



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

Engineered to increase productivity and minimize risks.



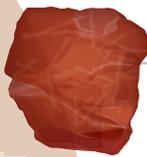
## Why GMA Garnet™ is a Better Abrasive



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 optimized sizing. This enables higher productivity and seamless operations for our customers.



### GMA Garnet™

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

### Indian Garnet

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



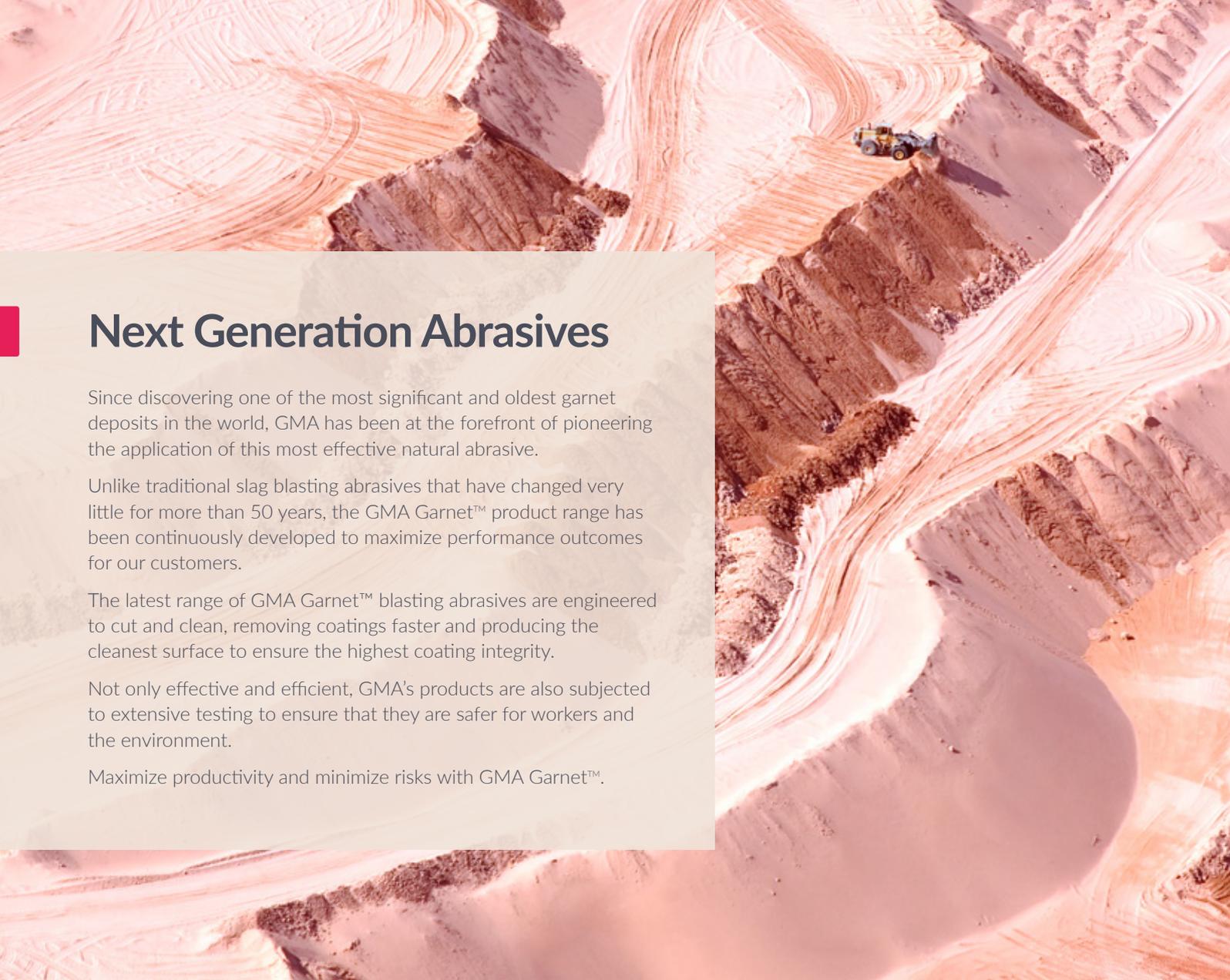
### Chinese Garnet

- 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 maximize 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.

Maximize productivity and minimize 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, Density (specific gravity) and Toughness (low friability), 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.

