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THE KUE GROUP GUIDE TO GRIT BLASTING

How To Choose The Right Surface Preparation Method For Your Project

Contents

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Grit Blasting: Is It The Right Blast Method For Your Surface Preparation Requirements?

Grit blasting is a method of abrasive blast cleaning used to prepare substrates for a wide variety of purposes. These range from general cleaning, vehicle restoration, preparation of a substrate for subsequent painting, coating or lining, through to preparing large scale components and plant for Non-Destructive Testing / Evaluation (NDT / NDE).

This guide has been compiled to aid in making an informed decision about whether or not grit blasting is appropriate for your application – and if we can help.

At **KUE Group** we specialise in dry grit blasting and wet abrasive blasting for NDT / NDE surface preparation for the power generation industry, as well as other heavy industrial applications. Grit blasting is an extremely effective method of preparing plant, tanks, vessels, pipework and components for NDT / NDE and for creating a surface suitable to receive a protective coating or lining. We are one of the UK's leading suppliers of contract surface preparation services, with mobile blasting units, a fleet of bespoke vehicles containing all equipment to carry out a standalone service on any site within the UK and Europe.

Our services are also available within our fully equipped in-house facility in Bradford where two large blast booths receive items from small components through to large items up to 4m in diameter x 12m in length.

By the end of this guide, you will understand what grit blasting is and what it is used for, as well as several alternative surface preparation methods. Full contact details and a summary of our services are included in a later section of this guide. If you have any questions in the meantime, please don't hesitate to call **+44 (0) 1274 721188** or send an email to **sales@kuegroup.com**

How Does Grit Blasting Work?

Grit blasting is the operation of forcibly propelling a stream of abrasive material under high pressure against a surface to clean or modify its surface properties. The abrasive material is contained either in a stream of compressed air (dry blasting) or water (wet blasting). Here at KUE Group we use a wide variety of abrasives dependent on the client's specification and surface finish required and / or the subsequent activity. Commonly used abrasives are Garnet, Chilled Iron Grit, Steel Grit, Aluminium Oxide, Glass Beads and Crushed Glass all of which remove old coatings, mill scale, rust, heat scale and contaminants from the substrate, preparing it for subsequent coating, lining, welding, NDT / NDE.

