



GMA GARNET™ **NEXT GENERATION** **ABRASIVES**

Engineered to increase productivity and minimise risks.



Why GMA Garnet™ is a Better Abrasive



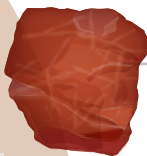
GMA Garnet™

- Solid almandine garnet particles after prolonged natural attrition.
- Very resistant to further breakdown.

Garnet has evolved over millions of years from the formation of igneous and metamorphic rocks under high pressures and temperatures.

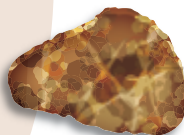
GMA owns multiple sources of almandine garnet, ensuring dependable and high quality supplies. Our products are derived from older deposits, containing a higher concentration of almandine garnet.

GMA Garnet™ is further enhanced by advanced processing to ensure high purity, unmatched cleanliness and optimised sizing. This enables higher productivity and seamless operations for our customers.



Indian Garnet

- Inherently weaker due to relatively short sedimentary life.
- Characterised by more fracture plains.



Chinese Garnet

- Poor abrasive characteristics due to a clustered crystal structure.
- Highly friable, breaks easily increasing dust levels.



Typical Slag

- Fractured structure, highly friable.
- Sharp, horn-like structures that can embed into the surface.



Next Generation Abrasives

Since discovering one of the most significant and oldest garnet deposits in the world, GMA has been at the forefront of pioneering the application of this most effective natural abrasive.

Unlike traditional slag blasting abrasives that have changed very little for more than 50 years, the GMA Garnet™ product range has been continuously developed to maximise performance outcomes for our customers.

The latest range of GMA Garnet™ blasting abrasives are engineered to cut and clean, removing coatings faster and producing the cleanest surface to ensure the highest coating integrity.

Not only effective and efficient, GMA's products are also subjected to extensive testing to ensure that they are safer for workers and the environment.

Maximise productivity and minimise risks with GMA Garnet™.

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The GMA Garnet™ Advantage

GMA Garnet™ is a uniquely strong natural mineral that effortlessly outperforms other abrasives when used in conjunction with the recommended equipment and air pressure.

Due to its inherent strength in three critical abrasive characteristics, Hardness, Toughness (low friability) and Density, GMA Garnet™ performs powerfully and efficiently when blasted, resulting in high productivity, minimal dust and a cleaner, uniform surface finish that is ready for coating.

1 Hardness

GMA Garnet™ has a higher relative resistance to abrade a surface compared to other abrasives.



2 Toughness

To remove surface coatings effectively, an abrasive must be tough enough to resist fracturing on impact.

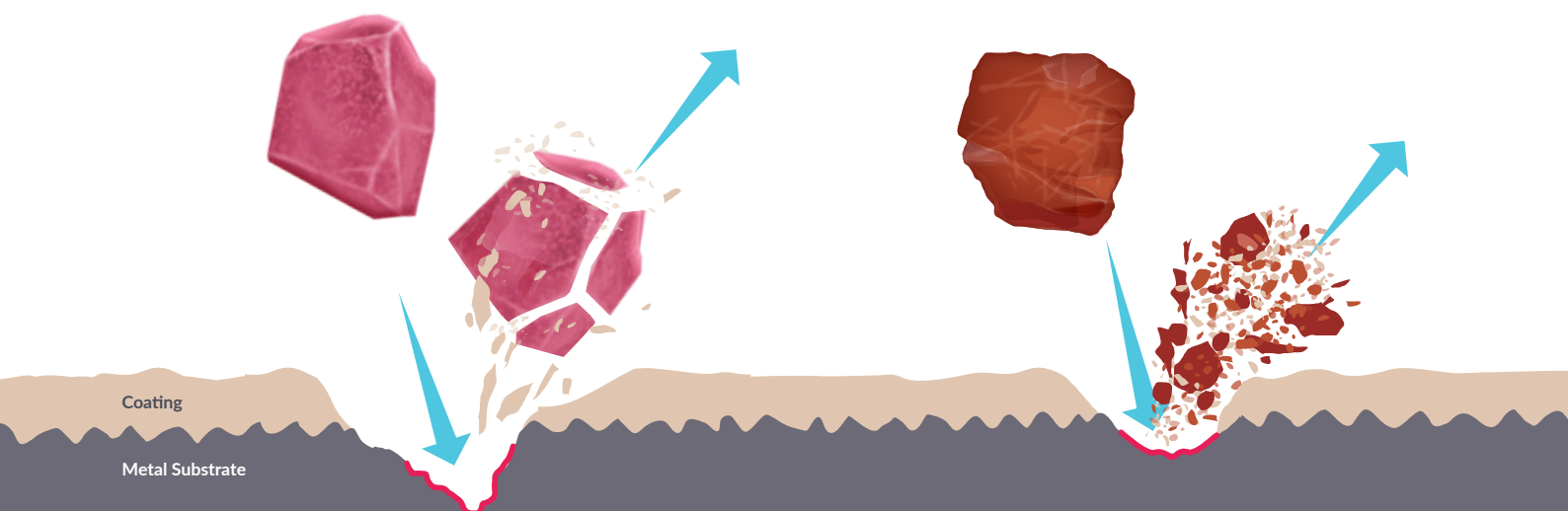
3 Density

A heavier, denser abrasive grain outperforms a less dense abrasive. GMA Garnet™ grains create a deeper, consistent anchor profile when blasted at the same pressure.

