

Technical Newsletter from
ADOR WELDING LIMITED
Formerly **Advani - Oerlikon Ltd.**

EFFICIENT WIND TOWER MANUFACTURING

Introduction

One of the established sources of renewable power is wind energy. With the growing demand for wind energy, the demand for wind towers also increases. The challenge for wind tower producers is to build towers to client specifications in the most efficient and profitable way. The requirements for towers for on shore and off shore are nearly similar, except for steels for offshore applications where extreme temperature requirements are to be met. Welding is the most widely accepted practice to build wind towers. This article provides insights into requirements for increasing productivity of tubular wind towers.

The design sets the rules for production

- The design, choice of material and material thickness determine the required welding and cutting solutions
- The height of the tower determines the number of shells to be fabricated
- Weld geometries need to be designed for fast production

1. The joint types

Joint types vary with plate thickness to obtain optimal strength at the lowest weld volume.

Product Update

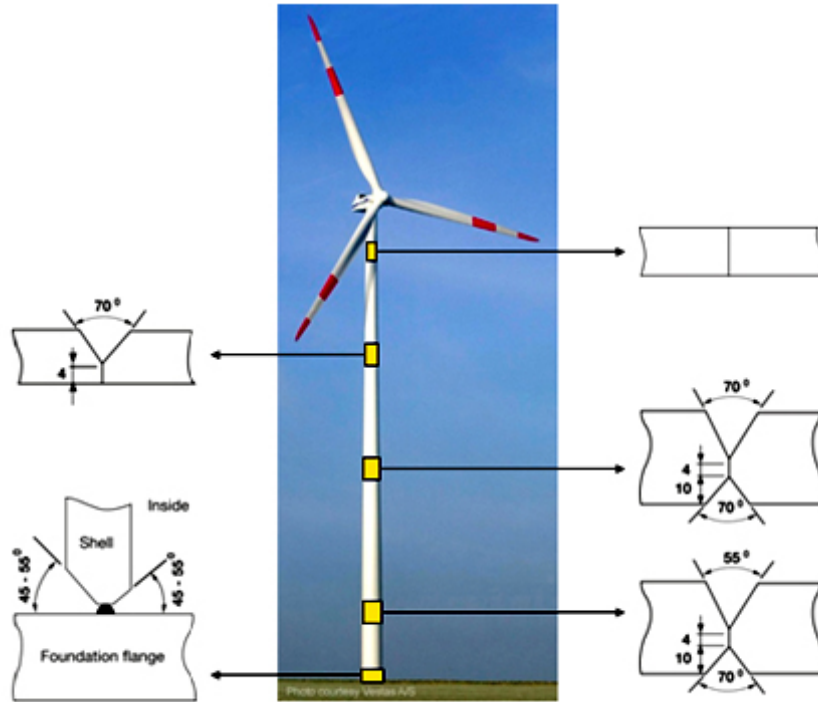
CHAMPTIG 400 P

Indigenous inverter based Pulse TIG DC welder



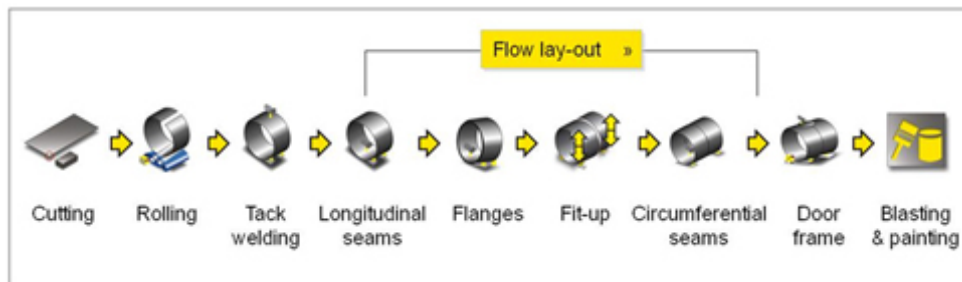
- Three phase inverter based, High efficiency and High Power Factor Pulse TIG/ MMA DC Welder
- Useful for wide variety of material types and thickness.

[read more](#)



2. The production flow

Cutting and welding are two important steps of a series of steps in the production of a wind tower. A standard flow lay out is described below and some details of the various steps are given thereafter.