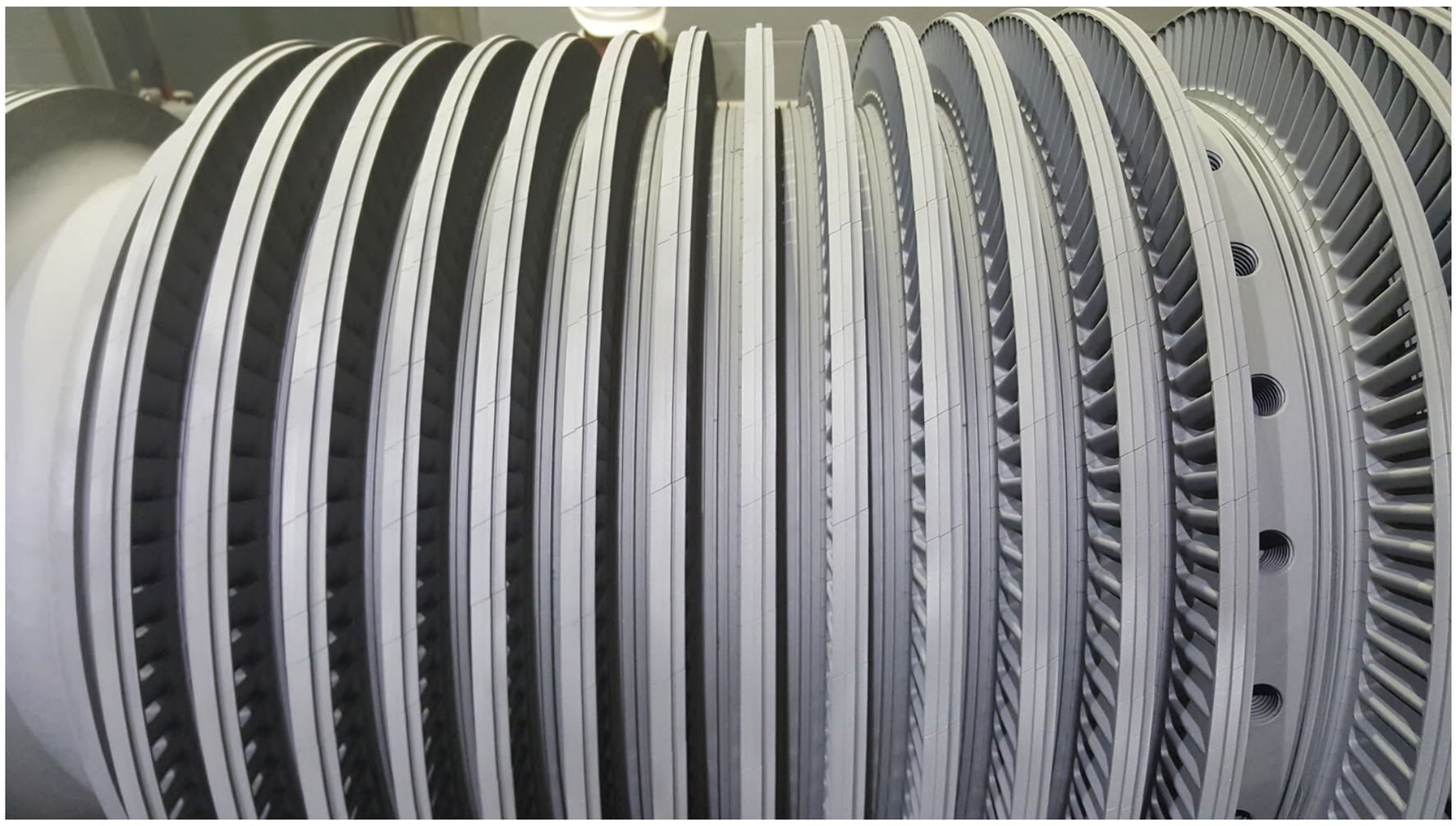
The abrasive and pressure are selected to prepare a surface to meet your demands depending on your application.

Grit Blasting Applications

There are a number of grit blasting methods. Abrasive can be propelled by compressed air alone, the addition of water enables wet blasting or mechanically such as in a wheelabrator machine. This ensures that there is a wide range of applications for which grit blasting is a solution.

1. Surface Preparation for Non-Destructive Testing / Evaluation (NDT / NDE)

Grit blasting is used to prepare a surface in readiness for Non-Destructive Testing / Evaluation (NDT / NDE). Its purpose is to provide a clean surface, free from mill scale, rust, heat scale and contaminants to enable the NDT / NDE professional to evaluate the substrate.



