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Global Vacuum Inert Gas Atomization (VIGA) Processing Technology Supply, Demand and Key Producers, 2023-2029

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Abstracts

The global Vacuum Inert Gas Atomization (VIGA) Processing Technology market size is expected to reach $ 175.5 million by 2029, rising at a market growth of 13.4% CAGR during the forecast period (2023-2029).

Global 5 largest manufacturers of Vacuum Inert Gas Atomization (VIGA) Processing Technology are ALD, PSI, Arcast, Consarc and ACME, which make up about 80%. Among them, ALD is the leader with about 25% market share.

Americas is the largest market, with a share about 45%, followed by Europe and Asia-Pacific, with share about 30% and 23%. In terms of product type, Medium VIGA Systems (50~250 kg) occupy the largest share of the total market, about 69%. And in terms of product application, the largest application is Metal Powder Manufacturer, followed by Universities and Research Institutes.

Vacuum induction melting and inert gas atomization is the leading process for production of a variety of high-performance metal powders and essential for quality manufacturing of Ni-based super-alloys as well as Fe-, Co-, Cr-based and other special alloy powders. In the VIGA system, a vacuum induction melting unit is integrated with an inert gas atomization unit. The starting materials are melted using electromagnetic induction which couples electrical power into the crucible/material under vacuum or in an inert gas atmosphere. Once the desired melt homogeneity and chemical composition have been achieved, the material is poured into a tundish by crucible tilting. The fine metal stream flowing from the tundish orifice into the atomization nozzle system is subject to a high-pressure, inert-gas jet and then atomized. The combination of molten metal and gas jet creates a spray of micro-droplets that solidifies in the atomization

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tower and forms fine powder with spherical shape.

VIGA is where the melting and pouring of the alloy prior to atomisation is carried out in a vacuum chamber, to allow the production of the most oxidation-sensitive and reactive alloys, especially Fe-, Ni- and Co-based alloys containing Al, titanium and rare earths. This includes ‘superalloys’ such as IN718, maraging steels and M-Cr-Al-Y alloys. This technique was developed from the 1950s and 1960s when there was a push to explore the potential benefits of rapid solidification (RS) to allow the production of more highly alloyed superalloys for aerospace and defence applications. This proved to be a very challenging field of application but, after several decades of development, is now absorbing many thousands of tonnes per year of VIGA-produced superalloy powders. This intensive development has meant that the technology lends itself well to producing powders for HIP, MIM and AM. Oxygen contents in the 50–200 ppm range are achievable. Particle shape is, again, spherical with mis-shapes. Particle sizes are as for IGA.

By 1940, air atomisation was a well-established process for the production of zinc, aluminium, and probably also copper/brass/bronze powders. During World War Two, German engineers applied it to pig iron for iron powder production using the RZ process (Roheisen Zunder-Verfahren or ‘pig iron ignition process’). In the 1950s, W D Jones in the UK worked on inert gas atomisation as well as water atomisation and, by the 1960s, plants were being built for thermal spray alloy powder production of the NiCrBSi self-fluxing type. The development of Powder Metallurgy of high alloys and the concept of Rapid Solidification (RS) for refinement of microstructures led to the construction in Sweden of inert gas atomisers for tool steels, which went commercial on a 1–2 t scale in the 1970s. At the same time, the US government invested heavily in R&D on RS superalloys for aerospace and the first Vacuum Inert Gas Atomiser (VIGA) units were constructed with 100–300 kg capacity.

Since then, the use of inert gas atomisation (IGA) with air melting, as well as VIGA, has become widespread in use for thermal spray powders, PM superalloys, AM powders, and MIM powders. VIGA production of superalloy powders in the US alone now amounts to something in the order of 10–20 kt/year.

Inert gas atomisation is the method of choice for more demanding applications, such as MIM, AM, HIP, HVOF, brazing pastes, etc. Nitrogen is the most economic option, but argon is also used on reactive alloys like superalloys and titanium. Helium is used mostly in the production of aluminium and magnesium powders, but there is currently a huge incentive to switch to argon due to the unstable supply and high cost of helium.

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Total installed capacity of IGA and VIGA probably approaches 100 kt/ year, with large numbers of plants in different countries and industries. They range from tiny plants for a few kgs of precious metal brazing alloy to 3 t/h continuous plants for tool steel production. The fact that they are mostly processing relatively valuable metals and alloys (high value-added, large margin applications) makes small, local, plants economically feasible as opposed to iron powder plants, where low cost and economy of scale is imperative.

This report studies the global Vacuum Inert Gas Atomization (VIGA) Processing Technology production, demand, key manufacturers, and key regions.

This report is a detailed and comprehensive analysis of the world market for Vacuum Inert Gas Atomization (VIGA) Processing Technology, and provides market size (US$ million) and Year-over-Year (YoY) Growth, considering 2022 as the base year. This report explores demand trends and competition, as well as details the characteristics of Vacuum Inert Gas Atomization (VIGA) Processing Technology that contribute to its increasing demand across many markets.

Highlights and key features of the study

Global Vacuum Inert Gas Atomization (VIGA) Processing Technology total production and demand, 2018-2029, (Units)

Global Vacuum Inert Gas Atomization (VIGA) Processing Technology total production value, 2018-2029, (USD Million)

Global Vacuum Inert Gas Atomization (VIGA) Processing Technology production by region & country, production, value, CAGR, 2018-2029, (USD Million) & (Units)

Global Vacuum Inert Gas Atomization (VIGA) Processing Technology consumption by region & country, CAGR, 2018-2029 & (Units)

U.S. VS China: Vacuum Inert Gas Atomization (VIGA) Processing Technology domestic production, consumption, key domestic manufacturers and share

Global Vacuum Inert Gas Atomization (VIGA) Processing Technology production by manufacturer, production, price, value and market share 2018-2023, (USD Million) & (Units)

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Global Vacuum Inert Gas Atomization (VIGA) Processing Technology production by Type, production, value, CAGR, 2018-2029, (USD Million) & (Units)

Global Vacuum Inert Gas Atomization (VIGA) Processing Technology production by Application production, value, CAGR, 2018-2029, (USD Million) & (Units).

This reports profiles key players in the global Vacuum Inert Gas Atomization (VIGA) Processing Technology market based on the following parameters – company overview, production, value, price, gross margin, product portfolio, geographical presence, and key developments. Key companies covered as a part of this study include ALD, Consarc, PSI, SMS Group, Arcast, Topcast, Avimetal, VMP and ACME, etc.

This report also provides key insights about market drivers, restraints, opportunities, new product launches or approvals, COVID-19 and Russia-Ukraine War Influence.

Stakeholders would have ease in decision-making through various strategy matrices used in analyzing the World Vacuum Inert Gas Atomization (VIGA) Processing Technology market.

Detailed Segmentation:

Each section contains quantitative market data including market by value (US$ Millions), volume (production, consumption) & (Units) and average price (K US$/Unit) by manufacturer, by Type, and by Application. Data is given for the years 2018-2029 by year with 2022 as the base year, 2023 as the estimate year, and 2024-2029 as the forecast year.

Global Vacuum Inert Gas Atomization (VIGA) Processing Technology Market, By Region:

United States

China

Europe

Japan

South Korea

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ASEAN

India

Rest of World

Global Vacuum Inert Gas Atomization (VIGA) Processing Technology Market, Segmentation by Type

Small VIGA Systems (

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