Selecting Blast Cleaning Equipment

A quick guide to the types of blast cleaning machines available and what you need to know to select the right one for your operation.

DEAN M. PETERS
Editor

He cleaning and finishing of castings has always been a tough, labor intensive operation. It is noisy, dusty, back-breaking work. But it is necessary because, for most applications, castings must be cleaned before they can be considered finished and functional. In some cases, they need to be cleaned before their quality can be verified.

Also, many casting users, sometimes regardless of the application, expect to receive cosmetically perfect parts. Given the fact that, aside from the packing and shipping department, your cleaning and finishing people are the last ones to handle the castings before your customer sees them, it stands to reason that the importance of your foundry shop (as the Europeans might refer to it) should not be minimized.

Stated briefly, the role of the cleaning shop is to transform a casting from its as-cast rough state to a finished product with a minimum of time and effort. Further, in today’s regulatory environment, this must be done in as clean and dust-free a workplace as possible. The ideal is for human handling of castings to occur only after they have cooled and been cleaned.

The factors to consider in selecting the right machine for your application are many and varied. But with the wide selection of machines and designs on the market, you may rest assured that there is equipment available to meet your needs.

Tumble Blast Machines

Probably the most common blast cleaning machine is the tumbler type. This design employs one or more shot blast wheels that hurl abrasive in an axial direction as the parts are tumbled in a drum. This is a good way to clean castings on a medium to high volume basis, providing the castings are not too delicate to be tumbled. The capacity range of these machines can run from about 200 lb up to 10,000 lb. Larger machines may require special foundations and additional sound-proofing. Also, high volume machines of any design with sophisticated separation systems may require additional ceiling clearances, so check these out before you make any final decisions.

Hanger Machines

In contrast to tumbler machines, generally considered the most effective for volume production, are hanger machines, used in applications in which cast components’ size, fragility, or size variability preclude the tumbling option. There are two types of hanger machines.

In the first, castings are manually loaded onto a suitably designed hanger. The blast chamber is then opened and the loaded hanger is pushed or power driven into the
Blast Cleaning Equipment Selection Checklist

The first question to ask in selecting the equipment appropriate to your cleaning application is "What do I need the system to accomplish?" Once you know that, you can proceed down the following detailed checklist, which can lead you to the size and type of equipment needed.

I. Description of Work
☐ Type(s) of parts to be cleaned.
☐ Size and geometric configuration of parts.
  ● Largest piece: Length, width, height, diameter, weight.
  ● Smallest piece: Length, width, height, diameter, weight.
☐ Is cleaning demonstration needed?

II. Operating Parameters
☐ Desired production rate.
☐ Available time to accomplish the work.
☐ System type: continuous, batch, or batch continuous.
☐ Condition of part to be cleaned.
☐ Cleaning requirements.
  ● De-burr, de-scale, burned-in sand, de-burr, cosmetic, etc.
  ● Specific customer specifications to be met.
☐ Temperature of parts to be cleaned.
☐ Is part-on-part impingement OK?
☐ Requirements for sand or magnetic separation.
  ● Recycling sand for downstream reclamation or disposal.
☐ Is moisture a problem?
  ● Do castings sit in the elements before cleaning?

III. System Requirements
☐ Space limitations.
  ● Available floor space.
☐ Can a pit be constructed?
  ● Substrate or water level problems?
☐ What is passline requirement?
☐ Can roof section be raised if necessary?
☐ Heaviest weight to be processed.
☐ Overhead or jib crane requirements.

IV. Material Handling Parameters
☐ How are parts to be introduced into the cleaning system?
☐ How are parts to be removed from the cleaning system?
☐ Plant-wide uniform tote box system to be maintained?
☐ Overhead monorail system required?
☐ Transfer system required?
☐ Standard transfer conveyor to be used?