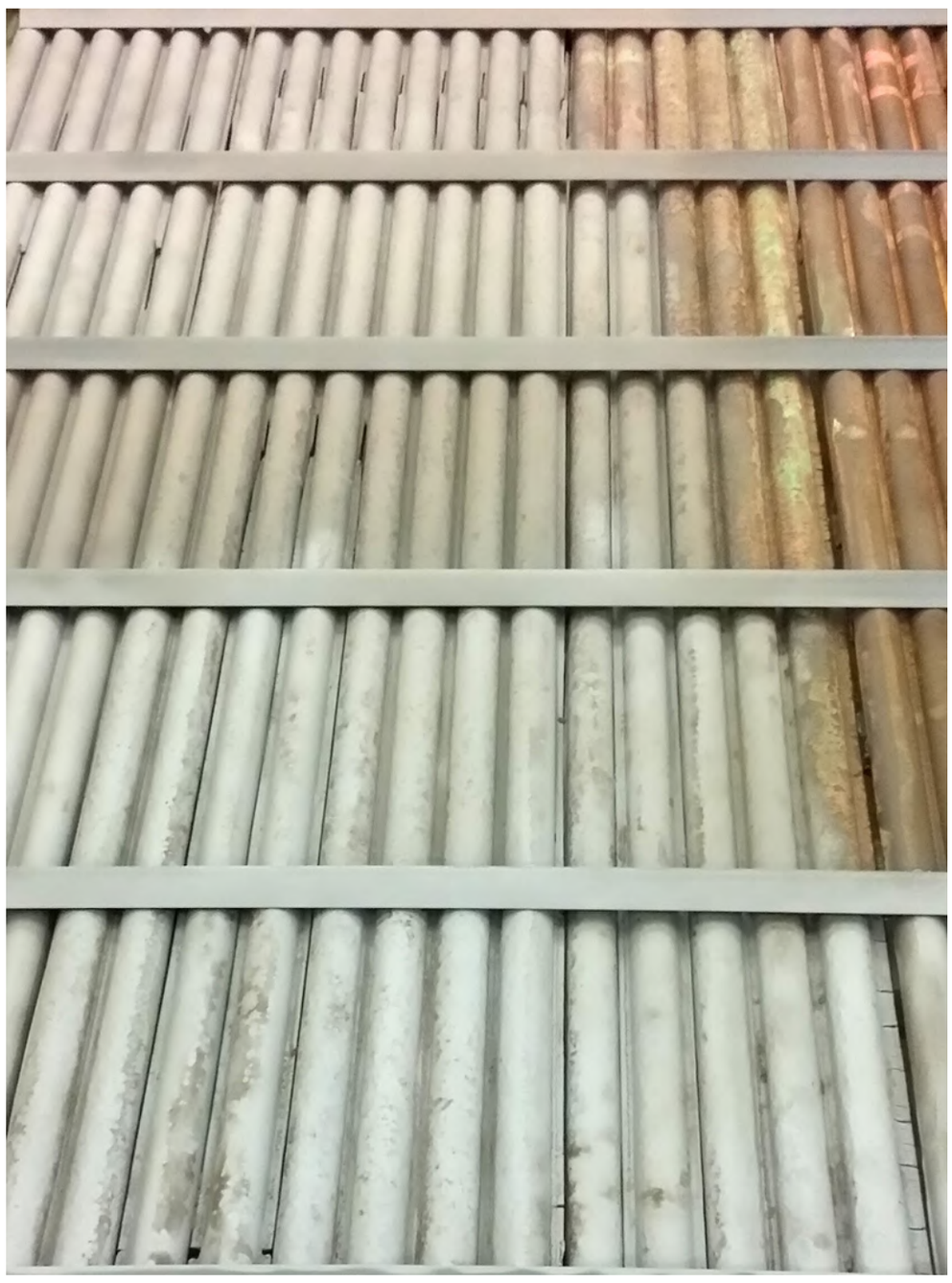
How Does Grit Blasting Work?

2. Surface Preparation for Coating and Lining

Coatings and Linings act as a protective layer to protect the underlying surface from either corrosion, erosion or both. Application of a coating or lining to a correctly prepared surface will enhance the performance and life expectancy of both the coating / lining and crucially the plant, equipment or item it is applied to. Grit blasting removes old coatings, mill scale and other surface contaminants as well as leaving a surface anchor profile that aids adhesion of the subsequent coating or lining.

3. Surface Cleaning

Grit blasting can be used to clean a surface by removing residues, contaminants and scale, therefore improving and increasing efficiency of a never-ending range of plant and equipment.