Not All Abrasives Have the Same Impact

As GMA Garnet™ is harder, tougher and denser, its grains are more resistant to breaking down on impact.

- | | | |
|---------------------|--------------------------|---------------------------|
| ✓ Lower dust levels | ✓ Increased productivity | ✓ Cleaner surface |
| ✓ Safer for workers | ✓ Lower consumption | ✓ Uniform surface profile |

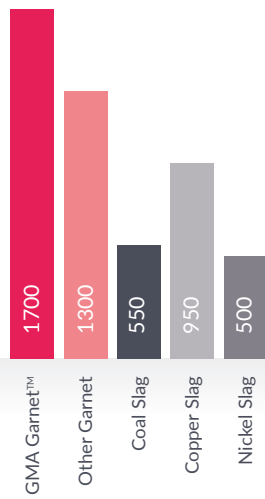


GMA GARNET™

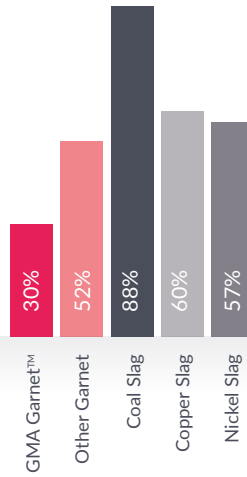
Harder, tougher and denser grains generate a cleaner, consistent profile – the optimal surface preparation for coating application.

OTHER GARNET

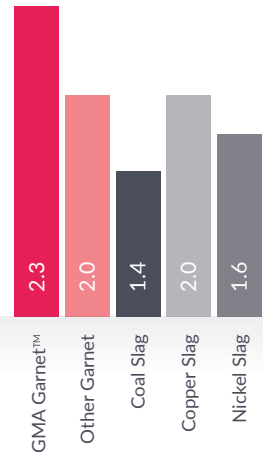
Inherently weaker with more fracture plains that shatter on impact creating dust.



KNOOP SCALE

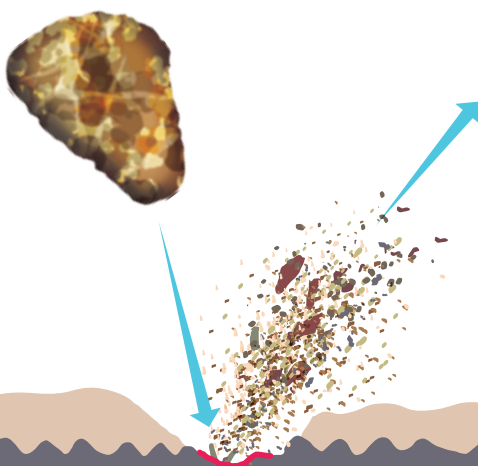


ABRASIVE BREAKDOWN (%)



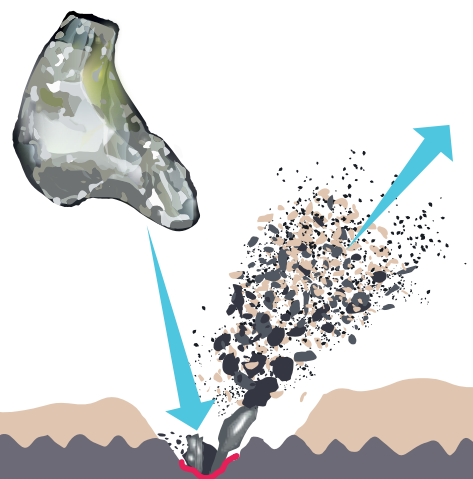
DENSITY (BULK DENSITY)

	Hardness	Toughness	Density
SLAGS	<ul style="list-style-type: none"> GMA is up to 80% harder than copper slags and nearly 3 times harder than coal slags. 	<ul style="list-style-type: none"> GMA Garnet™ up to 2.5 times tougher than coal slags. 	<ul style="list-style-type: none"> The Bulk Density of GMA Garnet™ is 60% denser than coal slags and 40% for nickel slags.
OTHER GARNETS	<ul style="list-style-type: none"> Up to 30% harder than other garnets. 	<ul style="list-style-type: none"> Up to 70% tougher than other garnets. 	<ul style="list-style-type: none"> Up to 20% denser than other garnets.
	<i>The Knoop scale is a measure of the hardness of a material.</i>	<i>Toughness is measured by the percentage of abrasive breakdown after one-time use.</i>	<i>Bulk density as measured by mass per g/cm³.</i>



TYPICAL CHINESE GARNET

Weak with increased fracture plains and inclusions that shatter on impact, creating higher levels of dust.