## 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.



## 2 Toughness

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

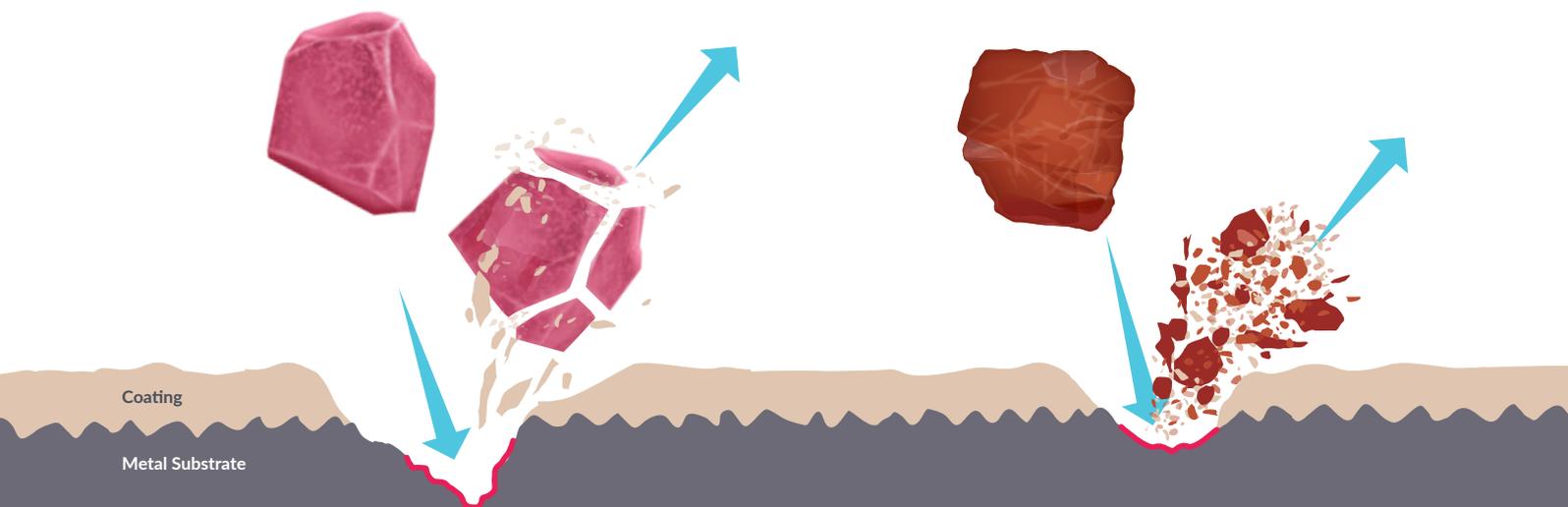
## 4 Angularity

Angularity of the grain affects how deep it cuts into the coating and underlying substrate. Angular grains produce a sharper anchor profile, whilst rounded grains produce a more even, smooth profile.

# 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 workers
- ✓ Lower consumption
- ✓ Uniform surface profile

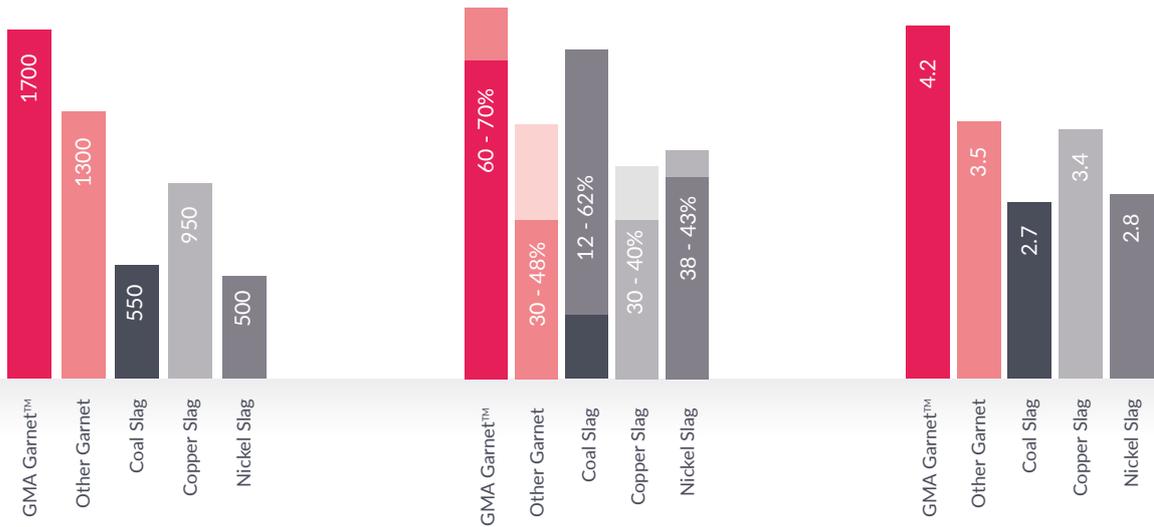


### GMA GARNET™

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.

