Air-Blast Cabinet Capabilities

Air-blast cabinets excel in a multitude of surface-treatment jobs ranging from cleaning to peening. A short list of the most common applications follows.

Finishing
- Add matte or satin finish, or decorative frost
- Remove glare or imperfections
- Blend marks
- Hone and burnish
- Mark identifications

Cleaning and Removal
- Chemical impurities
- Coatings
- Paint
- Sealants and adhesives
- Carbon deposits
- Scale
- Excess brazing
- Casting materials
- Flashing
- Burrs
- Rust
- Oxidation

Surface Treatment and Preparation
- Strengthen
- Add fatigue resistance
- Reduce design weights, porosity or friction
- Boost resistance to corrosion
- Improve lubrication
- Expose flaws for inspection
- Etch for bonding and adhesion
- Cut

Never use silica sand in any Empire equipment.
Operating Principles of Air-Blast Cabinets

Air-blast cabinets use one of two operating systems: pressure or suction.

As shown in the drawing to the right, pressure systems apply compressor power all the way from the media storage hopper to the nozzle outlet, resulting in faster work, more precise control at both high and low pressures and, in many applications, more efficient use of compressed air than is possible with suction systems.

Suction systems, which rely on a venturi effect to draw media from the storage hopper, offer the enticements of lower capital costs and easier deployment of multiple blast guns.

Tunable reclaimers (see right) recycle media of various densities. By adjusting a fine-tuning band on the reclaimer, the amount of air introduced into the system can be controlled to assure precise separation of functional media from dust and other unwanted debris.

As spent media, dust and debris are pulled by air flow to the reclaimer inlet, incoming air and media spiral in a downward vortex, throwing larger particles against the outer reclaimer wall. An air stream forms an upward counter vortex through the center tube, which carries out dust while heavier particles drop into the storage hopper below for reuse. A screen catches any oversized debris.

Dust and undersized debris are drawn from the reclaimer into the bottom of the dust collector. Sudden expansion forces heavier dust particles to the bottom. Remaining fine dust is pulled to the surface of the dust filters. Clean air can then be discharged to the work area.

NOTE: The CFM of Empire reclaimers is rated at nominal static working pressure of 6” water, with the exception of the 1200 CFM model, rated at 10” static pressure. Competitive units may appear to achieve higher CFM due to ratings based on inadequate working static pressure.
### Blasting Basics: Pressure-System Nozzles

#### Pressure-Blast Air Requirements (SCFM)

<table>
<thead>
<tr>
<th>Pressure (PSI)</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>80</th>
<th>100</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>¼” nozzle</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>13</td>
<td>14</td>
<td>17</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>½” nozzle</td>
<td>15</td>
<td>18</td>
<td>22</td>
<td>26</td>
<td>30</td>
<td>38</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td>⅝” nozzle</td>
<td>27</td>
<td>32</td>
<td>41</td>
<td>49</td>
<td>55</td>
<td>68</td>
<td>81</td>
<td>97</td>
</tr>
<tr>
<td>¾” nozzle</td>
<td>42</td>
<td>50</td>
<td>64</td>
<td>76</td>
<td>88</td>
<td>113</td>
<td>137</td>
<td>152</td>
</tr>
<tr>
<td>1” nozzle</td>
<td>55</td>
<td>73</td>
<td>91</td>
<td>109</td>
<td>126</td>
<td>161</td>
<td>196</td>
<td>220</td>
</tr>
</tbody>
</table>

4 SCFM = 1 horsepower

Compressors should be sized to the next larger nozzle to allow for nozzle wear.

#### Pressure-Blast Spray Diameters

#### Suction-Blast Air Requirements (SCFM)

<table>
<thead>
<tr>
<th>Pressure (PSI)</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>¼” nozzle, ½” air jet</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>½” nozzle, ¾” air jet</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>17</td>
<td>19</td>
<td>21</td>
<td>23</td>
<td>26</td>
</tr>
<tr>
<td>¾” nozzle, 5/16” air jet</td>
<td>15</td>
<td>19</td>
<td>23</td>
<td>27</td>
<td>31</td>
<td>37</td>
<td>38</td>
<td>42</td>
</tr>
<tr>
<td>½” nozzle, 5/32” air jet</td>
<td>31</td>
<td>38</td>
<td>45</td>
<td>52</td>
<td>59</td>
<td>66</td>
<td>73</td>
<td>80</td>
</tr>
</tbody>
</table>

