

B.F. Shaw Inc.

Welding Engineering

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To: Randy Davis Tip Mate Systems

Date: October 7, 2002

Subject: Ceramic Electrode Extension Nozzle

Randy,

It is often said that the simplest solutions are generally the best. In line with this philosophy it is obvious that the Tip-Mate ceramic nozzle has proven itself timely. It speaks for the absolute immensity of our industry that a technology lying dormant for so long would need to await the proper circumstances in order to be utilized to its fullest and become successful. I have to admit that in the beginning, unaware of the voluminous research in support, I was skeptical. I can now testify to the fact that I am convinced. The technology is sound.

As a matter of practical application we have done a number of experiments with the nozzle ourselves and discovered a number of applications. Given that the main thrust was solid wires, we of course have centered our efforts there. We have achieved wire speed rates of 190 IPM with 3/32" solid wires for carbon steel, B2, and B3 consumables. The decreased heat input allows good solidification of the puddle for circumferential butt welds.

Once convinced of viability of these applications we decided to think outside the box and do some work with flux cored applications. We were taking a look at flux cored SAW processes at the time and decided to apply the nozzle to them. With 3/32" FC-SAW we achieved a wire speed of 220 IPM on carbon steel. The coupon radiographed clean, and the bead appearance was excellent as was the case with solid wires.

The next stage for us was to assure ourselves of its viability mechanically. After performing all necessary ASME Section procedure qualification testing regimes we found no noticeable difference in mechanical properties. From that point forward the ceramic nozzle was applied.

I am certain that many of your customers have realized the exact same results as we have, but I would add one additional note that may be helpful. The narrow configuration of the ceramic nozzle itself, as compared to the current standard SAW nozzles, allows two distinct advantages. Either a more narrow groove design can be utilized for less volume deposition, or more flexibility and maneuverability can be afforded within the groove itself, or both. This maneuverability within the groove helps the welder to determine the placement of individual beads more precisely, and thereby improve radiographic reject rates.

In closing, I am sold on the technology and would certainly be willing to discuss it with any interested party would you consider it helpful.

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