TYPICAL SLAG ABRASIVE

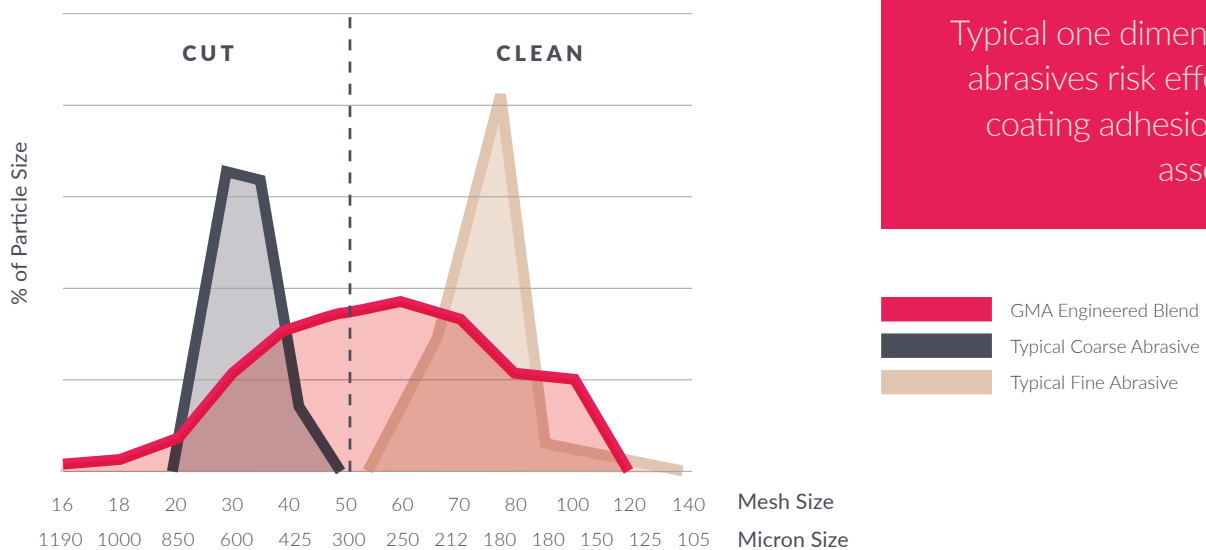
Lower hardness, toughness and density generating extremely high levels of dust, inconsistent profile and high levels of embedment.

One Dimensional Abrasives Cannot Cut and Clean

Typical blasting abrasive media is generally one-dimensional, consisting of either concentrated coarse particles or concentrated finer particles. The one dimensional nature of the particle size distribution results in a limited one dimensional performance.

A concentration of coarse particles cuts through thicker coatings, but tends to leave behind significant embedment as the larger particles are incapable of thoroughly cleaning smaller valleys or pits. This leads to slower production and higher abrasive consumption more abrasive per square metre.

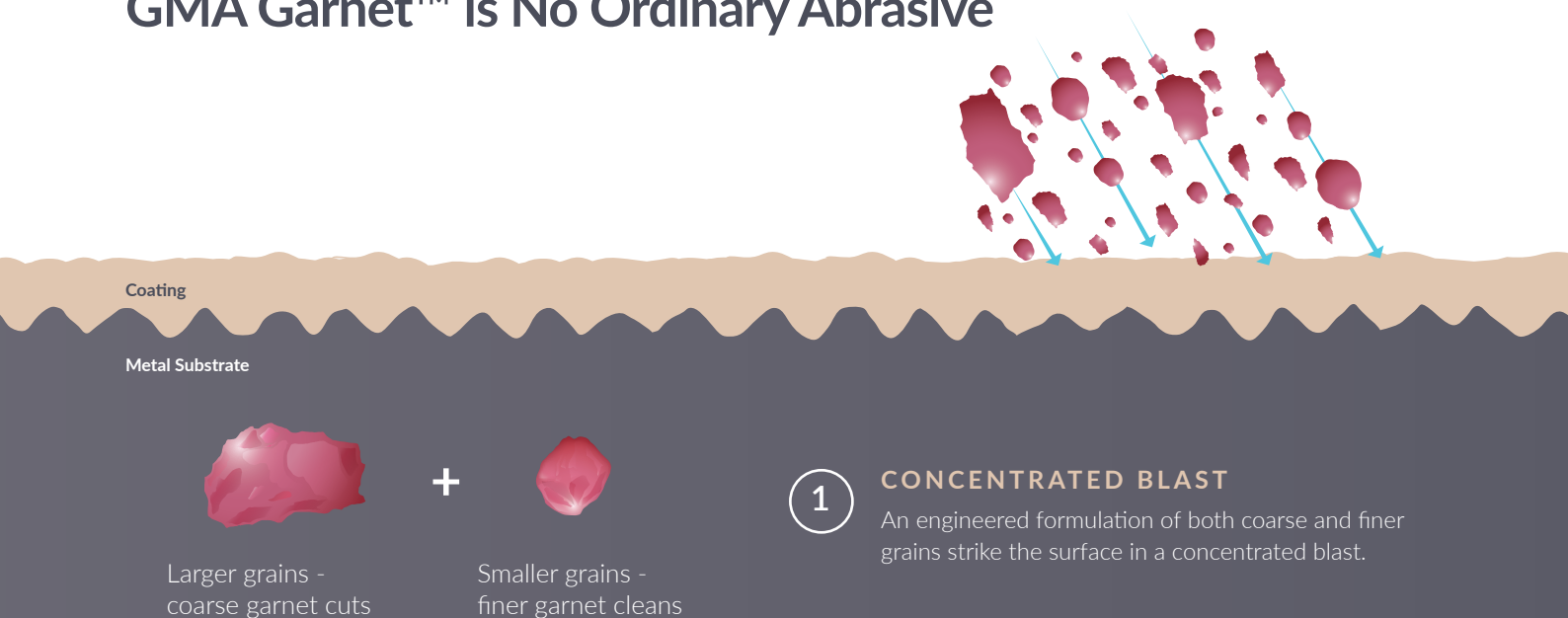
A concentration of finer particles is more efficient, in terms of speed and consumption, at removing mill scale or thinner coatings. However, it is usually ineffective at removing a tougher coating and producing a deeper surface profile depth.