4 SCFM = 1 horsepower

#### Suction-Blast Spray Diameters

Never use silica sand in any Empire equipment.
Blasting Basics: Media Guide

<table>
<thead>
<tr>
<th>Media Guide</th>
<th>Glass bead</th>
<th>Ceramic shot</th>
<th>Stainless cut wire</th>
<th>Steel shot</th>
<th>Steel grit</th>
<th>Aluminum oxide</th>
<th>Silicon carbide</th>
<th>Bicarb of soda</th>
<th>Crushed glass</th>
<th>Plastic media</th>
<th>Agri shell</th>
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</thead>
<tbody>
<tr>
<td>Finishing</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Cleaning/Removal</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Peening</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Surface Profiling (Etch)</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Working Speed</td>
<td>MED</td>
<td>MED</td>
<td>MED</td>
<td>MED</td>
<td>MED-HIGH</td>
<td>HIGH</td>
<td>HIGH</td>
<td>VERY-HIGH</td>
<td>LOW</td>
<td>HIGH</td>
<td>LOW-HIGH</td>
</tr>
<tr>
<td>Recyclability</td>
<td>HIGH-LOW</td>
<td>HIGH</td>
<td>VERY-HIGH</td>
<td>VERY-HIGH</td>
<td>MED-HIGH</td>
<td>MED-HIGH</td>
<td>MED-HIGH</td>
<td>MED-HIGH</td>
<td>LOW-HIGH</td>
<td>LOW-HIGH</td>
<td>LOW-HIGH</td>
</tr>
<tr>
<td>Probability of Metal Removal</td>
<td>VERY LOW</td>
<td>VERY LOW</td>
<td>VERY LOW</td>
<td>VERY LOW</td>
<td>MED</td>
<td>MED-HIGH</td>
<td>MED-HIGH</td>
<td>NONE</td>
<td>LOW-MED</td>
<td>MED-LOW</td>
<td>MED-Low</td>
</tr>
<tr>
<td>Hardness, MOH Scale (Rockwell RC)</td>
<td>5.5</td>
<td>7</td>
<td>6-7.5</td>
<td>6-7.5</td>
<td>8-9</td>
<td>8-9</td>
<td>9</td>
<td>2.5</td>
<td>5.5</td>
<td>3-4</td>
<td>1-4.5</td>
</tr>
<tr>
<td>Bulk Density (lb/cu. ft.)</td>
<td>100</td>
<td>150</td>
<td>280</td>
<td>280</td>
<td>125</td>
<td>95</td>
<td>60</td>
<td>100</td>
<td>45-60</td>
<td>40-80</td>
<td></td>
</tr>
<tr>
<td>Mesh Size</td>
<td>30-440</td>
<td>8-46</td>
<td>20-62</td>
<td>20-200</td>
<td>10-325</td>
<td>12-325</td>
<td>36-220</td>
<td>70-220</td>
<td>30-400</td>
<td>12-80</td>
<td>MANY</td>
</tr>
<tr>
<td>Typical Blast Pressures (psi)</td>
<td>20-55</td>
<td>20-90</td>
<td>20-90</td>
<td>20-90</td>
<td>20-90</td>
<td>40-80</td>
<td>20-50</td>
<td>20-60</td>
<td>10-40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shapes: □ Angular; • Spherical</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>• or •</td>
<td>•</td>
<td></td>
</tr>
</tbody>
</table>

NOTES: Above information is intended as a general reference guide. Consult your authorized Empire distributor for more specific guidance.
1) Sodium bicarbonate must be treated with a flow agent.
2) Do not use silica sand in any Empire blast equipment.
3) See “Media/Reclaimer Compatibility” chart on Page H2 for mesh sizes compatible with reclaimer systems.

Profile: A Critical Aspect of Surface Prep
Blast Class defines surface cleanliness. Surface Profile describes surface shape. For coatings—and the parts they protect—to perform successfully, surfaces must be clean and properly profiled.

In the blasting process, grains of abrasives carry kinetic energy to the work surface. Upon impact, the grains of aggressive abrasives dig out holes, creating a “mountain & valley” texture on the surface.

The texture created affects the appearance and friction coefficients of “finished” parts (those requiring no coating) most directly, but profile plays a major roll in the performance of coated surfaces as well.

Tailor Profiles to Coatings

When a profile protrudes through the primer, the surface soon rusts.

When a primer just covers the profile, little room remains for error.

Basic guidelines, shown below, provide a good start for best coating results.

Guide 1: Profile height should not exceed the dry-film-thickness (DFT) of the primer coat.
Guide 2: Profile height should not exceed a third of the total coating system’s dry-film-thickness (DFT).
Note: Consult the coating supplier for surface-profile specifications.
Blasting Basics: Surface Profile

**Blast Factors Affecting Surface Profile**

- **Abrasive Durability & Surface Hardness**
  - More durable abrasives dig a deeper profile more quickly than less durable media, which waste kinetic energy in the process of fracturing.
  - Harder surfaces resist the action of the abrasives more than softer ones.

- **Abrasive Shape**
  - Spherical media produce a dimpled/peened profile that normally enhances part strength.
  - Angular media cut a jagged profile receptive to coatings.

- **Abrasive Density**
  - High-density grains dig a deeper profile than low-density grains when all other blast factors remain constant.

- **Blast Intensity**
  - The maximum amount of work a particle can perform on a surface depends on its energy, a function of its mass and velocity. When all other variables — including fracture rates, shape, and density remain constant — faster moving particles dig a deeper profile.

- **Impact Angle**
  - Abrasives arriving at steep angles to the work surface dig deeper than those arriving at lower trajectories.

- **Embedment**
  - Larger, irregular, friable abrasives can embed in work surfaces, leading to poor results. Smaller, regular, more durable media reduce the risk.

For more information, contact Empire’s Applications Engineering Department.

Never use silica sand in any Empire equipment.