Shaft Straightening

Flame straightening is one of those old-timer skills everybody has heard of but few have had the opportunity to witness. The ability to straighten bent plates and shafts is almost magical in its simplicity. This technique has been used to straighten everything from the hulls of ships to samurai swords.

Metalworkers are continually confronted with the negative aspects of joining metals by welding. Whenever metal is heated, it expands and not always in a favourable way. Most often it has a negative impact on the end product. The results are manifested as warpage, distortion and stress.

Every welded structure will try to seek the position of least-stored stress. When welding on a metal structure, this is happening continuously. The weldment is undergoing a constant rearrangement to find this state of least stress.

Welding sequence and clamping can reduce, but can never eliminate the effects of expanding hot metal. When you stress-relieve a weldment or part, you are allowing remaining locked-in stress to dissipate via heating or vibration.

Flame straightening uses the same principles that cause warpage or distortion to make positive corrections. The best way to imagine how this process works is something like reverse welding. An example is using the effects of controlled distortion to induce a large camber. These kinds of results can be accomplished with the humble cutting torch and the knowledge of where to apply the technique.

Flame straightening is the specific application of controlled cycles of heating and cooling that are used to correct, enhance or minimize distortion in metals. Flame straightening causes a contraction or localized shrinking in metals used to effect changes in geometry. The technique is applied with a common oxy-acetylene torch in a specific way that induces the maximum amount of contraction.

Flame straightening works best when the distortion is caused by welding or is related to heat. It can be used on any material that has no restrictions on the application of heat from an oxy-acetylene torch. It works best with materials that do not have high thermal conductivity. Steel and stainless steel are the primary candidates, while aluminium and copper are less than enthusiastic about this technique.

Unlike pressure methods, such as hydraulic presses and screw jacks, flame straightening is the laser-guided smart bomb that attacks the exact offending areas. Pressure methods distribute their gross application of forces throughout the structure and sometimes cause more harm than good.

Hydraulic rams further complicate the correcting measures because they lack a sense of feel connected with the yield point of a particular material.

At Western Engineering we are fortunate to have a very experienced engineer, Brian Harvey, who is an expert in this area.

Shaft Straightening in Progress

Shaft Straightening Jig with long Hollow Shaft ready to be Straightened

Brian at Work with Oxy-Acetylene Torch and Cooling Water Nozzle