

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

## Product Update

### CHAMP 400

## Increase service life of hardfaced components (old or new) by adopting proper Welding Techniques

### What is hardfacing?

Hard facing can be defined as deposition of special alloy material on a metallic part by a suitable welding process to form a protective surface which resists friction, abrasion, heat, impact and corrosion or a combination of these wear factors. Hardfacing is used not only for repairing and re-surfacing old parts but also for producing new parts by using inexpensive base material.

### Common problems in hardfacing applications

Depositing a hard layer to withstand various wear factors may lead to distortion of the job, cracks in the deposit, peeling of the weld deposit and other problems such as not achieving the desired life of the weld deposit. While selection of the right welding process as well as consumables and equipment plays a major role, adopting the right techniques can contribute significantly to enhancing the service life of the resurfaced component. We will discuss some issues to help you in this endeavor.

### Depositing right quantity of weld metal

To make a successful hardfacing job, it is important to



Three phase inverter based, high efficiency and high power factor DC Welder

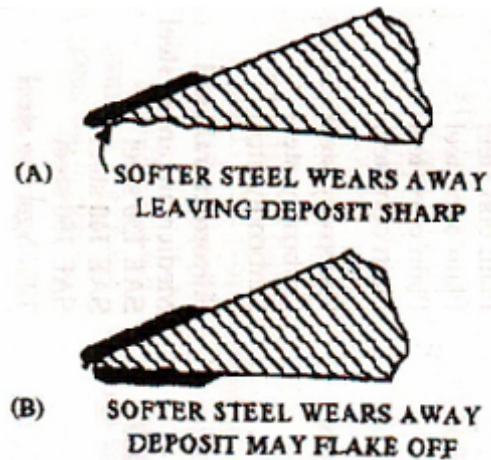
Enhanced Reliability due to SMD technology

High frequency IGBT based Rectifier

Arcforce adjustment on panel

TIG Welding possible with External HF Unit

deposit right quantity of weld metal at the right spot. A thicker deposit over a large area will not necessarily give higher service life. Correct application of deposit ensures efficiency as well as economy. The figure shows, the excavator tooth welded in B has twice the weld deposit compared to A. Yet tooth B will fail quickly in service because the brittle nose will first fracture. The soft base metal is then exposed and will wear out very fast. The hard deposit will also flake away very soon. In tooth A, the softer base metal wears away gradually, while the sharp edge of hard deposit continues to operate steadily.



**11.5: Placement of hard deposit on excavator tooth**  
**(A) Correct (B) Incorrect**

**Why is a buffer layer laid?**

What is the importance of a buffer layer? An intermediate layer laid between the base metal and hard facing layers is called a buffer layer. In case a hard deposit is laid on high carbon steel, the weld deposit will pick up carbon from base metal and become so hard that it will crack. In such a case it is preferable to lay a buffer layer with E7016 electrode (Tenalloy 16) and then lay the hard deposits. This procedure is also recommended for jobs which have been hardfaced once and are being reconditioned again, since the base metal becomes hard, due to wear and tear. The

**DOUBLE HORSE**



Reliable Dynamic output characteristics throughout the entire welding range

Infinitely variable current regulation through sturdy and smooth moving core mechanism

Adjustment of welding current is possible while welding is in progress

Natural air cooled transformers

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**Course for Quality Assurance & Control of Welding (QA-1)**  
**12th – 15th Oct. 2009**

**Refresher Course in Welding**

number of buffer layers will depend on the application i. e. amount of weld metal to be deposited.

### **Distortion**

Control of distortion of hardfaced jobs is as important as the welding procedure. One of the reasons for distortion of a hardfaced job is unequal heating and cooling of the weld metal and parent material which leads to uneven contraction on cooling. Incorrect sequence of welding also causes distortion and sometimes cracks in the weld metal. Distortion can be controlled by taking proper precautions. One such precaution is described below.

Distortion can be controlled by having symmetrical welds wherever possible. For example, when reconditioning a shear blade, welds can be laid alternatively on the four edges in short lengths. While building up a shaft, only a short run of deposit should be made parallel to the axis and the shaft should then be turned over and a similar run made on the opposite disc to equalize stress. If a long continuous run were made on one side only, this would cause a permanent distortion.

A hardfaced job has internal stresses due to unequal heating during welding. The deposit is in a state of stress because it has not been able to contract completely and the base metal is under compression. Distortion can be prevented or substantially reduced by annealing or stress relieving the base metal before hardfacing, Components meant for critical service are therefore stress relieved before hardfacing to ensure minimum or zero distortion.

### **Preheating to improve metallurgical properties**

Preheating of the base metal will not only minimize distortion but also prevent cracking of the deposit and base metal. Preheating of small parts is easy. They can be heated with an oxyacetylene torch. Large parts can be heated locally (where weld is to be deposited) or the entire part may be heated. This can be done by oxy acetylene torch or by electrical means. Preheating should not be too severe and rapid because then the outer surface heats up too much while the inside mass remains relatively cool.

**Technology (SC-1)  
9th – 14th Nov. 2009**

**Course for Welding  
Procedures & Qualifications  
(QA-2)  
23rd – 25th Nov. 2009**

**Certification Course for  
Welding Inspector (QC-1)  
7th – 12th Dec. 2009**

**Hands on training for  
Welders / Operators**

This can cause internal stresses as well as cracks in the base metal.

### **Mechanical and thermal treatment of hardfaced jobs**

The wear resistant properties of the hard facing deposit can be improved by mechanical (impact resistant improvement by repeated hammering) and thermal treatments. The procedure for heat treatment has to be adopted in accordance with the chemistry of the weld deposit and taking into consideration the type of service conditions it has to face. Engineering components such as automobile valves, hot working dies and hot shear blades can be most efficiently produced by correct choice of the base metal, hardfacing deposit chemistry and final heat treatment.

### **Welding processes for depositing hard material**

Hard weld deposits can be laid by using different processes, depending on the applications. Oxy acetylene welding is used for small parts and for precise buildup. Manual metal arc welding is most commonly used because of easy availability of welding consumables and equipment and also because of possibility of extensive buildup on heavy components. Flux cored hardfacing wires and submerged arc flux and wire combinations are used in semi automatic and automatic mode for hardfacing standard components on a production scale.

Ador Welding Limited has a wide range of superior hardfacing consumables for manual metal arc welding as well as for flux cored and submerged arc welding. These consumables are capable of withstanding wear due to impact, friction and abrasion, corrosion; heat and or a combination of these wear factors. Names of some consumables are given below. Please click on the name to know more about how the applications where these consumables can be used.

### **Range of Hardfacing Electrodes**

ZEDALLOY 250  
ZEDALLOY 350  
ZEDALLOY 350 (LH)

ZEDALLOY 550  
ZEDALLOY 550 (LH)  
ZEDALLOY 600  
ZEDALLOY VB  
ZEDALLOY 12Mn  
ZEDALLOY 20Cr  
SUPER ZEDALLOY  
SUPER ZEDALLOY Ni  
ZEDALLOY K

#### Range of fluxes for Hardfacing

AUTOMELT H 25  
AUTOMELT H 35  
AUTOMELT H 45

#### We are here to help you increase service life of hardfaced jobs

Please contact Mr. N H Singh (+91 95940 35560, [nhsingh@adorians.com](mailto:nhsingh@adorians.com)) for help in improving life of hardfaced components or for assistance in selecting process and consumables most suitable for your hardfacing job.



Project Engineering Solutions



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Welding & Cutting Solutions



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