V. Mechanical and Electrical Requirements
☐ Type of cabinet lining to be supplied.
  ● Manganese, manganese with hard lining, etc.
  ● Hydraulic or gear motor.
  ● Bearing, drive, and cylinder specifications.
☐ Type of blast wheel drive.
☐ Abrasive handling systems required?
☐ Primary and secondary power requirements.
  ● Type of controls.
  ● Standard.
  ● Programmable
  ● Diagnostic
  ● Linked to other equipment?
☐ Variable speed drives?
☐ Wiring required and panel location.
☐ Remote operator station needed?

VI. Pollution/Emission Control (Dust Collection)
☐ Cartridge or bag-style?
☐ Type of filter medium desired.
☐ Size requirements.
  ● Tie into existing system?
  ● Clearances under/around collector and type of discharge?
☐ Disposal system?
  ● Is fire protection needed?
  ● Is sound abatement required?
  ● Controls and safety equipment.
  ● Interior or exterior ventilation required?

VII. Supplemental Considerations
☐ Which options are desirable?
☐ Abrasive replenishers.
☐ Recirculation systems.
☐ Nice to have vs. need to have.
☐ What are major priorities?

VIII. Site Requirements
☐ Any permits required?
☐ Any civil or structural engineering required?
☐ What is impact on ventilation system?
  ● Make-up air required?
  ● Is current compressor adequate?
conveyor type of machine should be considered. This can provide a high level of throughput and integrates well with a highly automated operation. Typically, these machines can blast all four faces of an engine block at the rate of about 200 units hourly using eight blast wheels.

If you produce extraordinarily large castings, machines are available that operate on an axial throughput system providing a controlled flow of castings, simultaneously rocking and/or oscillating them under the blast stream.

**Controls and Accessories**

Virtually all manufacturers offer blast cleaning systems with state-of-the-art programmable and/or computerized controls that regulate the system's sequence and rate. Many have diagnostic capabilities. Remote operator stations are also an option.

Since the blast cleaning process produces some by-products that are recoverable and recyclable, most manufacturers offer systems for use with their equipment. These systems separate and recover sand, abrasive, and metal particulates for proper disposal or recirculation for re-use.

**Conclusion**

There's a blast cleaning system out there that meets your needs. To find it, get the manufacturers involved early in your evaluation process. You may know what you want to do, but they're the ones who can show you how to do it.
Blast Cleaning Equipment

Continued from p. 25

Blasting Basics

Blast cleaning systems are complex mechanical, electrical, and electromechanical components integrated to provide practical and efficient cleaning of cast components. But despite the sophistication and complexity of modern blast cleaning equipment, it all boils down to the following basics:

- **Blast Wheel**
  The heart of every blast cleaning system is the blast wheel. It has been said that the machine is only as good at cleaning as the wheel that throws the shot toward the cast components. It stands to reason, then, that the wheel design of a system under consideration for purchase should be studied closely. Examine the wheel's construction noting the type and number of vanes it has; the materials used in its construction; the quality of its housing; the type of drive used to turn it; the horsepower ratings of the wheel motors; the types of bearings used; and the rate of abrasive delivered to the parts to be cleaned.

- **Separator**
  The separator must meet the requirements of your application. Inadequate or poor separator systems can undermine your cleaning operations. In sand casting applications, for example, sand will come away from the castings first and quickly. It must be dealt with adequately, or the sand will cycle back to the blast wheel and cause wear problems. Make sure that air filters are capable of meeting current environmental regulations.

- **Shot Blast Chamber**
  It is important to ensure that the chamber is adequately protected. Hard metallic plates used as liners are best, but some operators cut costs by using rubber to line the chamber. Be careful, though, since some manufacturers warn that economies here can lead to rapid wear, serious down time, and additional overall cost.

- **Maintenance**
  Blast cleaning is a self-destructive process, so a rigorous maintenance program is essential to realize an adequate return on your equipment investment. To facilitate the maintenance process, see how easy it is to check and replace vanes, impellers, linings, etc. Ask the manufacturer what the reasonable life of these items might be and on the availability of replacement parts. It may be a good and cost effective idea to contract for maintenance with the manufacturer of the system.

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