Equipment Required For Grit Blasting

In order to carry out industrial blast cleaning / grit blasting the following is required;

- A source of high volume, high pressure clean compressed air.
- A blast pot, this is a pressurised, tank like container filled with abrasive blast media, used to allow an adjustable amount of abrasive blast media into the blast line.
- An abrasive blast media.
- A blast hose, deadman handle and venturi design blast nozzle to deliver the abrasive media stream to the substrate.

Health and Safety is of paramount importance when undertaking grit blasting operations and PPE is the last line of defence for the blast operative. As a minimum a blast operative is provided with a blast helmet providing impact protection and a source of clean breathing air. Blasting overalls providing enhanced protection from the abrasive media ricochet. Blasting gauntlets to protect the hands and forearms and safety footwear.

Types Of Abrasive Media

There is a wide range of abrasive blasting media available in the marketplace today, each with its own beneficial uses and benefits and drawbacks of use. The table below provides an overview of those commonly or uncommonly used.

Abrasive Type	Shape	Hardness (Aveage in Mohs)
Garnet	Semi-Angular	7.5
Aluminium Oxide	Semi-Cubical	9.0
Glass Bead	Spherical	5.0
Chilled Iron	Angular	9.0
J Blast (Expendable)	Angular	7.0
Steel Shot	Spherical	4.8
Steel Grit	Angular	4.7
Stone Grit	Mixed	6.5
Crushed Glass	Angular	5.0
Walnut Shells	Semi-Angular	2.5
Bicarbonate of Soda	N/A	N/A
Sponge	N/A	N/A

Surface Preparation Grades

BS EN ISO 8501-1:2007 is a visual assessment of surface cleanliness that specifies a series of rust grades and preparation grades of steel surfaces. The various grades are defined by written descriptions together with photographs and are summarised below.

- A) Steel surface largely covered with adhering mill scale but little, if any, rust.
- B) Steel surface which has begun to rust and from which the mill scale has begun to rust.
- C) Steel surface on which the mill scale has rusted away or from which it can be scraped, but with slight pitting visible under normal vision.
- D) Steel surface on which the mill scale has rusted away and on which general pitting is visible under normal vision.

The required type of finish depends upon the application as follows:

- Sa1: Light blast cleaning – When viewed without magnification, the surface shall be free from visible oil, grease and dirt, and from poorly adhering mill scale, rust, paint coatings and foreign matter.
- Sa2: Thorough blast cleaning – When viewed without magnification, the surface shall be free from visible oil, grease and dirt, and from most of the mill scale, rust, paint coatings and foreign matter. Any residual contamination shall be firmly adhering.
- Sa2½: Very thorough blast cleaning – When viewed without magnification, the surface shall be free from visible oil, grease and dirt, and from mill scale, rust, paint coatings and foreign matter. Any remaining traces of contamination shall show only as slight stains in the form of spots or stripes.
- Sa3: Blast cleaning to visually clean steel – When viewed without magnification, the surface shall be free from visible oil, grease and dirt, and from mill scale, rust, paint coatings and foreign matter. It shall have a uniform metallic colour.

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Comparing Surface Preparation Techniques

As with any methodology, grit blasting is better suited to some applications than others. Here is a quick guide to how grit blasting compares to alternative methods.

1) Grit Blasting

- ✔ Grit blasting is fast, efficient, and effective. Within the industry, it is recognised as having the best ratio of time taken to required surface cleanliness. For end users and clients, this means reduced downtime and, consequently, improved productivity. Therefore, in terms of ROI, grit blasting is an excellent choice.

- ✔ The availability of differing abrasive blasting media options mean that grit blasting can be optimised for the duty of use. From expendable single use Garnet for general NDT / NDE and coating / lining use to Aluminium Oxide and Glass Beads which are both recyclable and used in the surface preparation of critical turbine components and non-ferrous items

- ✔ The abrasive media is often inexpensive, and in many cases features the added capacity for either recycling or reuse. This often makes it a cost-friendly approach to surface preparation.

- ✔ Grit blasting can be carried out both in-house or on-site as required. As such there is a solution for all your surface preparation needs.

