



Magnesium



Growing with Galaxy Magnesium™

Motion, Flight,
Build, Finance, Power,
Life, Green

GalaxyMagnesium.com



The Time has Arrived for Magnesium

Galaxy Magnesium is the world's premiere direct source of magnesium, revolutionizing entire industries with light, strong, versatile, durable and green magnesium – superior in many ways to steel or aluminum alloys.

An international company based in the United States, Galaxy is streamlining global supply chains, offering custom alloys for unparalleled performance and delivering Galaxy Finance — all-inclusive pricing, direct from the most productive mines in the world, and real-time commodity trading.

From automotive, aerospace, energy and construction to pharmaceuticals, Galaxy Magnesium is paving the way to a lightweight future through reasonable, stable cost, guaranteed quality commercial magnesium.

With offices in New York, Atlanta, Geneva, Honolulu, Xi'an, Beijing and Shanghai, Galaxy is well positioned to responsively serve global markets.

Join the **#MagnesiumRevolution**





Galaxy Motion

Galaxy Motion is helping to transform the transportation industry through the use of lightweight, high-strength, flexible, durable, energy-efficient magnesium. Magnesium is light and has a low melting point, so it takes less energy to refine, to move around as part of a vehicle component, and to recycle. It is the green choice for industrial metals.



Galaxy Motion works closely with automotive industry leaders, including Panoz Engineering, Deltawing, and SRO Motorsports America. Our development of magnesium-optimized vehicles for use in competitive auto racing showcases magnesium shows how magnesium can meet the toughest engineering and performance requirements, with no compromise for safety. Together with Panoz, Galaxy Motion has sponsored several highly successful SRO World Challenge GT4 races (at Road America near Milwaukee, at Course of the Americas in Austin, and at Indianapolis Motor Speedway), where Panoz vehicles competed at the highest levels with the best vehicles and drivers in the world.

The Galaxy Motion team, led by president Dan Panoz, provides decades of design and engineering expertise, through large, diversified technical facilities and talented resources centered in Atlanta. Panoz is an experienced automotive development firm with deep expertise -- a complete automotive design, testing, prototyping and low-volume manufacturing operation. Dan is a legend in the automotive industry; he led the effort to adopt aluminum in cars, starting in the late 1990's. Now he has turned his talent to establishing magnesium as the standard for lightweighting: replacing energy-intensive, heavier steel and aluminum alloys from which most vehicles are constructed today.



The resulting projected total weight savings: 20-30%, depending on the type of vehicle and its current metal mix.

Galaxy Motion works across the automotive industry as a supplier of basic magnesium commodities, as well as in original alloy design, testing, specification and supply. This begins with pure magnesium, graduating to standard alloys, then to custom alloys for high-performance options. Galaxy Motion designs and fabricates individual auto parts -- original designs as well as magnesium replacements for factory parts. Finally, Galaxy Motion implements magnesium optimization strategies by focusing on interconnected vehicle subsystems – for example body panels, the chassis body, front and rear bumpers, seat frames. These coordinated magnesium systems maximize the strength and lightness of all their constituent parts.

Not all elements of a vehicle can currently be made from magnesium; there is an important role for steel, aluminum and even carbon fiber. Galaxy Motion identifies the appropriate role for magnesium in the total ecology of a vehicle's performance, coordinated with other materials.

Through its sister company Galaxy Finance, Galaxy Motion delivers financial engineering as well: long-term, price-stabilized, guaranteed quality and quantity deliveries of magnesium products, direct from the mines to global industrial customers.

Galaxy Motion supports the formation of a non-profit open standards forum -- the Flying Tigers Institute -- which shares the results of its research into magnesium applications, together with groundbreaking work being done by many others around the world.

Galaxy Motion is sparking the magnesium transformation of all elements of the transportation industry, including from bicycles, scooter and motorcycles to passenger vehicles, race cars, vans, sport utility, commercial trucks, bullet trains and freight cars. The design approaches and materials specifications developed in one vehicle type often translate efficiently into benefits for other vehicle types.

