A few tips to be sure that rolling windtowers becomes a profitable business.

(Pictures and Video are courtesy of EWP Sweden)
The energy produced by a wind turbine is proportional to the size of the blades mounted around the rotor. The longer are the blades, the higher is the power output.

The generator is always mounted over a steel tower, the height of which determines the maximum length of blades and therefore the quantity of energy that can be generated by the wind power caught by the system. The power and height of wind turbines is constantly increasing, therefore the size of the steel towers is growing in diameters and thickness to guarantee stability to those giants measuring up to over 100 mt (300ft) in height.

Rolling conical shells for production of wind towers is more and more a matter of precision obtained in the minimum cycle time. Modern plate rolling machines guarantee high output rate and maximum reliability.
The Manufacturing Steps:
The construction of the steel tower supporting the turbine is guided by a standard process.

Plate Cutting and Bevelling

Rolling Plates and Flanges
The Manufacturing Steps:
The construction of the steel tower supporting the turbine is guided by a standard process.

Assembly and Welding
The Manufacturing Steps:
The construction of the steel tower supporting the turbine is guided by a standard process.

Finishing, Painting and Transport on site
The Manufacturing Steps:
The construction of the steel tower supporting the turbine is guided by a standard process.

Erection over foundations
The Manufacturing Steps:
The construction of the steel tower supporting the turbine is guided by a standard process.
The choice:
Selection of the best machines is an important step towards profitability.

The ideal machine to roll towers is:

- FAST;
- PRECISE;
- RELIABLE;
- USER FRIENDLY;
The ideal towers rolling machine is:
• Fast;
• Precise;
• Reliable;
• User Friendly;

The Plate rolling machine has to produce one conical section in less than **20-30 minutes**. This time includes aligning and tack welding. The fastest machines on the market have four rolls, the fastest of these four rolls machines are those with higher installed rolling power.
A machine with less HP for rotation has either less torque resulting in problems when rolling thicker plate, or less speed resulting in longer production time or BOTH. Therefore the machine with more HP installed for rotation is the obvious choice.
The ideal towers rolling machine is:
- Fast;
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How Precise?

The more precise the machine, the more consistent the tolerances of the rolled piece, which results in enormous time savings during the welding and assembly process, with the overall result of higher quality product with a short production time.
**The ideal towers rolling machine is:**
- Fast;
- Precise;
- Reliable;
- User Friendly;

**How Precise?**

The Precision of the rolled cone section is measured by:
- Length of **Flat End** of leading and trailing edges after Prebending;
- Amount of **Barrel/Reel** defect over the full range of thickness;
- Consistency of the **cone Angle**;
The most precise machines on the market are those with the closest distance between the bending points. These machines are the ones identified by the side bending rolls being as near as possible to the lower central roll (pinch roll), in fact almost touching.

The Precision of the rolled section:
- Length of Flat End after Prebending;
- Amount of Barrel/Reel defect;
- Consistency of the cone Angle;

Length of Flat End after Prebending
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Amount of Barrel/Reel defect;

The most precise machines on the market are those with larger diameter rolls (Top Roll, Pinch Roll and Side Rolls). Larger diameter rolls guarantee reduced deflection under load so they are less crowned to roll a wider range of thickness without needs of time consuming shimming operations.

\[
\text{Rolls Deflection} = K \times \frac{\text{Load} \times \text{Roll length}}{(\text{Roll Diameter})^4}
\]
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- Length of Flat End after Prebending;
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Consistency of the cone Angle:

The degree of tilting has to be preset automatically and kept constant for the whole duration of the rolling cycle. The most Precise system to guarantee this constant balancing is electronic by means of numeric control.
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How Precise?

The Numbers to Keep in mind:
- **Linear Slides** guarantee Flat Ends limited to **1,5 times** the thickness;
- **20% Larger Rolls** Diameter gives **100% reduction** of Rolls Deflection;
- **EPS** (Electronic Balancing System) guarantees balancing tolerances below **0,2 mm (0,008”)**;
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How Reliable?
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How Reliable?

It is practically impossible to stock several rolled parts and the production flow has to be continuous from cutting, rolling, welding, painting, delivery. A good installation is designed to produce in excess of **200 complete Towers per year**. This is possible using one rolling machine intensively on 2-3 shifts every working day. In such conditions reliability of the machines is the key factor to assure that the complete production line will not be stopped.
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How Reliable?
Roll Movement should be on linear slides to avoid transverse loads concentrated on small diameter pins typical of machines with swing arms. The machine rolling precision should not be affected by clearances and wear of too many small joints.
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Rolls supports should be tilt-able so that rolling cones does not generate off-center load. The tilting degree should be unlimited as guaranteed by MCS systems (4 independent bearings supporting each roll).
The most critical part of the plate forming area is obviously the rolling machine. When this equipment is built according to the correct design criteria, then a single operator is capable of achieving the optimized output rate of 1 tower section every 20-30 minutes, including tack welding. ... Although the operator has to be competent to achieve this, the handling system and CNC software will support the operator throughout the production.

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How User Friendly?

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Plate Supports are very useful allowing the machine to operate without any need of overhead cranes that could be utilized for other duties. The top beam is freely tilt-able according to cone angle. Capacity should be between 5 and 20 Tons according to the size of the heaviest section.