2) Ultra-High Pressure (UHP) Water Jetting

- ✔ UHP Water Jetting involves firing water at a surface at pressures up to 60,000 psi. It can be effective at reducing salt/chloride levels from the substrate.

- ✔ UHP jetting is also optimised for assisting in the removal of thicker coatings. In these cases, more than one methodology may have to be employed.

- ✖ There are always logistical concerns when working with water. The need for the residual water to drain and debris to be filtered has to be taken into consideration. This includes the safe disposal of any hazardous material.

- ✖ UHP Water Jetting produces high noise levels at the work face requiring specialist hearing protection. Coupled with ultra-high working pressures, increased levels of PPE are required. In addition, specialist training is required to be a UHP Water Jetting Operative.

- ✖ UHP Water Jetting equipment is both expensive to hire or purchase and has historic reliability issues

3) Shot Blasting

- ✔ Shot blasting is often confused with grit blasting, but they are actually used for very different purposes. Shot Blasting involves firing small, smooth spherical particles, usually steel to clean iron, steel, forgings and provide a smooth surface finish, also used in peening to alter an items mechanical properties, increasing resistance to fatigue for critical parts used in aerospace, automotive, ship building and rail industries.

4) Manual / Tool Cleaning

- ✔ Manual or tool cleaning is considered to be the best option for small localised areas.
- ✖ Manual or tool-based cleaning is also time-consuming, which translates to increased downtime and higher staffing costs. As a general rule, these approaches take 75% longer than grit blasting.

In this section we answer a few of the questions we receive most frequently about grit blasting:

How much will it cost?

This depends on the type of grit blasting that is required, the size of the project, and how the work is to be carried out. As this varies from small one-off projects to preparing large or complex surface areas within OGC and Power Generation Sites, individual quotes are prepared. KUE Group provides detailed quotes for free via our **online form**.

How quickly can you do it?

KUE Group endeavour to complete your requested scope of work within the shortest time frame possible. We have immediate access to our fully trained workforce and own plant and equipment ensuring your needs are met wherever possible. Precise details of timescales can be provided when the project details are outlined.

Will you damage my plant?

The simple, short and honest answer is no, KUE Group have been at the forefront of surface preparation for over 46 years with an exemplary record.

How quickly do I have to coat a surface after grit blasting?

The generally accepted industry standard is 4 hours after completing the blasting process with the caveat that ‘all surfaces to be coated should be clean, dry and free from contamination’. Substrate temperature should be at least 3°C above the dew point and always above 0°C. Application at ambient air temperatures below 5°C is not recommended. The maximum air and substrate temperature for application is 50°C providing conditions allow satisfactory application and film formation. If the air and substrate temperatures exceed 50°C and coatings are applied under these conditions, paint film defects such as dry spray, bubbling and pinholing etc, can occur within the coating.

Incorporating leading coating specialists Lithgow Saekaphen Ltd, KUE Group can advise on the best procedure for your project or include a protective coating or lining service.

For more information on coatings, please browse our selection of **free guides**.

Why Work With KUE Group?

Grit blasting is offered as a service by many multi-disciplined companies within the UK as an ‘add-on’ to the main core business. KUE Group ARE Surface Preparation specialists it's what we do, pure and simple.

If you work within the power generation, oil, gas or chemical sectors or indeed any industry where surface preparation, coatings or linings are required then KUE Group can be a key business partner. Here’s why:

Experience

KUE Group has over 46 years’ experience of surface preparation and corrosion protection. This means that we were leading the development of grit blasting boiler pressure parts and turbine components well before it became the industry standard. Experience leads to a safer, more reliable, and more accurate project approach. It also means confidence and peace of mind for our clients.

After 46 years, we have seen a lot. However, there is always a new challenge on the horizon, and if KUE Group can help you with it we will.

