the Welding Defects DECODED

Case Studies on Welding Defects

(An quarterly compilation, an initiative of IndiaWelds.com)

Issue 001 Jul-Sep 2017

Dear Welding Enthusiast!

Every fabricator, at some point of time gets into a bizarre situation that demands an 'on job' solution. The defects in welding can put us into a myriad of complexities that demands both time and money. At that time, what we need is just an 'idea' that can sail us through!

As the saying goes, "the best teamwork comes from men who are working independently towards one goal in unison." It is with this spirit that we, IndiaWelds.com in association with Spatter Cure Enterprises, a pioneer in the industry for its range of anti spatter solutions, are presenting to you 'the Welding Defects Decoded' – a periodical featuring case studies on welding defects.

Through our 'Welding Defects Decoded', we attempt to bring forth issues that we come across during welding, and how the contributor worked out a solution in that specific job set up. Because not all that we read in texts are practically possible to do, in a given particular set up, we are looking for ideas that are applicable to eliminate the welding defect(s).

Herein, we aspire to bring in the experienced minds together, to achieve quality in welding. Situations and solutions have been encapsulated into different case studies and presented in a small writeup that is easy, on-the-go read. These might reflect upon your own such moments of difficulties and the cases may come handy as references as well.

This will benefit not just the industry professionals, but also the students who will shape the future of our industry.

In the first issue, we take up two issues 'Magnetism in Welding' and 'Welding Distortion'. Both these issues are quite rampant in the fabrication industry. Two of our contributors have attempted to bring forth basic and a practical solution that will help many others facing similar situation.

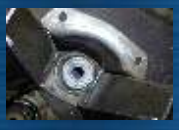
Again, as Henry Ford once said, "coming together is a beginning. Keeping together is progress. Working together is success."

And this is only the beginning! Let us all join hands, learn and succeed!

Keep welding - metals and words!

Team - Welding Defects Decoded

In this Issue



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For more information, and contribution, write to us at wdj@indiawelds.com

DECODING BLOW HOLES IN STAINLESS STEEL WELDING

In a set up where all parameters of welding was perfect, what led to blow holes in my job forced me to a new perspective of looking at defects.

It was my usual job of welding a 9.5 mm stainless steel sheet. And I along with my buddy had gained immense notoriety in dealing with most difficult welds. We had the perfect MIG welding environment and gave a sound job. However, it turned to be a bad weather day for me! My perfections and skills were put at stake! I had to get to the root cause of what was causing blow holes in my weld joint! And keeping in mind my approaching deadline to complete the jobs at hand, I knew I had a tough task.

Material Welded	Austenitic Stainless Steel – SS304 9.5 mm
Type of Welding	MIG
Wire Size & Voltage	0.030" , 21 V
Pre -Weld Preparation	Yes, Preheating

The Issue

We all know that blow holes can be caused due to a number of factors like arc length, travel speed, current input, surface preparation etc. But here, in my case, all these factors were kept at the ideal level. All possible solutions were worked upon but none gave results.

Upon observation, we could make out that there was problem with the arc. The arc got deflected every time it was struck. This led to a bad weld. The deflection of arc or arc blow led us to some other theory. We checked the workpiece connection, the joint design, the equipment settings etc. All seemed fine too. We understood that we need to look beyond this...

The Arc Blow

Since arc blow can be caused also due to magnetism in the sheets, we started reasoning out with the material that we welded upon. The sheets were new from a reputed supplier. But we could take no chance.

We got the material to test for its composition. The result showed that there was around 9% of Nickel in the stainless steel. A higher percentage of Nickel increased the magnetic susceptibility of the steel. This led to a deflection of Arc or Arc blow during welding.

Preheating that was done prior to welding should have taken care of magnetism. But in our case, that seemed not enough. Since we could not change the material at that time, we worked towards demagnetization and achieved a sound welding.

The Solution

The magnetism in the sheet can be induced due to the material. Before undertaking welding for huge jobs, it is better to get the material tested.

Demagnetisation is a costly and time consuming process that can best be avoided by using the correct material with Nickel content in stainless steel (SS304) not going preferably beyond 8% . This saves upon a lot of effort in rectifying the issues that otherwise arise due to magnetism. Only preheating may not yield results.

Contributed by: D. Jena
(The author is a mechanical engineer with 15 years of experience.)

DISTORTED WELDING, DISTRESSED WELDER!

When my weld always gave me angular distortion and sleepless nights, I tried a new method to set it correct.

I am a not so novice welder with few years of experience in MIG welding. Mostly I have worked on thin sheets and for components for automobile industry. This time my firm got a contract for big components that required welding of thick sheets (20mm).

The 20mm thick sheet was MIG welded with a single V groove. However, the non uniform cooling issue and the residual stress thus formed led to angular distortion in the welded plate. The distortion though was very little, but none the less that gave me an out of proportion finished component.

Different angles to face the angular distortion

Distortion is an issue that is common in thin sheets as well. And we handled it previously with proper clamping. This time, I tried increasing the speed and worked with the voltage too. But none gave me the needed finish.

I was also suggested to try U groove to minimize distortion. But the U groove being an expensive affair, I could not go ahead with it. I was also suggested to clamp it in a distorted manner so that after welding I got the plates straight. Then I tried to work on the edge preparation that was easy – the V groove that I was already working on. However, there was a change this time. I tried double V groove. And yes, it worked!

Finally the edge got it right!

I would consider that the double V groove worked for me both economically and qualitatively. The edge preparation did not require any special preparation. Double V was easy to get as the sheet was thick. What happens is, when we are welding on both sides, the stress developed by the filler metals and the heat generated during welding on one side is balanced by the stress developed on the other side. This is probably easy as the edge preparation is viable.

Material Welded	MS 20mm
Type of Welding	MIG ; Spray Arc Transfer
Wire Size & Voltage	.045" (1.1 mm), 30V
Groove Preparation	V – Groove

And from then on, double V groove became a regular joint preparation for any of my thick sheet welding. As they say, to set things straight, use the curve...err use the `V'!

Contributed by: H.Pandey
(The author is a welding enthusiast with 5 years of experience.)