Axial III Plus Plasma Spray Torch

The Axial III Plus is a smaller, lighter, and more ergonomic version of the original Axial III M600 torch that produces the same high-quality coatings at high feed rates and deposition efficiency.

Key Innovations

- 90° cable configuration to reduce overall length and allow easy access to fasteners for assembly and disassembly.
- Optimized part features and dimensions to reduce overall mass.
- Larger gas jet lines to reduce back pressure.
- Integrated features to reduce total number of parts.
- Multi-start threaded nozzle cap and threaded cathodes for quick and easy fastening.
- Pre-aligned suspension injector assembly to eliminate the need for manual alignment.
- Modified anode retainer design and tolerances for better electrode alignment.
- Refined electrical cable contacts for easier assembly and disassembly, greater longevity, and more secure electrical connection.
- High-velocity and high-force articulating air jets for more effective substrate cooling and blow-off.
- Maintains Axial III M600 plasma geometry, coatings, and parameters.

Quantitative Improvements

<table>
<thead>
<tr>
<th>Feature</th>
<th>M600</th>
<th>A3+</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length – torch &amp; contact block</td>
<td>23.6 in</td>
<td>6.1 in</td>
<td>74% reduction</td>
</tr>
<tr>
<td>Mass – torch &amp; contact block w/o cables</td>
<td>15.75 lbs</td>
<td>6.70 lbs</td>
<td>57% reduction</td>
</tr>
<tr>
<td>Average Assembly/Disassembly Time</td>
<td>5min:21sec</td>
<td>2min:28sec</td>
<td>54% reduction</td>
</tr>
<tr>
<td>Number of Parts</td>
<td>84</td>
<td>61</td>
<td>27% reduction</td>
</tr>
<tr>
<td>Gas Jet Back Pressure @ 250 slm</td>
<td>27 psi</td>
<td>20 psi</td>
<td>26% reduction</td>
</tr>
</tbody>
</table>
Coatings

The \textit{M600} and \textit{A3+} torches produce very similar, high-quality coatings as illustrated below.

\begin{center}
\includegraphics[width=\textwidth]{coatings.png}
\end{center}

\textbf{A3+ Specifications}

\begin{tabular}{|l|l|}
\hline
\textbf{Plasma jets} & 3 converging \\
\hline
\textbf{Plasma chemistry} & \textit{Ar, N}_2, \textit{H}_2 (He) \\
\hline
\textbf{Plasma flow} & 100 – 300 slm \\
\hline
\textbf{Power range} & 30 – 150 kW \\
\hline
\textbf{Arc current} & 100 – 250 amps/jet \\
\hline
\textbf{Feedstock injection} & axial with plasma flow \\
\hline
\textbf{Spray Distance} & 2 – 10 in (5 – 25 cm) \\
\hline
\textbf{Mass} & 6.7 lbs (3.04 kg) \\
\hline
\textbf{Length} & 6.1 in (15.5 cm) \\
\hline
\end{tabular}

\textbf{Industrial Applications}

\begin{itemize}
\item Aerospace & Industrial Gas Turbines:
  \begin{itemize}
  \item Thermal barrier coatings for turbine blades, vanes, combustion liners and ducts.
  \item Metallic and ceramic abradable coatings for compressor housing.
  \end{itemize}
\item Pulp & Paper:
  \begin{itemize}
  \item Wear and corrosion-resistant coatings for rolls, doctor blades, and other parts.
  \end{itemize}
\item Semi-conductor manufacture:
  \begin{itemize}
  \item Plasma etch-resistant coatings for etching chambers.
  \item Dielectric coatings for electrostatic chucks.
  \end{itemize}
\item Solid Oxide Fuel Cells:
  \begin{itemize}
  \item Electrolyte layer, anode, and cathode.
  \end{itemize}
\item Automotive:
  \begin{itemize}
  \item Wear-resistant coatings for brake discs, shifter forks, etc.
  \end{itemize}
\item Medical:
  \begin{itemize}
  \item Biocompatibility coating for implants.
  \item Anti-viral coatings.
  \end{itemize}
\end{itemize}

\textbf{About Mettech}

Northwest Mettech Corp. is a manufacturer of innovative plasma spray equipment featuring Axial Injection. Since 1990, Mettech and our worldwide network of distributors and partners have provided solutions to demanding coating requirements.

Key offerings of our product line include:

\begin{itemize}
\item \textit{Axial III M600} and \textit{Axial III Plus} plasma spray torches with the associated control system and power supplies.
\item Suspension Plasma Spray (SPS) equipment to produce nano-structured coatings.
\item Service, support, and contract coating development.
\end{itemize}

\textbf{Contact Information}

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