QHSE certifications and accreditations

KUE Group have a commitment to maintaining a safe, healthy, environmentally sound and productive work place on all sites where our personnel are employed and this has been demonstrated by the award of OHSAS 18001, ISO 14001, ISO 9001 and high scoring Achilles UVDB B2 Verification in recent years.

Details of our accreditations include:

- **ISO 9001:2015 Quality Management Systems**

  A set of internationally recognised quality management standards. Certification guarantees that a company meets all statutory and regulatory requirements so that exemplary service is provided.

- **ISO 14001:2015 Environmental Management**

  International standard that specifies requirements for an effective environmental management system.

- **BS OHSAS 18001:2007**

  Occupational Health and Safety Management.

- **Achilles UVDB Category B2 Verified**

  Guarantees the ethical, environmental, and quality of supply chain management.

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Find Out More

Thank you for downloading this guide. We hope you have found it useful and it has answered some of your questions about grit blasting. If you'd like to find out more or discuss a project, please get in touch by phone or email.

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Email: **sales@kuegroup.com**

Appendix: Glossary Of Grit Blasting Terms

You may come across some or all of the following terms when discussing abrasive blasting methods with a supplier.

- **Abrasive Blasting –** This is a ‘catch all’ term that encompasses differing generic types of blasting such as grit blasting, shot blasting, sand blasting, bead blasting and wet blasting but can be summarised as the process of forcibly propelling a stream of abrasive material under high pressure against a surface to clean or modify its surface properties. The abrasive material is contained either in a stream of compressed air (dry blasting) or water (wet blasting).

- **Anchor Profile (Blast Profile or Surface Profile) –** A physical measurement of the blast cleaned surface from the lowest valley to the top of the highest peak (measured in microns).

- **Bead Blasting –** The use of glass or plastic spherical beads as the blast media.

- **Blast Hose –** A durable hose usually manufactured from SBR (styrene-butadiene or styrene-butadiene rubber) offering excellent abrasion resistance.

- **Blast Media –** The abrasive selected to be most suitable for the application.

- **Blast Nozzle –** An attachment that is fitted to the end of a blast hose from which the blast media exits under high pressure due to the venturi design, usually manufactured from tungsten carbide for added durability.

- **Blast Pot –** An externally pressurised, purpose designed and built container, filled with the selected blast media and used to allow an adjustable amount of blasting media into the blast hose.

- **Blast Pressure –** The pressure at which the blast media exits the blast nozzle.

- **Blast Profile (Anchor Profile or Surface Profile) –** A physical measurement of the blast cleaned surface from the lowest valley to the top of the highest peak (measured in microns).

- **Deadman Handle –** An attachment fitted to a blast hose / blast nozzle that acts as a safety device should the blast operative become incapacitated.

- **Dry Blasting –** A method of blasting where the blast media is propelled in a stream of compressed air.

- **Grit Blasting –** The operation of propelling a stream of angular abrasive under high pressure against a surface to clean or modify its surface properties.

Appendix: Glossary Of Grit Blasting Terms

- **Ice Blasting** – the use of dry ice (solid carbon dioxide) as the blasting media.
- **Sand Blasting** – An often misused term describing grit blasting.
- **Shot Blasting** – A widely used misrepresentation of grit blasting whereas shot blasting involves the use of small, smooth spherical blast media.
- **Surface Finish** – Often referred to as cleanliness and described in detail here.
- **Surface Profile (Anchor Profile or Surface Profile)** – A physical measurement of the blast cleaned surface from the lowest valley to the top of the highest peak (measured in microns).
- **Vacu Blasting** – As other blast methods but with an added suction hose encapsulating the blast nozzle to help minimise the egress of blast media.
- **Wet Blasting** – As dry blasting but with the addition of water either added to the compressed air and blast media within the blast hose or as an external fitting to wet the blast media on exiting the blast nozzle.
- **Whip End** – A smaller diameter blast hose to facilitate bending the hose into hard to get areas.