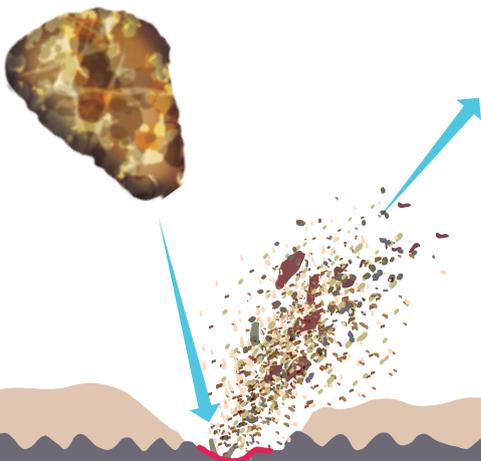


**1** HARDNESS

**2** TOUGHNESS

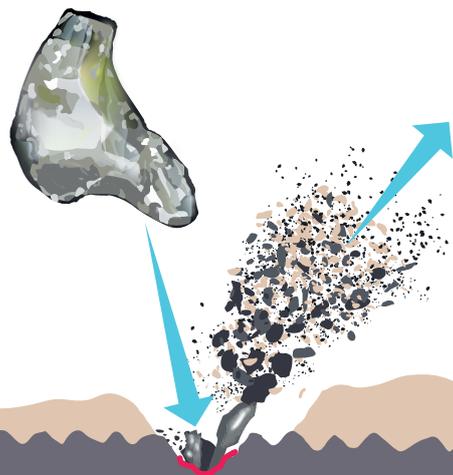
**3** DENSITY

|               | Knoop Scale  | Abrasive Recovery  | Specific Gravity   |
|---------------|--|--|--|
| SLAGS         | <ul style="list-style-type: none"> <li>GMA is up to 80% harder than copper slags and nearly 3 times harder than coal slags.</li> </ul> | <ul style="list-style-type: none"> <li>GMA Garnet™ up to 5 times tougher than coal slags.</li> </ul> | <ul style="list-style-type: none"> <li>GMA Garnet™ is up to 60% denser coal slags and approx. 25% denser than copper slags.</li> </ul> |
| OTHER GARNETS | <ul style="list-style-type: none"> <li>Up to 30% harder than other garnets.</li> </ul>   | <ul style="list-style-type: none"> <li>Up to 100% tougher than other garnets.</li> </ul>             | <ul style="list-style-type: none"> <li>Up to 20% denser than other garnets.</li> </ul>   |
|               | <i>The Knoop scale is a measure of the hardness of a material.</i>   | <i>Toughness is measured by the recovery of usable abrasive after one-time use.</i>                  | <i>Specific Gravity is the ratio of the abrasive density to the density of water.</i>  |



**TYPICAL CHINESE GARNET**

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



**TYPICAL SLAG ABRASIVE**

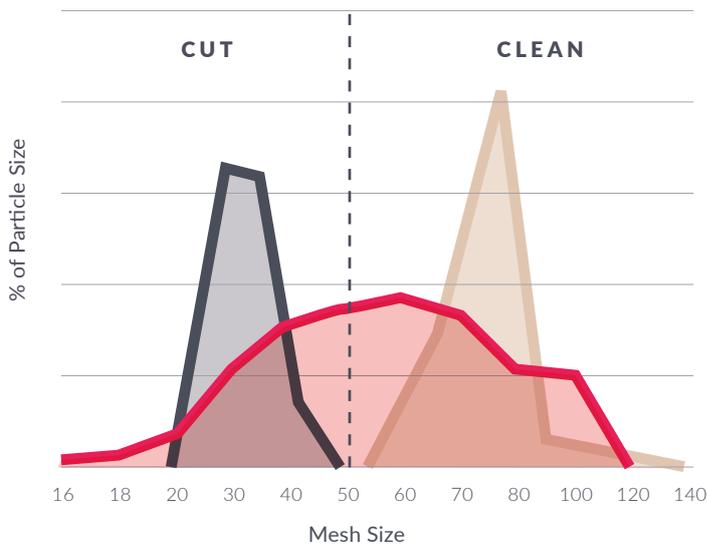
Lower hardness, toughness and density generating extremely high levels of dust, inconsistent profile and high levels of embedment.

# 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 consuming more abrasive per square foot.

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 tougher coating removal and producing a deeper surface profile depth.

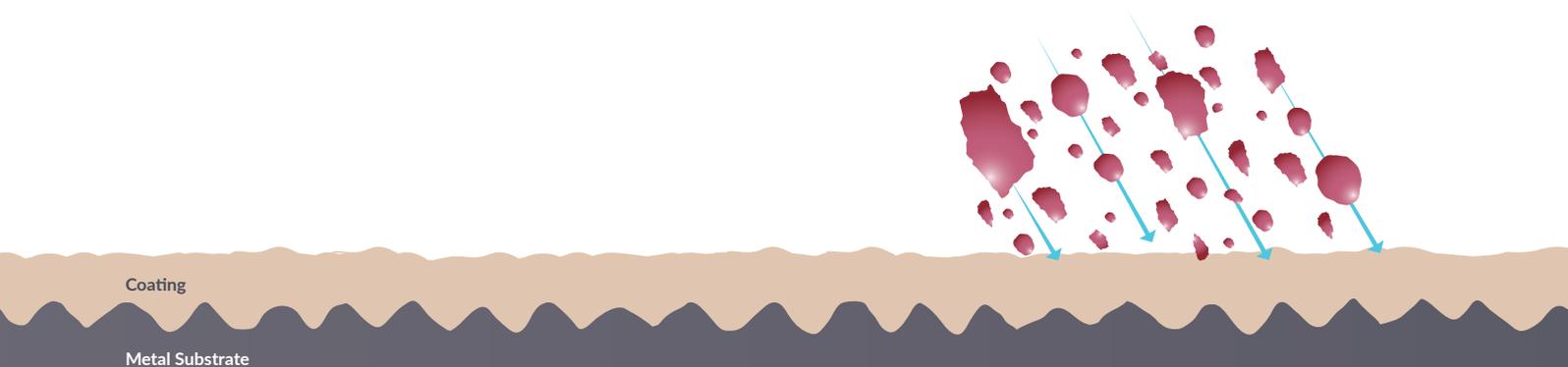


Typical one dimensional abrasives risk effective coating adhesion and asset life.

