# Article on critical surface preparation process

*Saturday, 14 Nov, 2009*

Source - Thefabrictor.com

An estimated 68% of all coating failures are attributed to poor surface preparation that could have been prevented. By using cleaning technology that can achieve near white conditions, you can ensure that paint, adhesives, and other coatings achieve maximum quality with less waste.

It is evident that there is a shift in the global industrial landscape, particularly in North America. Traditional industries, such as fabrication and metalworking, are realigning themselves to seek out opportunities in more progressive industries, such as aerospace and power generation. In doing so, they are gearing up to address the specific and exacting demands of such sectors. At the basic level in the fabrication industry, whether the focus is on building ships or wind towers, surface preparation plays a key role in the life of coatings.

Field conditions are harsh on metal surfaces, with corrosion being the silent enemy. Therefore, all steel components used in equipment that will be subjected to the elements go through a surface preparation process before being assembled. Steel pretreatment commonly is accomplished using mechanical and chemical techniques. This article explains the mechanical pretreatment technique of blast cleaning.
How Important Is Surface Preparation?

A recent study on corrosion and its prevention revealed that 68% of all coating failures are attributed to poor surface preparation that could have been prevented. The study also found that the life of a coating depends as much upon the degree of surface preparation as on the subsequent coating system.

The Society for Protective Coatings identifies 5 initial rust conditions ranging from plain mill scale to rust and pitting that can be present before surface preparation. These are identified as Condition A, B, C, D and G*.

Condition A—Steel surface is completely covered with adherent mill scale and little or no rust visible.

Condition B—Steel surface covered with both mill scale and rust.

Condition C—Steel surface completely covered with rust; little or no pitting visible.

Condition D—steel surface completely covered with rust; pitting visible.

Condition G—Coating system applied over mill scale bearing steel.

Condition G of steel is not commonly encountered in fabrication projects.

The most common initial conditions of steel is A and B. The resultant expectation of surface finish is traditionally SSPC-SP-10 / Sa 2-1/2 / NACE 2, or near white blast cleaning.

This is defined by SSPC and NACE as:

Removal of nearly all mill scale, rust, rust scale, paint, or foreign matter by the use of abrasives propelled through nozzles or by centrifugal wheels, to the degree hereafter specified. A Near-White Blast Cleaned Surface Finish is defined as one from which all oil, grease, dirt, mill scale, rust, corrosion products, oxides, paint or other foreign matter have been completely removed from the surface except for very light shadows, very slight streaks or slight discolorations caused by rust stain, mill scale oxides, or light, tight residues of paint or coating that may remain. At least 95% of each square inch of surface area shall be free of all visible residues, and the remainder shall be limited to the light discoloration mentioned above.

Mechanical pretreatment of steel can be carried out using blast nozzles and centrifugal blast wheels. All other factors being stable, productivity of the cleaning operation is directly proportional to the amount of abrasive propelled on the part being cleaned. Airb last nozzles (3/8 in. diameter at 60 PSI) propelling metallic abrasive typically discharge 10% of the blast media by a centrifugal blast wheel (15-in.-diameter wheel, 20-HP motor). Blast nozzles typically are used when the application requires cleaning with nonferrous media. They also are used in mobile blasting rigs.

To provide a comparison of operating efficiency, a single centrifugal wheel provides the same cleaning efficiency as eight ½-in.-diameter blast nozzles. Also, compressed-air nozzles require a large amount of compressed air when compared with electric motor-driven centrifugal wheels.

Centrifugal blast wheels are either direct-driven or belt-driven through a bearing system. The resulting line speed of the associated blast machine is directly proportional to the total connected wheel horsepower.

Understanding the production process in reference to surface preparation will help you appreciate the value added by pre treating steel at different stages. Let's consider the wind power industry as an example (ship-building follows a similar sequence of activities).

Raw stock consists of plate steel from ½ in. to 2 in. thick. The plates are pre blasted in a multiple-blast-wheel plate cleaning machine that cleans plate from 4 ft. up to 15 ft. wide at line speeds starting at 5 FPM and higher, based on wheel HP. Blast wheels are located at strategic locations to clean both sides of the plate simultaneously.

These cleaning machines have replaced acid pickling lines and offer an environmentally friendly alternative to chemical stripping.

Some installations have taken this process a few steps further by incorporating painting and curing equipment downstream of the blast machine.

A clean part offers better bonding to paint, adhesives, or any such coating when compared to a part that hasn't been blasted. The savings in paint can be significant, especially in high-volume environments, when parts are properly prepared. Preservation lines, commonly found in shipyards and large metal processing facilities, consist of a pre heater and blast machine upstream to the paint booth. Plates and profiles are treated through the blast machine and cleaned to a near white or white metal finish to ensure uniform paint adhesion and consistent dry film thickness.

Continuing with the production process in the wind power industry, the blasted plates are rolled into sections referred to as cans. These cans vary in diameter and length depending on their location in the wind tower assembly. The cans are welded together along their seams to form the assembly. Upon completion of welding, they are manually blasted as an assembly to clean the welded seams and other discolorations generated by the production process.

Such air blast booths can be up to 100 foot long and can accommodate up to eight operators manually blasting the inside and outside of the part by indexing it on rollers to access the entire inside surface. A typical turnaround time for a 60 foot section, using six to eight operators, is about six hours for manually blasting and removing abrasive from the inside.

The can is now ready for painting before assembling the internal components and completing the wind tower construction. Blasting processes, whether with ferrous or nonferrous media, generate a lot of dust. Dust sources include breakdown of blast media and scale or other contaminants dislodged from the component being blasted. By design, blast machines have to be ventilated and the dust filtered to prevent contaminating ambient air.

(Sourced from www.thefabricator.com)