Typical one dimensional abrasives risk effective coating adhesion and asset life.

A wider particle size distribution enables effective coating removal and deeper profile depth by coarse particles, enhanced by the efficiency and cleaning benefits of the finer particles.

GMA Garnet™ is No Ordinary Abrasive



Multi-Dimensional Engineered Blends

GMA's Engineered Blends are optimised for blasting performance by leveraging a wider particle distribution that is formulated to 'cut & clean' faster than traditional one dimensional abrasive products.

GMA's proprietary formulations contain a specific balance of particle sizing to optimise blasting performance. Coarser particles effectively 'cut' through the coating and generate the required profile depth, while finer particles 'clean' the anchor profile and improve the efficiency of the blasting process.

GMA Garnet™ products not only deliver fast and effective coating and rust removal at the lowest possible consumption rate, but leave the cleanest surface ready for inspection and coating application.

GMA's engineered blends
'Cut & Clean' to produce a
cleaner surface.

GMA GARNET™

COARSE PARTICLES CUT

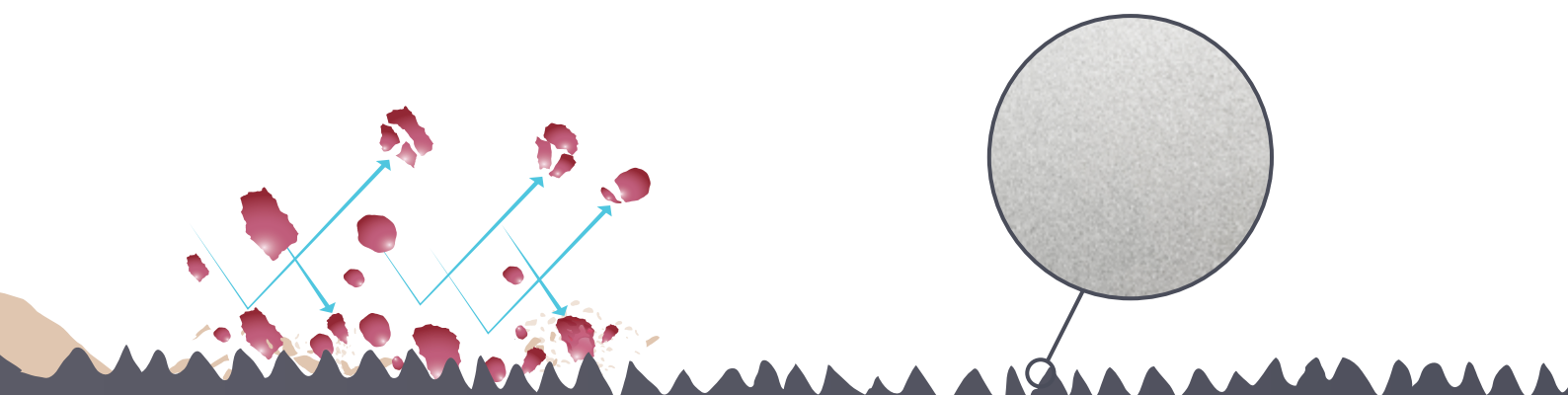
Removing the
toughest, thickest
coatings and rust.

FINER PARTICLES CLEAN

Improving surface
cleanliness
and anchor profile.

GMA ENGINEERED BLEND

GMA Garnet™ is formulated to effectively cut through coatings and efficiently clean the surface.



2

CUT DEEPER, CLEAN FASTER

Coarser grains effectively 'cut' a deeper anchor profile, while finer grains 'clean' the anchor profile and improve the surface finish.