- GMA Engineered Blend
- Typical 20/40 Mesh Abrasive
- Typical 80 Mesh Abrasive

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

# GMA Garnet™ is No Ordinary Abrasive



 + 

Larger grains - coarse garnet cuts

+

Smaller grains - finer garnet cleans

1

## CONCENTRATED BLAST

An engineered formulation of both coarse and finer grains strike the surface in a concentrated blast.

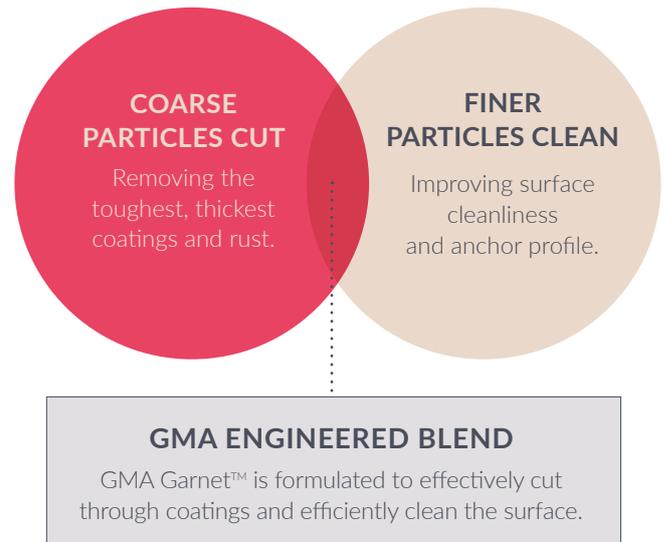
# Multi-Dimensional Engineered Blends

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

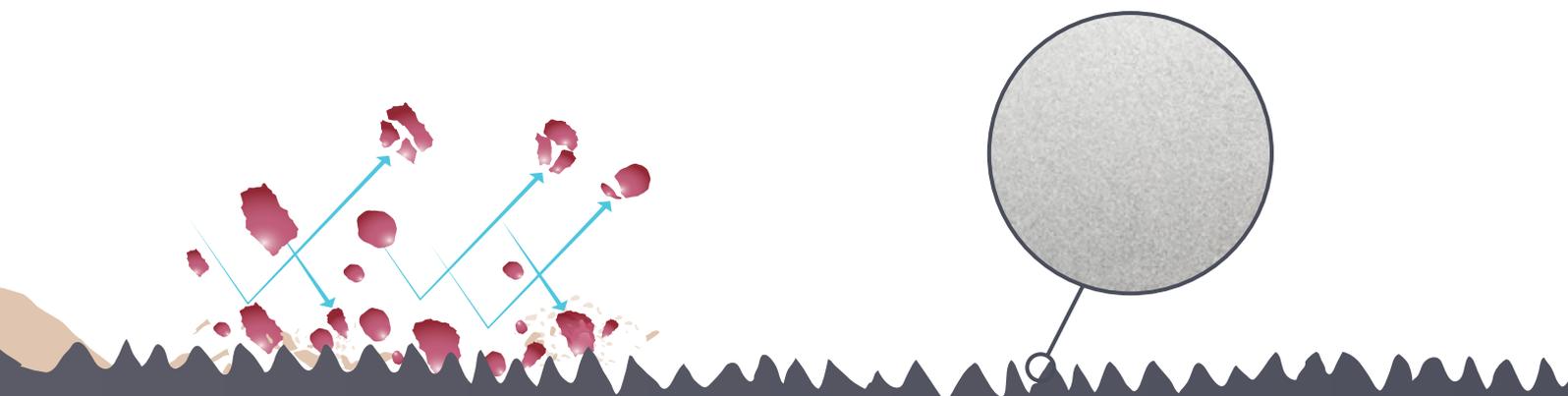
GMA's proprietary formulations contain a specific balance of particle sizing to optimize blasting performance. Coarser particles effectively 'cut' through the coating and generate the required profile depth, while finer particles 'clean' the anchor profile and improve the efficiency of the blasting process.

