guangxi, 545006, P.R. China

Tel.: +86 772 3116402

Email: sales@ovm.cn

website: www.ovm.cn www.ovmchina.com