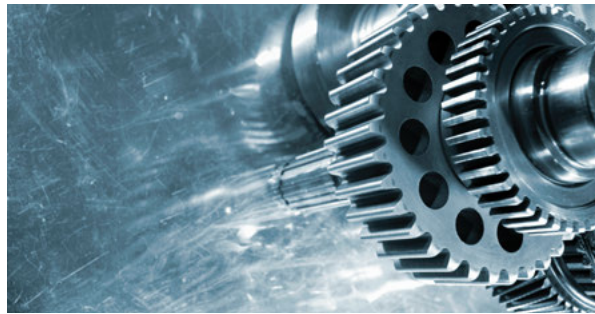
Galaxy Motion is committed to the advancement of energy-efficient vehicles that are responsive to the green power needs of the post-Covid-19 environment, both economically and environmentally.

Magnesium in motion, everywhere.



Galaxy Flight

Since the mid-1970's, the fields of commercial aircraft, defense, automotive and space flight have relied upon carbon fiber to create specialized surfaces and structures that are lightweight, stable, and strong. The challenge with carbon fiber is its cost. Aluminum is the leading metal alternative, and is much less expensive than carbon fiber -- but aluminum is 20-30% heavier. So carbon fiber is used only in settings where lightweighting is essential, and high cost can be justified.



Galaxy Flight, created by Galaxy Magnesium, is resolving this challenge and taking lightweighting to new heights, at reasonable cost -- through the targeted application of custom magnesium alloy technologies.

Magnesium is similar in weight to carbon fiber – within five-to-ten percent of equivalent carbon fiber when it is layered and finished – but it costs much less. A lightweight helicopter rotor, for example, may cost \$60,000 if made with carbon fiber. Its magnesium equivalent may cost less than \$10,000.

Today's most advanced magnesium alloys provide many features in addition to their primary lightweighting benefit. Galaxy Flight custom-designs magnesium alloys for a variety of missions, working with the top magnesium alloy laboratories in the world. Compared to steel and aluminum, a magnesium part can be designed to exhibit superior strength, greater resistance to torque and stress forces, better vibration damping and noise reduction, increased electromagnetic resistance, remaining stable at very high and low temperatures with fast transitions, with lower corrosion.

Bringing new materials to an industry like aerospace, with such precise tolerances, takes time, exacting research and validation. Galaxy Flight is committed to this course for the long term. Through our alliances with the Institute for Metals Research, Panoz Engineering and DeltaWing, Galaxy Flight specifies and produce magnesium alloys that are precisely matched to the most challenging mission.

The skies are not the limit.



Galaxy Build

Technology in the construction industry is stable and mature; new materials and techniques can take a long time to be adopted. New buildings and structures have been built with concrete, copper, aluminum and steel for generations. Galaxy Build has developed alternatives to steel, aluminum and classic Portland cement that can help architects, engineers and construction companies realize significant productivity gains: through tough, lightweight magnesium.



Galaxy Build is implementing magnesium in structural materials, including both vertical and horizontal beams used as primary structural support. Standard steel reinforcing bars embedded in concrete (rebar) can be replaced with more lightweight, corrosion-resistant magnesium.

Reducing the gross weight a building supports can increase the life cycle and durability of the entire structure, the cost of construction, and the useful height, dimensions and overall mass of a building.

Roofing, internal walls, ceilings, heating and cooling equipment, interior ducting, internal features such as rails, shelving and stairs are all candidates for a critical design review, given the greater weight of steel (50% or more) and aluminum (20% or more) compared to their magnesium counterparts.



Magnesium

Water piping, made today with copper or variants of plastic PVC (polyvinyl chloride) can be made more efficiently, with environmental, energy and cost advantages, when fashioned with magnesium.

Lighter, more durable, corrosion-resistant magnesium maintains a stable form over time compared to steel. Even the forms used to pour concrete -- made today from wood, plastic or cardboard -- can be made more durable with magnesium.

Magnesium supplied by Galaxy Build can be comparable in cost to steel and aluminum, because the alloys are sourced, refined and produced right at the mine and provided direct to manufacturers. Long, inefficient supply chains of buyers, dealers, brokers, wholesalers, agents and distributors are being replaced with Galaxy's simplified, streamlined model.