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 GARNET™



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

# Maximizing 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 minimize downtime.

# Reduce Overall Project Costs

GMA Garnet™ results in higher productivity and lower abrasive consumption, despite the higher initial product cost compared to slags. Lower clean up and equipment costs, and minimized labor and blasting time on the job, can **save 15-30% on a typical blasting project** - making GMA Garnet™ a far more effective and efficient abrasive choice.

| TOTAL BLASTING COST: GMA GARNET™ |                       |       |                | <br><b>30% Total Cost Savings</b> |
|----------------------------------|-----------------------|-------|----------------|--|
| Abrasive Cost                    | Clean up and disposal | Labor | Equipment Cost |  |

Although typical waste slag abrasives are priced lower per tonne, they are often inferior in quality and performance, resulting in lower productivity at a higher consumption rate. More slag abrasive is needed to complete a project, dramatically increasing clean up, disposal, labor and equipment costs, ultimately increasing total project costs.

| TOTAL BLASTING COST: TYPICAL WASTE SLAG |                       |       |                |
|---|-----------------------|-------|----------------|
| Abrasive Cost                           | Clean up and disposal | Labor | Equipment Cost |



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

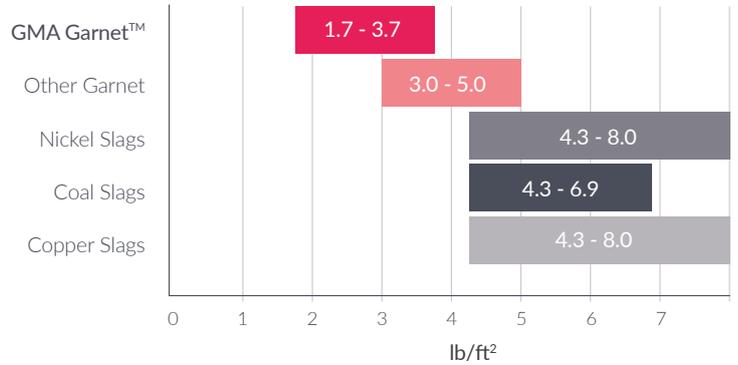
Our dedicated sales, technical and application specialists provide expertise in selecting the best products, industry know-how and resources to help solve coating removal and surface preparation problems.

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.

# Unparalleled Blasting Performance and Efficiency

Slag abrasive consumption rates are **65% higher** than GMA Garnet™ and on more complex structures, more than **twice as much slag** is used!

ABRASIVE CONSUMPTION



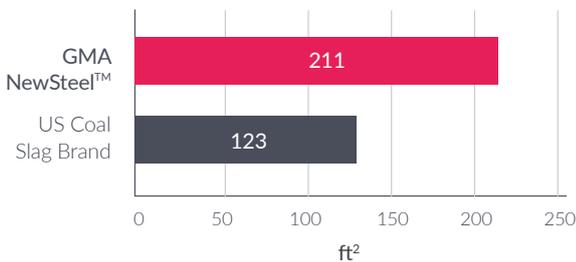
Note: Consumption rates were measured after blasting steel plates in a controlled environment, with each product optimized for maximum performance. Blasting production and consumption rates will vary under different conditions. Source: Comparative Study of Prevalent Blasting Abrasives in the US Market, April 2019.

## Case Study – Unlock Higher Productivity with GMA Garnet™

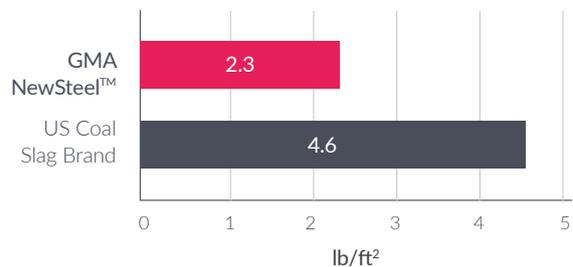
### 25,000ft² of Mill Scale Removed 71% Faster from Tank Exterior

Waste slag performance issues had become a major roadblock to productivity and profitability for one industrial blasting and coating services contractor servicing the petrochemical, industrial and energy sectors. Recent OSHA regulations, project timelines tightening and supply shortages heightened their concerns about the true cost of waste slag abrasives. GMA's Technical Experts organized a performance trial for the client that mirrored their project requirements; and compared GMA NewSteel™ to a well-known coal slag brand. The results were clear – GMA's garnet abrasive delivered 71% higher productivity at 15% lower cost and 50% lower abrasive consumption – showcasing in real-time the immediate rewards of switching from waste slag to a premium garnet abrasive.