3

SUPERIOR COATING ADHESION

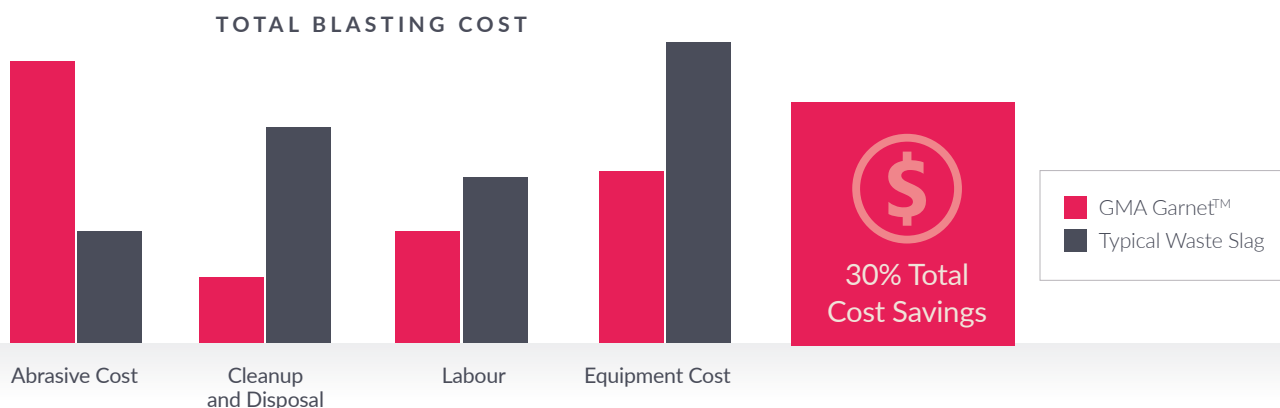
GMA Garnet™ formulations 'cut & clean' to produce the cleanest surface profile, improving coating adhesion and extending coating life.

Maximising Productivity

While the cost of blasting abrasives varies dramatically, choosing an abrasive purely on price can have a detrimental impact on an operation's ability to minimise downtime.

Reduce Overall Project Costs

GMA Garnet™ results in higher productivity and lower abrasive consumption, despite the higher initial product cost compared to slags. With GMA Garnet™, you can **save 15% to 30% on a typical project** due to lower cleanup and equipment costs, and reduced labour and blasting time. This makes GMA Garnet™ far more effective and efficient than other abrasives in the market.



Although the typical slag abrasives cost lower per tonne, these are often inferior in quality and performance, resulting in lower productivity at a higher consumption rate. In fact, more slag abrasives are needed to complete a project. This dramatically increases your cleanup, disposal, labour and equipment costs and ultimately, increases your total project costs.

As an example, the project estimation for the surface preparation of nine tanks and portable water pipeline is as follows:

Total area of 9 tanks: 300,000m²

Total area of portable water pipeline: 70,000m²

With GMA Garnet™, you will save **29%** on abrasive consumption. Additionally, the shorter project time which is a significant reduction of **2.5 months** enables you to move on to the next project.

Parameter	Other Garnet	GMA Garnet™
Coverage (m ² /T)	51	72
Quantity (T)	7,253	5,138
Time (Hrs)*	14,509 (7.5 months)	9,840 (5 months)

LOWER ABRASIVE CONSUMPTION

29%

REDUCE PROJECT TIME BY

2.5 MONTHS

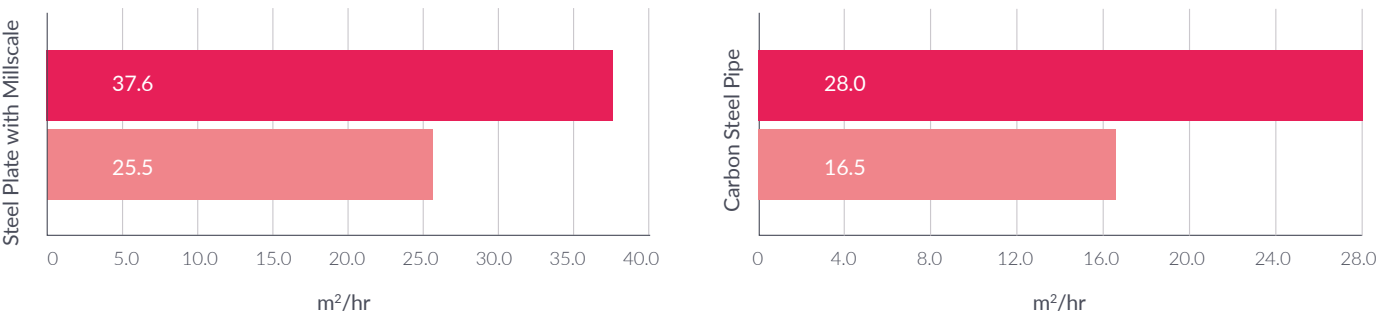
*The time is based on two 8-hour shifts a day with four blasters working on site.