3. Cutting

CHAMP T 400

Inverter (IGBT) based energy efficient welding rectifier



- Inverter (IGBT) based, energy efficient welding rectifiers for heavy duty structural welding applications
- High power factor, high efficiency resulting energy savings up to 35% over thyristorised rectifiers

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CROMOTEN / CROMOTEN C

Low Alloy High Tensile Electrodes

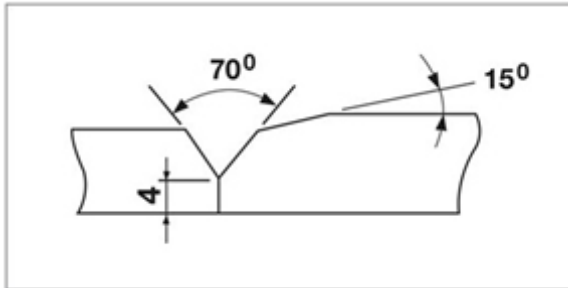


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Helpline No.
1 800 233 1071

For Welding &
Cutting Equipment,
Service & Spares

- With modern cutting machines and software, steel plates are perfectly cut and prepared in a reliable and accurate process
- High quality bevelling is crucial for successful welding
- All sides of the same plate must be bevelled for the joint preparation
- Bevel types per side may differ, for example for joints with different material thickness tapering is adopted. This design also reduces stress concentration at the joint (refer figure below).



4. Rolling and forming



Cut and bevelled plates are rolled into conical shapes (above) and tack-welded (described in 6 below).

5. Welding

- Welding is a major time factor in the production of a wind tower and comprises of tack welding, longitudinal welding and circumferential welding.
- The cost of welding is a small part of the total costs
- Investing in efficient automated welding solutions increase productivity substantially



FREE SERVICE CLINIC
can be arranged on request if you have 25 or more numbers of AWL make welding and cutting equipment at single site/ nearby site. For Further Details Please E-Mail to cmo@adorians.com

Service Clinics During the Month of January 2013

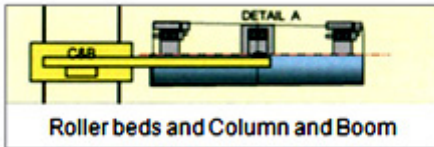
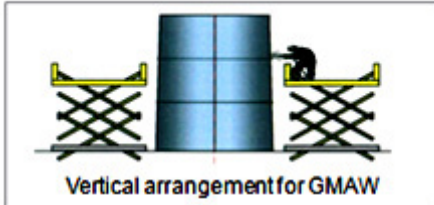
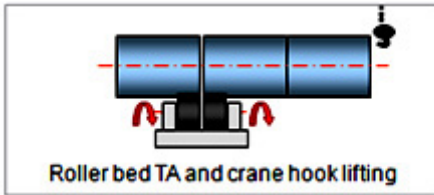
- SHREE CEMENT LTD UNIT I
BEAWAR- JAIPUR AO -
JAIPUR - 11 NOS.
- SHREE MEGHA POWER
BEAWAR- JAIPUR AO,
JAIPUR - 13 NOS.
- ESSAR STEEL (I) LTD –
BLAST FURNACE UNIT
HAZIRA, SURAT-
AHMEDABAD AO,
AHMEDABAD - 15 NOS.

Ador Welding Academy (AWA)



**A Cost Effective Model to
Create New Welders and
Upgrade Skills of Existing Welders**

6. Tack welding



Tack welding can be performed:

- on the roller bed with crane lifting
- with shells standing on top of each other
- on the roller bed with fit-up equipment

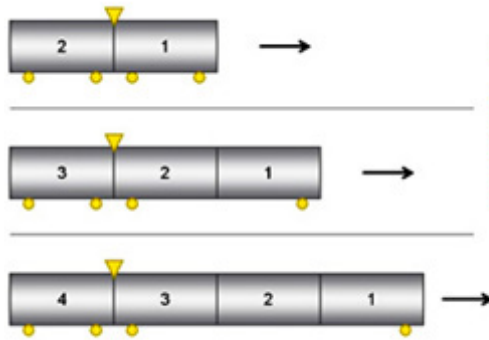
7. Longitudinal welds

After tack welding, longitudinal joints are welded with the submerged arc welding process, both on the inside and outside. This can be done in a separate station or in the same station, where the circumferential welds are also carried out. Two popular practices adopted for longitudinal welding are described below.