PRODUCTIVITY



ABRASIVE CONSUMPTION



**72%**  
Higher Productivity



**15%**  
Less Cost



**50%**  
Less Abrasive



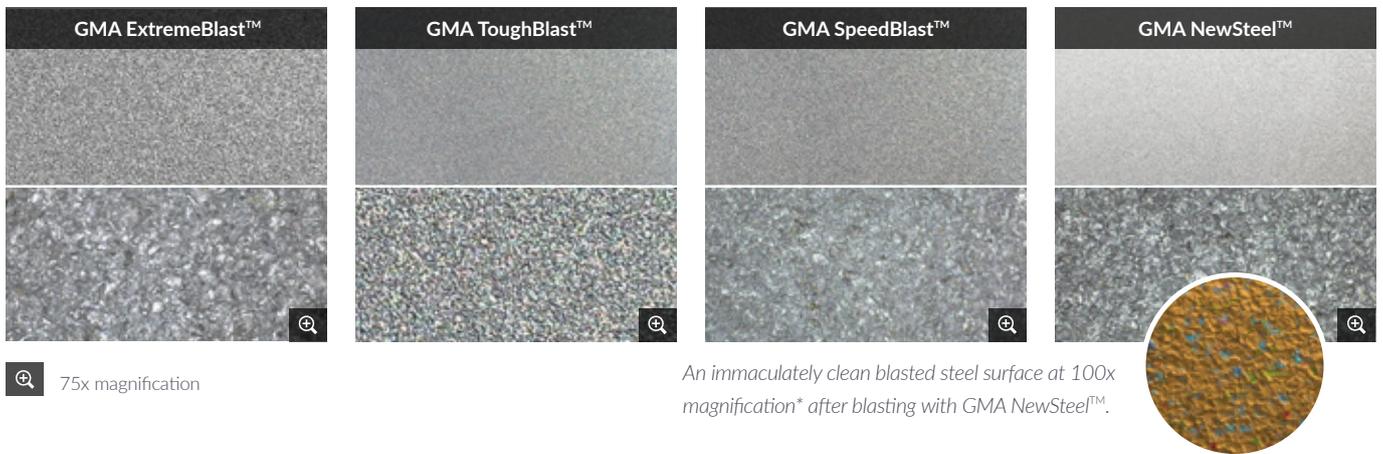
**58%**  
Less Downtime

# Minimizing 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.

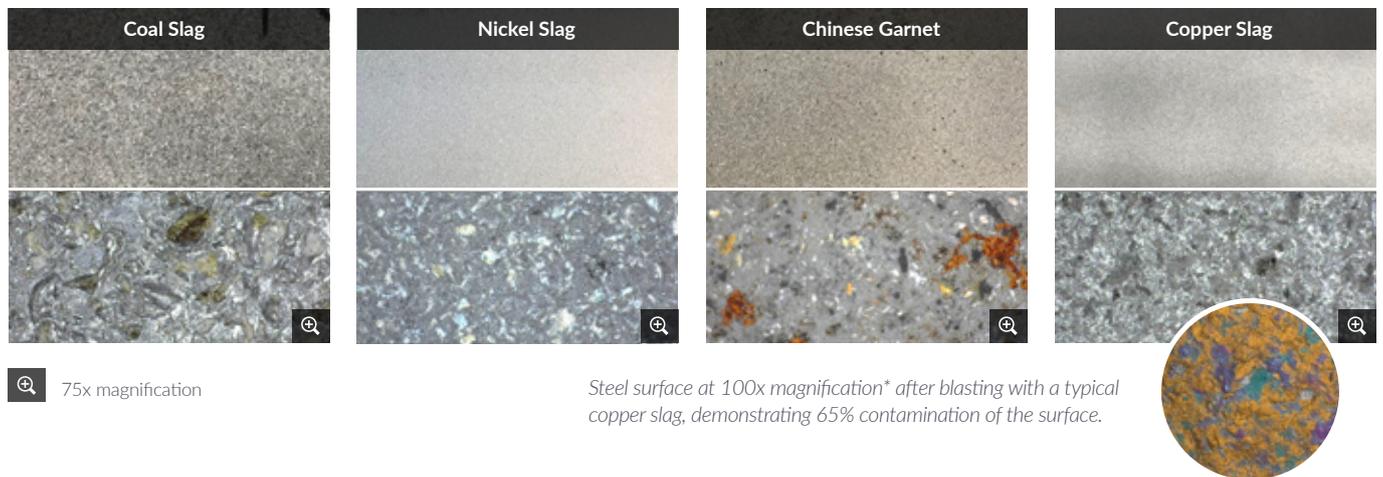
## A Cleaner Surface Increases Coating Life

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 - minimizing 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.**

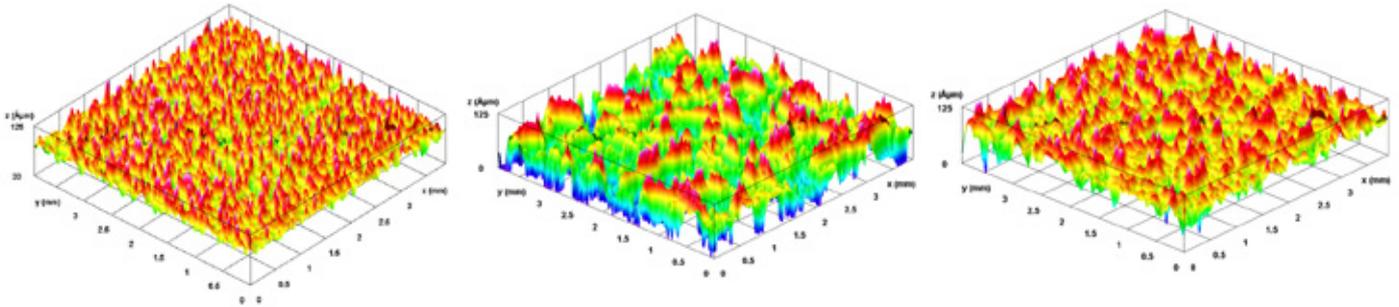


Measured using Scanning Electron Microscope (SEM), Backscattered Electron (BSE) and digital analysis.



