AMADA®

NUGGETS™

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TECHNICAL APPLICATION BRIEF

Cascading

OVERVIEW

"Cascade" welding is used in a variety of applications: large sheet metal welding, cross wire welding, bracket to sheet metal, electronic cabinets, and furniture just to name a few.

Cascade welding occurs when a control using just one weld schedule, initiates a single air valve to close multiple electrodes, and sequentially fires two or more SCR's. A number of variations can be applied to this methodology enabling end users to improve the welding process, and reduce maintenance and operating costs. This Nugget explains how and why Cascade welding is used, how it can be improved, and the benefits these improvements will realize.

THE BENEFITS OF CASCADING

Power Distribution

Cascading allows for even power distribution such that each phase of the line can be fired in a sequence that minimizes power requirements. This is particularly important in systems that are already at their available power limits. Additionally, not all buss systems are designed to handle such high power all at once.

Capital Equipment Cost Savings

Cascading the weld process reduces the need to purchase multiple controls; one cascade control with multiple SCR's can operate multiple electrodes.

OPERATING COST SAVINGS

Cascading allows for more even power consumption. Power costs can be considerable when operating multiple controls. Especially when all controls are fired at the same time; peak power costs rise quickly.

MAINTENANCE COST SAVINGS

As one control can operate multiple stations, spare parts and maintenance costs are kept to a minimum; rather than having multiple controls each requiring their own wiring, water, and installation the builder can use one cabinet, which encloses the appropriate number of SCR's.

SPACE REDUCTION

One control and multiple SCR's use considerably less space than multiple controls, allowing the integrator to reduce the size of the weld machine and use less floor space for the overall production line.

Added Features of Amada Miyachi Americabrand Cascaded Controls

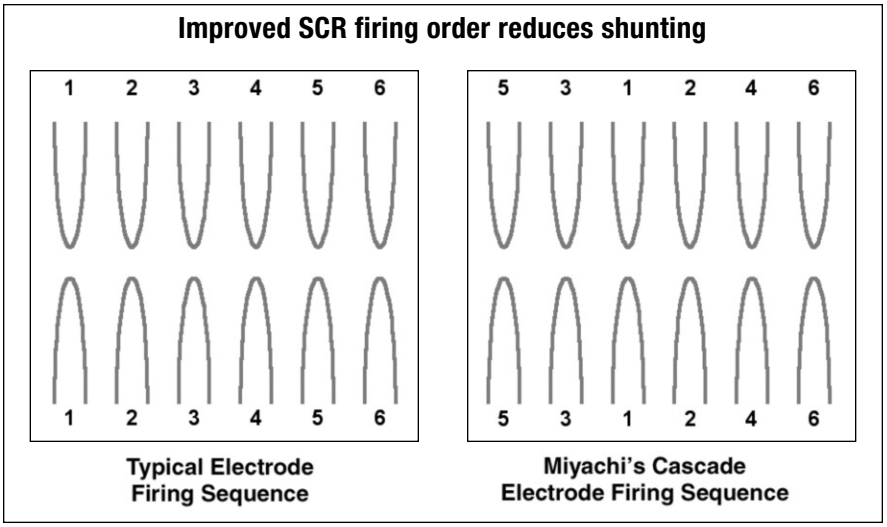
FLEXIBILITY

Process Control

The ability to use different weld schedules during the cascade process allows each weld to be optimized. For example, in a process with parts of differing material thickness, properties or tooling, schedules can vary within each weld.

Steppers minimize maintenance

The ability to count the welds and program the weld schedule for each electrode allows the end user to establish steppers. "Steppers" are programmable increases or decreases in the heat or current settings that are automatically implemented based on the weld count. The use of steppers can greatly increase electrode life and/or improve weld nugget quality. When used with Secondary Constant Current, stepping is of great benefit as the operator can increase the time between electrode dressing/replacement while maintaining the appropriate amount of current, giving precise control over the welding process.



Selectable schedule sequencing

REDUCED SHUNTING

In certain applications spot welds may be close enough together to cause shunting (current takes a path through a conductor other than the desired conductive path). If this occurs, the required weld current may not be reached and the resultant weld will be of poor quality. Shunting can occur when all the welds are made at the same time or in the wrong sequence. New features within Amada Miyachi's Cascade controls allow the user to improve the process so that shunting is reduced significantly or eliminated.

CURRENT CONTROL

Secondary Constant Current can be monitored and fed back to the control.

The most common weld mode used for cascade welding is "Percent Heat", an open loop mode, which does not provide information feedback to the weld control, therefore, limiting the ability to control the weld process because variations in the system are not compensated for. Secondary Constant Current, a closed-loop mode, feeds back an output signal and automatically adjusts output during the weld process to ensure that the required current is consistently delivered. Primary Constant Current control can be used but will not achieve the same level of control as Secondary Constant Current because it monitors on the primary side of the transformer and does not necessarily reflect the current passing through the part.

Reads the actual current at the weld electrodes.

By using Secondary Constant Current the user is able to program the proper current required for each spot weld application and to set upper and lower control limits. Should the process go out of these control limit ranges an external alarm can be sounded.

Secondary Constant Current can be used on up to 8 transformers.

As stated above, the Percent Heat mode does not provide feedback with regard to multiple welds and transformers. Similarly, Secondary Constant Current working with only one feedback coil would not provide sufficient information to keep the process under control. In order to understand what the process is doing on up to 8 transformers the user must have the capability of connecting toroidal coils for each transformer. Each of the welds can then be monitored and upper and lower control limits can be set for each.

SUMMARY

Amada Miyachi's new Cascade STA Series Weld Controls feature independently selectable schedules and SCR's, and multiple channel secondary constant current for up to 8 transformers. While conventional controls require the use of an external controller such as a PLC to perform sequential firing, cascading allows the operator to control firing sequences without the use of an external controller. With the addition of individual component monitoring for SCR's and Transformer thermostats, the welding process has never been in better control.

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