



Welding Process Selection

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Step 1 - Joint Requirements

- The first thing to look at is whether your weld joint is large or small, whether the joint is out of position or not, and whether the base metal is thick or thin.



In welding, the needs of any joint are expressed in four terms:

1. **Fast fill** (high deposition rate welds)
2. **Fast-Freeze** (the joint is out of position overhead or vertical)
3. **Fast-Follow** (high arc speed and very small)
4. **Penetration** (the depth the weld penetrates the base metal)

Fast Fill

Required when a large amount of weld metal is needed to fill the joint. A heavy weld bead can only be laid down in minimum arc time with a high deposition rate. However, Fast-Fill becomes a minor consideration when the weld is small.



Fast Freeze

Implies that a joint is out-of-position, and therefore requires quick solidification of the molten crater. Not all semiautomatic processes can be used on fast-freeze joints.



Fast Follow

Suggests that the molten metal follows the arc at rapid travel speed, giving continuous, well-shaped beads, without "skips" or islands. This trait is especially desirable on relatively small single-pass welds, such as those used in joining sheet metal.



Penetration

Varies with the joint. With some joints, penetration must be deep to provide adequate mixing of the weld and base metal and with others it must be limited to prevent burn through or cracking.



Step 2 - Matching Joint Requirements with Processes

Manufacturers' literature will usually give information on the ability of various processes to fulfill the needs of the joint. (Or, a call or email to your local welding supplier will bring the needed information.) A wrong answer is virtually impossible at this point, since the deposition rate and arc-speed characteristics of each process can be clearly defined. Since you have characterized your weld joint, it's simply a matter of selecting the process that suits your characterization.

So what do you do when you find that two or more processes are suitable, which is sometimes the case? You create a checklist!

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Step 3 - The Checklist

Considerations other than the joint itself have a bearing on selection decisions. Many of these are specific to your job or welding shop. However, they can be of great importance and a key factor in eliminating alternate processes.

Organize these factors into a checklist and consider them one-by-one:

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- **Volume of Production**

You must justify the cost of welding equipment by the amount of work, or productivity, required. Or, if the work volume for one application is not great enough, another application may be found to help offset the costs.

- **Weld Specifications**

Rule out a process if it does not provide the weld properties specified by the code governing the work.

- **Operator Skill**

Operators may develop skill with one process more rapidly than another. Will you have to train your operators in a new process? That adds cost.

- **Auxiliary Equipment**

Every process has a recommended power source and other items of auxiliary equipment. If a process makes use of existing auxiliary equipment, the initial cost in changing to that process can be substantially reduced

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- **Accessory Equipment**
Availability and cost of necessary accessory equipment - chipping hammers, deslagging tools, flux lay-down and pickup equipment, exhaust systems, et cetera - should be taken into account.
- **Base-Metal Conditions**
Rust, oil, fit-up of the joint, weldability of the steel, and other conditions must be considered. These factors could limit the usefulness of a particular process.
- **Arc Visibility**
Is there a problem following irregular seams? Then open-arc processes are advantageous. On the other hand, if there's no difficulty in correct placement of the weld bead, there are "operator-comfort" benefits with the submerged-arc process; no head-shield required and heat from the arc is reduced.

Fixturing Requirements

A change to a semiautomatic process requires some fixturing if productivity is to be realized. Appraise the equipment to find out if it can adapt to processes. The completed checklist should contain every factor known to affect the economics of the operation. Some may be specific to the weld job or weld shop. Other items might include:

Protection Requirements
Range of Weld Sizes
Application Flexibility
Seam Length

Setup Time Requirements
Initial Equipment Cost
Cleanliness Requirements

Evaluate these items realistically recognizing the peculiarities of the application as well as those of the process, and the equipment.

Human prejudice should not enter the selection process; otherwise objectivity is lost - when all other things are equal, the guiding criterion should be overall cost.

Step 4 - Review of the Application

This may seem redundant, but the talents of experts should be utilized. Thus, the checklist to be used is tailored by the user to his individual situation. You know your application best and your welding expert knows his equipment best. Together, you should be able to confirm or modify the checklist.

Systemizing the Systematic Approach

A system is of no value unless it is used. Create a chart and follow the steps to determining process. By taking the time to analyze each new weld joint, your operation will become more productive and your welding experience will be more fulfilling.



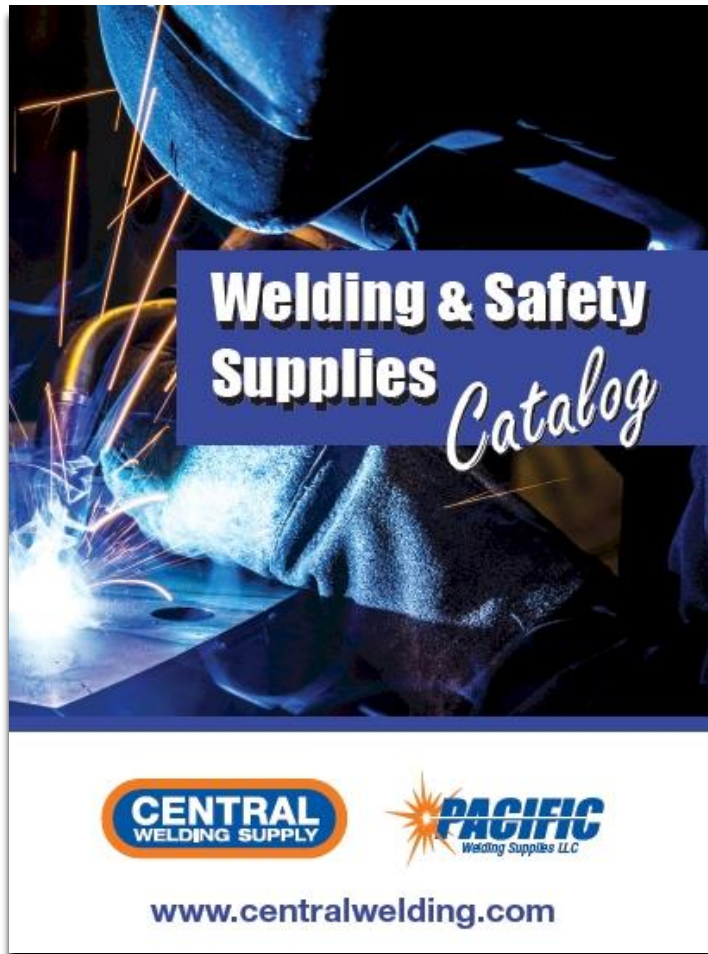
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