Portland Cement is made primarily of limestone, chalk, sand, clay and iron ore, all of which are resource-constrained. Galaxy Build has access to plentiful supplies of magnesium that are economically available. Substituting a magnesium compound for some of the elements in cement gives you Galaxy Cement – a new, denser cement that works more smoothly in conjunction with magnesium rebar. This approach produces a stable concrete surface with less embedded rebar and the same degree of stability.

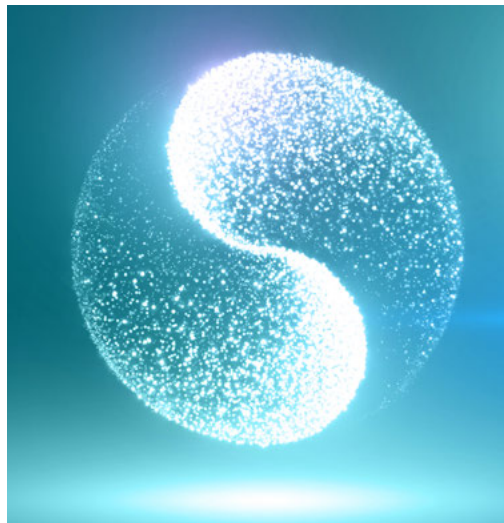
Magnesium in construction can help one of the world's most energy-intensive industries shift to a lighter, more plentiful metal that is produced with lower energy.

Building a lightweight future.



Galaxy Life

Magnesium is key to healthy nutrition for everyone. It is also a powerful tool in specialized medical treatment. Fulfilling both nutritional and medical needs with high-quality, economical magnesium is the mission of Galaxy Life.



Moderate magnesium deficiency is common across all populations and demographics, worldwide. Because magnesium is key to enzyme reactions that affect the absorption of nutrition, protein synthesis, muscle and nerve function, blood glucose, blood pressure regulation and heart rhythm, and an immune system that is resistant to virus and bacterial infection, the symptoms of sustained magnesium deficiency can range from uncomfortable to serious. Symptoms of moderate magnesium deficiency may include difficulty in sleeping, loss of appetite, sensitivity to loud noises and bright lights, numbness, nausea, abnormal heart rhythm, chronic weakness, colds and viral infections, and personality changes.

Getting enough magnesium is easy for most people, given a balanced diet of green vegetables, nuts, legumes, whole grains and berries, but sometimes these dietary options are not observed, or other conditions like diabetes or alcoholism are present, and modest daily supplements are needed. 70% of the U.S. population has some degree of magnesium deficiency. But not all magnesium supplements are created equal; the correct ratio of magnesium and companion compounds ensures that this vital mineral is fully bioavailable and can be absorbed thoroughly.



Galaxy Life provides precise, high-quality magnesium supplements in various forms, to the nutritional supplement industry. Because Galaxy has large reserves of pure, inspected magnesium, and can cut through inefficient supply chains that add unnecessary cost, magnesium supplements from Galaxy are among the most cost-effective in the world.

Severe magnesium deficiency is another matter. Because of genetic, dietary or environmental factors, severe magnesium deficiency, which exhibits little in behavioral symptoms, is sometimes not detected until serious health conditions, including sudden cardiac arrest syndrome, occur. According to the U.S. National Institutes of Health, sudden cardiac death (SCD) may be associated with as many as 30,000 deaths each year in the U.S. alone. More study is needed, taking into account population diversity and lifestyle issues, but this finding could implicate 250,000 or more needless deaths per year, worldwide.

To correct severe magnesium deficiency, carefully-controlled intravenous administration is required, using highly purified magnesium compounds in liquified form. By arming the medical community with sufficient supplies of high-quality magnesium, as well as the know-how to test for the deficiency and administer magnesium correctly, it is possible that Galaxy Life may assist in preventing needless death and suffering.

Currently, cost may be a factor; an intravenous bag of pharmaceutical-grade liquid magnesium may cost \$300 or more. The same high-quality liquid magnesium is available from Galaxy Life at less than 1/4 of this cost.

Galaxy Life can provide pharmaceutical-grade magnesium at significantly lower cost to the medical community, and make it more universally available. Galaxy Life is also dedicated to providing consumer, patient and physician education, to identify, detect and treat severe magnesium deficiency, including knowledge of correct dose and timing.

Magnesium - a source of Life.