## Extending Coating Life with Unrivalled Adhesion

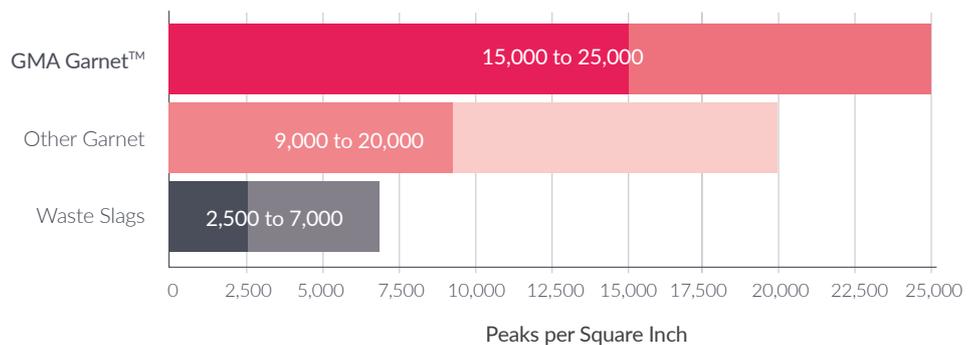
GMA Garnet™ can generate up to four times higher peak density than slag abrasives. An increased concentration of uniform peaks per square foot not only lowers the quantity of coating applied, but also increases coating adhesion, improving substrate protection.



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

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

PEAK DENSITY CHART



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

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.

# Reduce Health, Safety and Environmental Risks

Many slags produce toxic dust up to **6 times** above acceptable exposure limits.

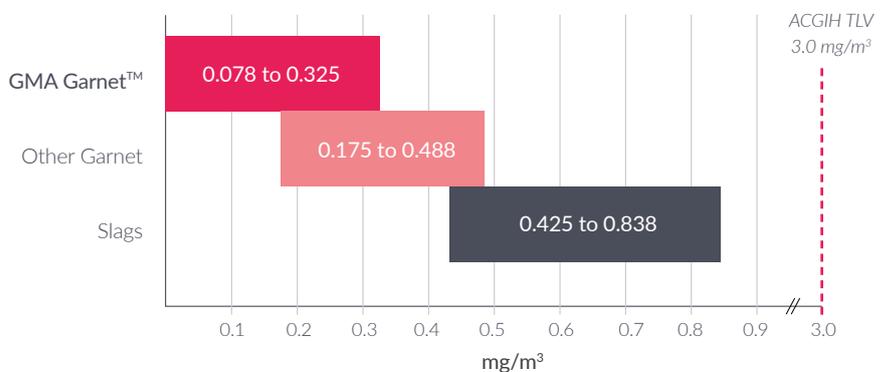
## Minimize Blasting Dust

Abrasive blasting is a dusty business. Dust is inevitable with abrasive blasting and is the prime hazard for visibility, site contamination and community exposure. Toxic particles such as arsenic, barium, beryllium, chromium and other materials may be present in the dust that workers and employees can be exposed to.

Therefore, keeping dust to a minimum through abrasive selection and engineering controls will keep workers safer.

**Independent tests measuring respirable dust levels showed that GMA Garnet™ generated 80% less dust than the dustiest slag and other garnet abrasives.**

**RESPIRABLE DUST AIR SAMPLE - OUTDOOR  
(20 FEET DOWNWIND, 8-HR TWA)**



ACGIH TLV refers to the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV). Results from 60 minute blasting tests were time Weighted Average (TWA) for 8 hours.

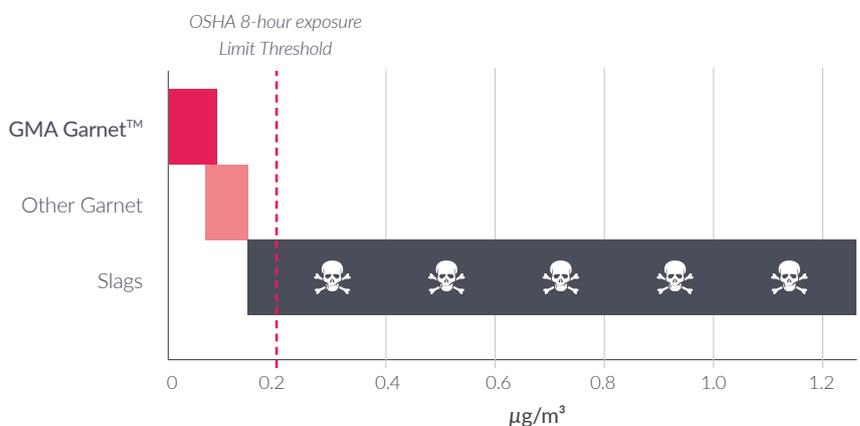
## Reduce Worker Exposure to Beryllium

All coal slags used for coating removal and surface preparation can expose workers and bystanders to dangerous airborne quantities of toxic heavy metals such as Beryllium, which is associated with chronic beryllium disease and lung cancer.

If coal slags are used, engineering and work practice controls need to be implemented. These controls can be costly and can be avoided if you substitute the abrasive.

For more detailed information on the Beryllium Rule and what it will mean to your business please contact OSHA USA or refer to the OSHA website\*.