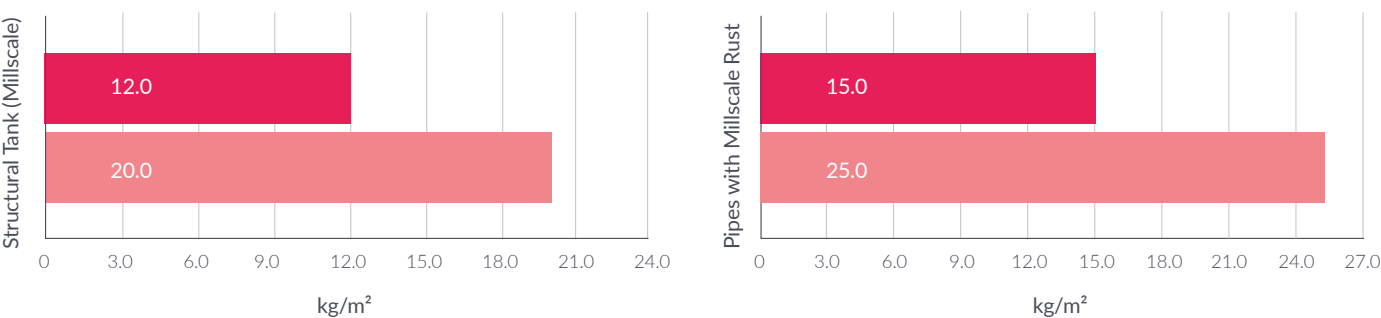
Unparalleled Blasting Performance and Efficiency

GMA Garnet™ abrasives deliver over 40% more productivity compared to other garnet abrasives. Abrasive consumption is also significantly lower by 25% to 45%.

PRODUCTIVITY



ABRASIVE CONSUMPTION



The results were recorded from abrasive blasting trials conducted at blasting yards in the UAE.



GMA's Technical Experts can help reduce overall project costs by 15-30%*

Our dedicated sales, technical and application specialists provide expertise in selecting the best products, industry know-how and resources to help solve coating removal and surface preparation problems.

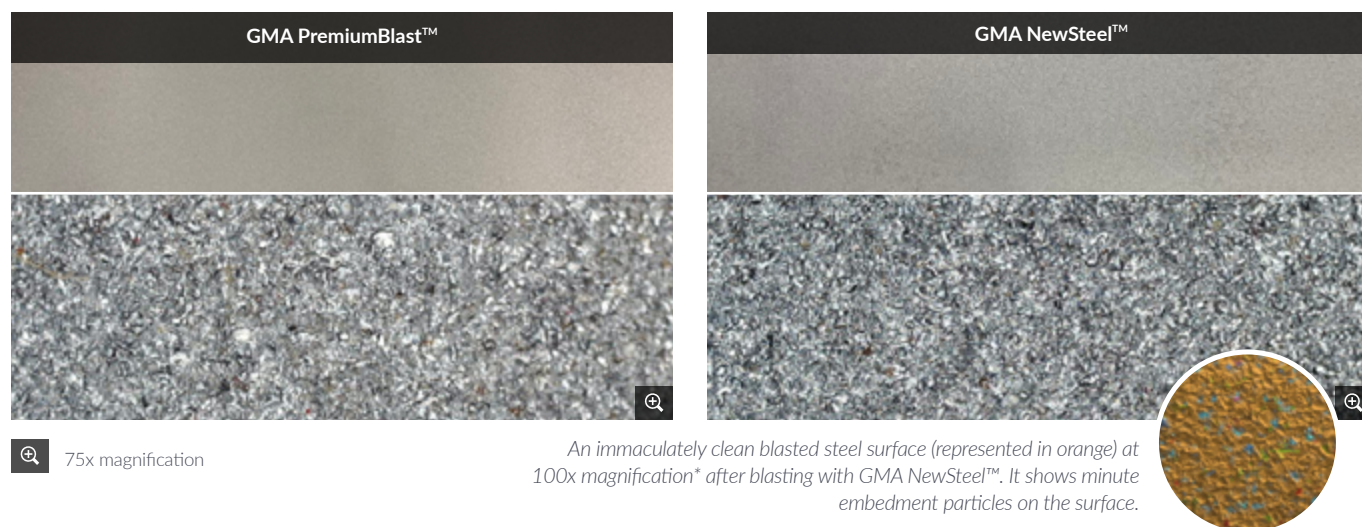
The information and claims stated are provided as a general purpose guide. Abrasive, labor, clean up, equipment and disposal costs vary from project to project. Actual project and productivity cost results could be materially different from projected results expressed or implied.

Minimising Operational Risks

Operational risks can significantly impact the reputation and stability of plant operations. GMA Garnet™ plays a crucial role in mitigating operational risks and equipment failures by generating a cleaner surface and increasing coating adhesion.