Options for increasing productivity:
- Vertical Supports;
- Lateral Supports;
- Plate Feeding System;
- Numeric Control Units;

**Vertical Supports**
Plate Supports are very useful allowing the machine to operate without any need of overhead cranes that could be utilized for other duties. The top beam is freely tilt-able according to cone angle. Capacity should be between 5 and 20 Tons according to the size of the heaviest section.
The lateral or side support is needed only for rolling very light plates to relatively large diameters. This option becomes more interesting when it is combined with an hydraulic clamp that is used to automatically align the plate edges for tack welding.

Options for increasing productivity:
• Vertical Supports;
• Lateral Supports;
• Plate Feeding System;
• Numeric Control Units;
Modern feed tables are designed to keep the plate feeding direction constantly aligned with the cone direction without the need of overhead cranes. While the machine is rolling one part, the feed table can automatically set the next one in the exact position for immediate introduction resulting in valuable time savings.

Options for increasing productivity:
- Vertical Supports;
- Lateral Supports;
- Plate Feeding System;
- Numeric Control Units;
A Modern Graphic CNC can be used to manage in the automatic cycle all machine functions. There is no need of expert bending roll operators nor experts in information technology as the PGS type of controls guide the operator through the programming routines.

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The real truth about rolling towers:
A selection of the most frequently asked questions with answers and explanations
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Q- How to calculate the productivity of a rolling line? Is it realistic to calculate production times of 5-10 minutes per can (over 4 pieces per hour) as some manufacturer advertise?

A- No, 5-10 minutes is only the rolling time. It is necessary to consider always the tack welding that keeps the machine busy for other 10 minutes. In order to make a serious evaluation of the productivity of one single rolling line, it is better to consider outputs of 2-3 cans per hour. This can be done by one man without any need of re-rolling using the best machines on the market.
The real truth about rolling towers:
A selection of the most frequently asked questions with answers and explanations

Q- Is there any reduction in the capacities of the machines rolling the wind tower cones similar to what happens for traditional cone rolling applications?

A- No. The angle of the cone is small and the rolling is made with the same process as cylindrical section, the rolls are almost horizontal with the consequence that there is no reduction in the machine capacity. This is strictly depending on the cone angle only, and has nothing to do with the design of the machine. Any rolling machine can produce towers up to its nominal capacities.
The real truth about rolling towers:
A selection of the most frequently asked questions with answers and explanations

Q- Is there any damage on the edge bevel of the cone due to the friction of the plate against the front cone device?

A- No. The angle of the cone is minimal and the rolling is made with the same process when producing cylindrical sections, the plate never interferes with the cone device. Any good quality roll bending machine can produce wind tower section with perfect bevels without any need of dedicated or “patented” solutions.
Q- Do rolling machines with lower power help to save money?

A- No. When modern gearboxes are used for torque transmission, less power means only less rolling capacity. Over 90% of the machine installed power has to be used for rolls rotation, less power simply means either less rotation speed or less torque or both.
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Q- How can a machine with smaller rolls and less rotation power be guaranteed to roll high heavy plates?

A- Be very aware of “tricky offers”. Any bending roll builder can make the claim of high capacities when there is no mention made of important parameters such as “Flat End”, “Barrel/Reel Defect”, “Number of Passes”, “Machine Life”, ...
The real truth about rolling towers:
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Q- How to compare plate rolling machines “apples for apples”?

A- The size of a rolling machine is very easily determined by the size of all its rolls (top, pinch, side rolls). Additional important information to check out is the clamping tonnage and the torque available on the top roll. Do not automatically trust the promised capacity and make sure that the machines you are comparing have similar roll diameter, rolls centre distance, Hp, …
The real truth about rolling towers:
A selection of the most frequently asked questions with answers and explanations

Q- Is it helpful to use a tilting feed table?

A- No. When the rolling machine is good, it is not necessary to tilt the feed table. The tilting feature of the feeding table is needed only to prebend heavy plates that cannot be lifted when the rolling machine has undersized lateral cylinders. Correctly engineered machines have lateral cylinders strong enough to prebend and lift also the thickest plates without any additional help from overhead cranes or “fancy” tilting in-feed.
Q- Is it necessary or useful to have conical rolls?

A- Absolutely not. First of all it is important to consider that there is no added benefit in having only one interchangeable conical top roll. All rolls should be conical. But machine with all the rolls conical in shape rolls are suitable to roll cones specifically. The first sections of the tower are often cylindrical pieces, it would not be possible to roll them with conical rolls.
Q- When is a three rolls machine with variable geometry a good alternative to the four rolls design?

A- Variable geometry 3 Rolls machines are an excellent alternative to the four rolls machines for tower sections over 60 mm thickness (2”-3/8). In this size range the higher versatility and precision of the variable geometry machines compensates its slightly lower output rate.
The best supplier:
• Builds the ideal machine;
• Offers top quality service;
• Has proven experience;

FACCIN builds the Ideal Tower Rolling Machine

• Is Fast because of high power installed and dedicated accessories;
• Is Precise because it has Larger Rolls, Linear Slides and EPS;
• Is Reliable because it is never undersized;
• Is User Friendly because is prepared for the most advanced CNC;
The best supplier:
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FACCIN offers top quality service

• Machine Parts are built in house;
• Large stock of components because of our high production;
• Worldwide network of service centers committed to excellence;
Faccin were the first rolling machines dedicated to windtowers; Years of experience in the field brought an enviable know-how; Probably the longest reference list of satisfied customers;

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