**BERYLLIUM AIR SAMPLE - INDOOR  
(CONFINED SPACE, 8-HR TWA)**



Source: Industrial Hygiene Abrasive Products Assessment Report. HSE Solutions Inc. 2019.  
\*For more information visit the OSHA website on [www.osha.gov](http://www.osha.gov)



## Reduce Worker Exposure to Heavy Metals

As slags are a waste by-product from coal power plants and metal smelting, they can contain high levels of heavy metals.

When slags are used as blasting abrasives, these heavy metals can be released into the air and will often exceed toxic respirable exposure limits.

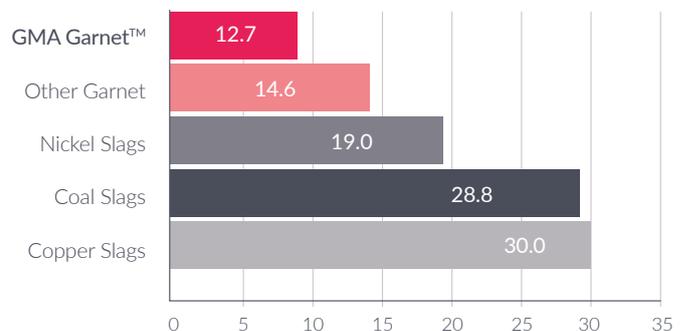
| Heavy Metal | US Coal Slag Brand | US Copper Slag Brand | GMA Garnet™ |
|-------------|--------------------|----------------------|-------------|
| Arsenic     | ☠                  | ☠                    | ✓           |
| Barium      | ☠                  | ✓                    | ✓           |
| Beryllium   | ☠                  | ☠                    | ✓           |

☠ Above OSHA Allowable Limits      ✓ Below OSHA Allowable Limits

## GMA Garnet™ is the Safer Abrasive

To help to reduce your exposure risks to potential hazards, GMA has laid the groundwork by performing comprehensive risk assessment research on potential respirable and environmental contamination. Independent HSE consultants have confirmed that GMA Garnet™ poses a 2 ½ times lower health risk than waste slag abrasives.

### PRODUCT HEALTH RISK ANALYSIS



GMA Garnet™ poses **2 ½ times** lower safety risk than waste slag abrasives.

Source: Industrial Hygiene Abrasive Products Assessment Report – HSE Solutions, 2019. Average overall health risk assessment has been analysed using both respirable and heavy metals data analysis for 17 commonly available abrasive blasting products.



What's in the bag will ultimately be on the ground.

## Reduce Environmental Contamination

Blasting with slag abrasives without containment not only poses a serious risks to human health, but also threatens to harm the environment. If not properly managed and contained, using slags poses a high risk of contaminating soil and water bodies, including water tables that supply drinking water.

THE EPA AND CALIFORNIA STATE ALLOWABLE HEAVY METALS LIMITS

|            | US Coal Slag Brand A | US Coal Slag Brand B | US Coal Slag Brand C | US Copper Slag Brand | US Nickel Slag Brand | GMA Garnet™ |
|------------|----------------------|----------------------|----------------------|----------------------|----------------------|-------------|
| Arsenic    | ☠                    | ✓                    | ☠                    | ☠                    | ✓                    | ✓           |
| Barium     | ☠                    | ☠                    | ✓                    | ☠                    | ✓                    | ✓           |
| Beryllium* | ☠                    | ☠                    | ✓                    | ✓                    | ✓                    | ✓           |
| Chromium   | ☠                    | ☠                    | ☠                    | ☠                    | ☠                    | ✓           |
| Lead       | ☠                    | ✓                    | ✓                    | ✓                    | ✓                    | ✓           |
| Copper*    | ✓                    | ✓                    | ☠                    | ☠                    | ✓                    | ✓           |
| Nickel*    | ✓                    | ✓                    | ✓                    | ✓                    | ☠                    | ✓           |

✓ Below EPA and CAM Allowable Limits
☠ Above EPA and CAM Allowable Limits

Source: Industrial Hygiene Abrasive Products Assessment Report - HSE Solutions, 2019.

Note: Further heavy metals covered by EPA RCRA 8 and CAM 17 regulations are not included in the above table as all products were within the allowable limits thresholds.

\*Beryllium, Copper and Nickel limits reference CAM 17 regulations. If more information is required, refer to CAM 17.

For more information on RCRA 8 and the allowable limits of Be, CU and Ni, please refer to the Environmental Protection Agency (EPA) website on [www.epa.gov.au](http://www.epa.gov.au)

# 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



## OIL & GAS, MINING

Plant Integrity and Maintenance



## MARITIME & MILITARY

Shipbuilding and Repair



## METAL FABRICATION

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



### **GMA SALES & DISTRIBUTORS**

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### **WAREHOUSES**

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Los Angeles | Seattle | Stockton | Tampa | Virginia Beach | Worcester

### **GMA MINE & PROCESSING PLANTS**

Montana (Mine) | Pennsylvania | Oregon | Houston

**[gmagarnet.com](http://gmagarnet.com)**

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