(i) Growing line principle

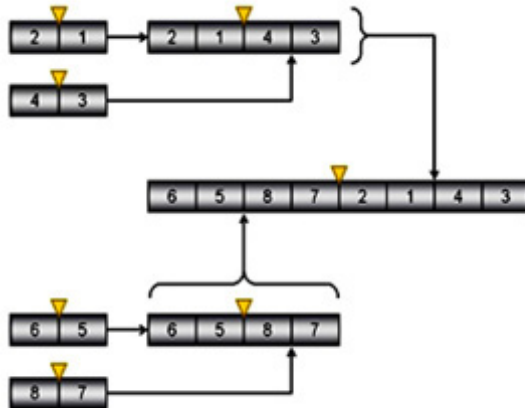
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In this principle, longitudinal joints are done on a number of pipe sections, in a linear fashion one after the other. This is a relatively slower process with low throughputs.

(ii) Added lines principle



In this principle, longitudinal joints are done on a number of pipe sections, in a tandem using more number of Welding Machines operating in tandem and using customized dove-tailed fixtures. This increases the productivity and throughput

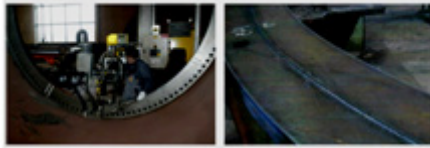
8. Longitudinal welding station



The station for longitudinal welds consists of:

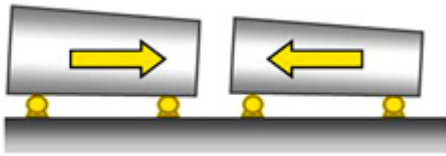
- Handling equipment to position the shell
- Welding equipment (power sources, welding heads, control units, etc.)
- Consumables handling equipment (wire feeders, flux systems)
- Equipment to position welding heads and consumables at the joint

9. Flanges

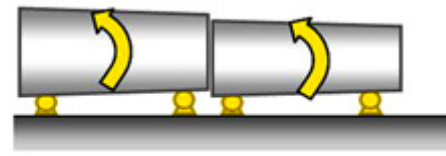


- Flanges need to be welded absolutely perpendicular to the tower by Submerged Arc Process using either special purpose Flux Cored Wires for SAW or solid SAW Wire with added flux.
- Heat distortion is a challenge

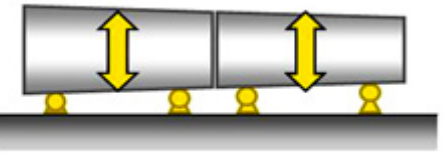
10. Fit-up



Horizontal alignment



Vertical alignment 1 (angular)



Vertical alignment 2 (shell - to - shell)

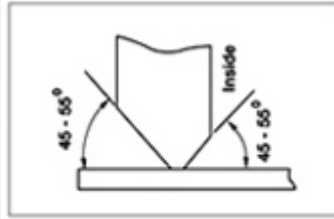
- Shells need to be perfectly aligned and rotated to allow welding in the downhand position
- Different methods are needed, depending on the choice of equipment
- Various fit-up solutions, such as active and idle roller beds and crocodile solutions are available.

11. Circumferential welds



- The circumferential welds join shells to form a tower
- More time consuming than longitudinal welds, due to length of the joint
- High quality welds require perfect synchronisation between welding equipment and roller beds
- Superb operator control and supervision is equally important

12. The door frame



- The tower door frame is a structure that copes with high pressure forces.
- The frame can be welded to the tower manually with flux cored wires.

13. Blasting & painting

After the shells are welded, blasting and painting are essential to preserve the tower in the field

14. The tower segment



The production results are:

- High quality welded wind tower segments
- Produced with safe and ergonomic equipment
- Solutions that enable high productivity.

Ador Welding Ltd. support

The welding and cutting solutions come with valuable support and commitment to allow customers to reach their full potential:

- Training at all levels
- In-depth seminars with the industry experts
- Productivity audits
- Establishment of welding procedures

Please contact cmo@adorians.com for assistance in selecting welding equipment (MMAW/ SAW/ FCAW/ Automation Systems) and consumables, cutting equipment as well as training of engineers/ welders for maximising productivity in wind tower fabrication.



WELDING ELECTRODES,
WIRES & FLUXES



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IN WELDING AUTOMATION



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ACADEMY PVT. LIMITED



PROJECT
ENGINEERING SOLUTIONS



WELDERS TO THE NATION SINCE 1951
ADOR WELDING LIMITED
(Formerly known as Advani-Oerlikon Limited)



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