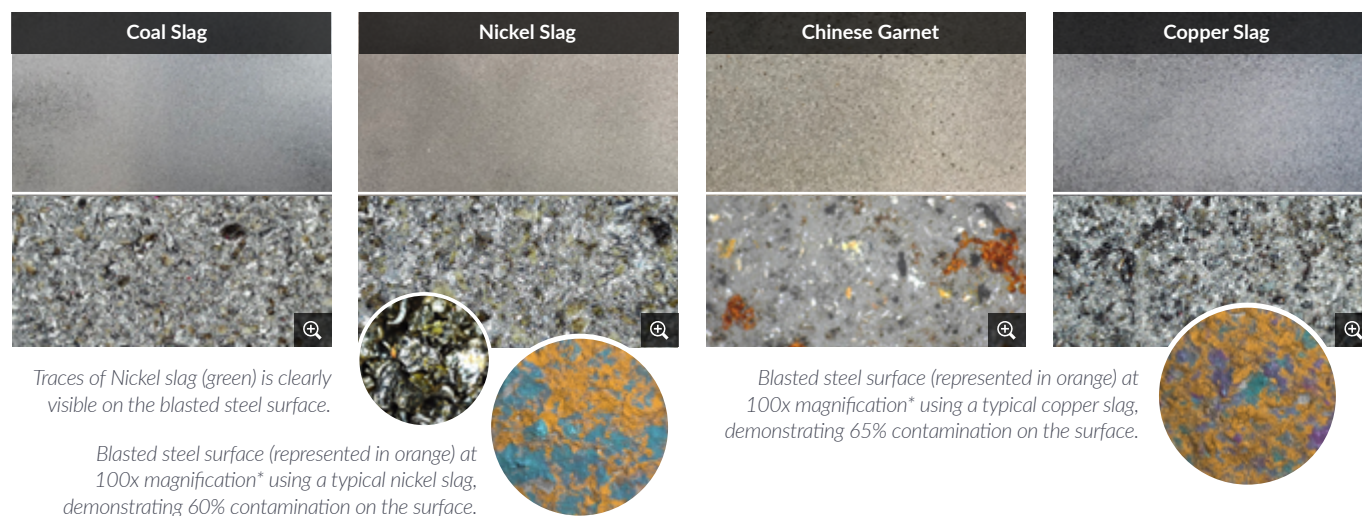
A Cleaner Surface Increases Coating Life

In the short term, a cleaner surface can reduce inspection failures and keep projects on schedule. The benefits are even greater in the long term, with improved coating integrity resulting in a longer coating life. **GMA Garnet™ products consistently produce a cleaner surface - minimising secondary cleaning, keeping projects on schedule and improving coating integrity.**



Waste Slags Produce up to 75% of Abrasive Embedment

Blasting with typical waste slags can result in small abrasive particles embedding into the surface. Viewing a blasted surface with the naked eye can be deceiving, as magnification shows that, on average, 60% of a slag blasted surface is embedded with residual abrasive. **Typical embedment levels from slag blasting can cause corrosion and blistering, resulting in high rework costs or possible warranty claims.**

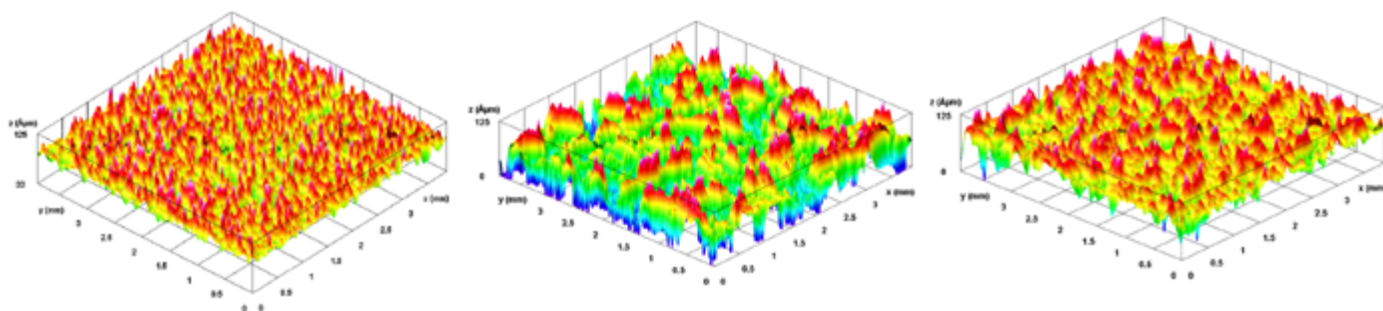


Measured using Scanning Electron Microscope (SEM), Backscattered Electron (BSE) and digital analysis.



Reduce Coating Application Time with Unrivalled Peak Density

GMA Garnet™ can generate up to four times higher in peak density than slag abrasives. An increased concentration of uniform peaks per square metre not only lowers the quantity of coating applied, but also reduces coating costs and application time.

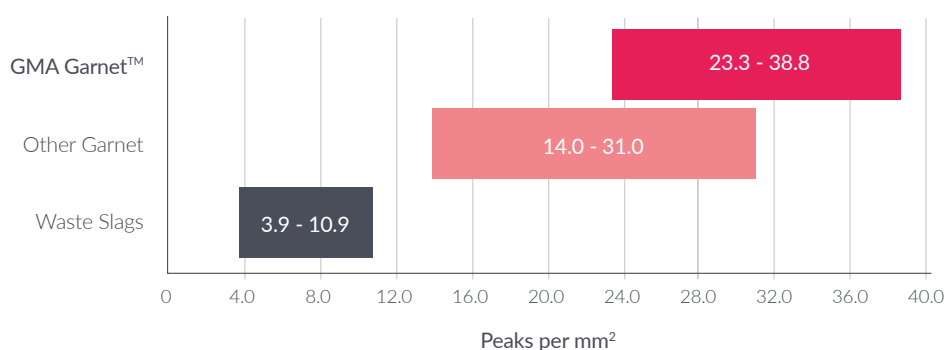


GMA Garnet™	Typical Slag	Other Garnets
<ul style="list-style-type: none"> Uniform profile with increased surface area. 	<ul style="list-style-type: none"> Non-uniform surface profile. 	<ul style="list-style-type: none"> Less-uniform surface profile.
<ul style="list-style-type: none"> Less coating required and greater adhesion. 	<ul style="list-style-type: none"> Potentially poor paint wetting resulting low adhesion between the coating and substrate. 	<ul style="list-style-type: none"> Lower peak density will reduce coating adhesion.

Source: Comparative Study of Prevalent Blasting Abrasives in the US Market, April 2019.

GMA Garnet™ produces up to **4 times** the peak density compared to slags.

PEAK DENSITY CHART



Source: Comparative Study of Prevalent Blasting Abrasives in the US Market, April 2019. Average Results from typical 80 Mesh and 30/60 Mesh abrasives on carbon steel which had light mill scale and surface rust.

Sustainable Management of Used Garnet

At GMA, we believe in a sustainable approach to business, and this is reflected in the way we manage our natural resources. We are committed to maximising the life span of our garnet resources, minimising the generation of waste from our garnet products and preventing this non-renewable mineral from going into landfills.

Since 2004, we have been working with customers to improve their commercial outcomes while minimising the impact on the environment. This resulted in providing used garnet disposal solutions for our customers and developing used garnet reprocessing facilities.

GMA Middle East has been recognised by a number of world class customers, Middle Eastern municipalities and Environment, Health and Safety regulatory bodies for developing and promoting used garnet disposal within the region.

Renew and Reuse

GMA Garnet™ abrasives are known for its superior toughness and low friability. Our natural abrasives can be recycled up to five times without compromising its reliable, high quality performance.

At our garnet reprocessing facilities, used garnet sourced from blasting is first cleaned to remove all contaminants including dust, rust, paint flakes, metallic particles and other impurities. This is followed by precise sizing into various grades to suit end user requirements.

Strict sampling and quality control procedures ensure that sizing and purity are maintained to our own industry best standards.

Environmentally Friendly Garnet Disposal Programmes

We offer customised garnet disposal solutions in the form of supply chain contracts, buyback programmes and waste disposal programmes coordinated through the local authorities. These programmes help customers lower disposal costs and reduce project costs. Moreover, you save time and resources from the need to manage disposal arrangements.

Our packaged solutions are approved by the local governing bodies and waste management services, namely Dubai Municipality, Abu Dhabi Waste Management Center, Ras Al Khaimah Investment Authority (RAKIA) and Fujairah Municipality. GMA is the only garnet recycler approved by the Dubai Municipality to manage used garnet disposal in Dubai, UAE.

Via our garnet disposal programmes, we have collected over 150,000 tonnes of used garnet for reprocessing and saved over 110,000 tonnes of reusable garnet from landfills since 2008. The remaining waste materials are repurposed in industrial works such as road and concrete fillers or responsibly dispose of in regulated landfills.



Via our garnet disposal programmes, we have collected over **150,000 tonnes of used garnet** for reprocessing and saved **over 110,000 tonnes of reusable garnet** from landfills since 2008.

Key benefits of GMA's garnet disposal programmes



SAVE COST

Reduce project costs with lower garnet disposal costs.



SAVE TIME

Save time and resources required to manage garnet disposal arrangements.



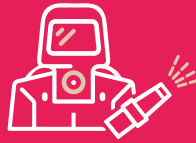
SAVE THE ENVIRONMENT

A sustainable and environmentally responsible solution to dispose of used garnet.

The Preferred Industry Choice

GMA offers a complete range of garnet abrasives for any surface preparation requirement from removing resistant coatings and heavy rust, to fast mill scale removal and specialty coating requirements.

GMA Garnet™ is approved by leading paint manufacturers, and is the preferred abrasive among global oil & gas companies, full-service shipyards and international fabricators.



INDUSTRIAL CORROSION CONTROL

Rust Removal, Surface Preparation, Coating Integrity.



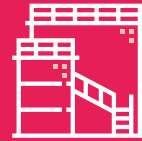
INFRASTRUCTURE

Construction and bridges.



MARITIME & MILITARY

Shipbuilding and Repair.



METAL FABRICATION

Mill Scale Removal, Petroleum Plant, Storage and Pipelines, Structural Steel.



OIL & GAS, MINING

Plant Integrity and Maintenance.



GMA MIDDLE EAST

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