Galaxy Power

Galaxy Power, a division of Galaxy Magnesium, is focused on the metal components used in Artificial Lift Systems in Energy Exploration and Production -- in particular on the advantages of **magnesium as a strong, lightweight alternative** to steel and aluminum.



Galaxy Power is accelerating innovation in the **upstream, mid-stream and downstream** oil and gas sectors, through the use of magnesium alloys that provide significant savings in operating costs, promote energy efficiency, match or exceed the performance of current standard metals, and enhance energy production optimization.

Galaxy Power offers three innovative Artificial Lift System Solutions:

- **Bridge Plug with Soluble Magnesium:** Bridge Plugs are used in vertical and horizontal oil wells and are typically constructed of conventional steel, aluminum, and composites. Traditional permanent bridge plugs are difficult to



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extract and recycle; the process is time-consuming, delays productive work for crews, and requires expensive equipment. The Galaxy Power bridge plug features soluble magnesium that can be programmed to dissolve after a specific time, within a range of pressure, temperature and time parameters based on specific operating environments.

- **Well-Bore Equipment:** Galaxy Power offers lighter, thinner downhole well-bore equipment made largely from magnesium alloys. Up to 50% lighter than the steel alloys currently in use, magnesium allows for more durable materials that can be thinner, and operate with less friction.

The tubes, barrels and liners and other components that are used in the well-bore with our lighter, magnesium-based design place less stress on the pump at the surface. This means a more efficient lift system, which breaks down less frequently and consumes less energy in operation.

- **Vertical Hydraulic Pump:** Existing standard transverse oil pumps -- the familiar bobbing horsehead design used in oilfields around the world for more than a century -- are limited in their productivity. Their mechanical design exerts wear and tear on the well bore equipment, pump arms, gears, fulcrum and supports requiring ongoing maintenance -- Energy consumption remains the highest cost in operation of these lift systems. The performance of this original design has been improved over time, but the basic physics of the transverse pump have rarely been questioned.

Galaxy Power offers a re-designed alternative for the oilfield: a vertical hydraulic pump, with fully-enclosed components in a compressed vertical geometry. This patented, proprietary design creates alternating pressure within a the well that extracts the oil and gas more efficiently with less energy. The equipment is serviced and replaced less frequently, leading to dramatic cost and energy savings.

Galaxy Power: Industry Resource for Innovation

Energy production and exploration companies face unique challenges in today's global energy markets, and Galaxy has innovative solutions to answer those challenges. New magnesium alloys contribute to **safety, create efficiencies in operations**, and address persistent challenges to the **delivery of sustainable performance**.



Galaxy specifies precise **magnesium substitutes** for the current high-strength steel, brass, chrome and aluminum used in the industry, bringing extraordinary performance and durability improvements. To work in the most difficult surface, subsea, and subterranean environments, Galaxy is forming strategic partnerships and alliances that impact the bottom line, and provide environmental and social value to energy producers.

Galaxy Power: Now and in the Future

We begin by listening -- this is the key to earning a leadership position in the industry, building a reputation for understanding the current challenges of the customer. Galaxy Power then creates **intensively tested, fully-trusted technologies**, with a comprehensive range of cost-effective products and services. We **invest in research, prototyping, partnerships and joint development** -- constantly keeping our eye on the horizon of innovation.

Energy professionals who bring challenges to Galaxy involving new magnesium alloys receive our immediate attention. As an international team, we assist customers worldwide with understanding the technical and business advantages of magnesium. Our **science, chemistry, nano-processing, metallurgy**, and product development resources allow us to develop solutions based directly on immediate customer specifications. Additional capabilities include prototype creation, including **CNC systems, small-volume manufacturing** and ultimately **volume manufacturing** for proven equipment. Galaxy Power brings magnesium to all types of **Artificial Lift Systems and Offshore Platform Lightweighting**.

We invite industry professionals and customers who seek solutions to energy production opportunities using magnesium to discuss their requirements with Galaxy Power.

Magnesium: Key to a more powerful future.

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Galaxy Green

Galaxy Magnesium is developing green, environmentally-positive products that utilize the special properties of magnesium. Applications begin with in home cleaning and home energy.

Keep an eye on this space for updates to come in the near future.

Magnesium for the future of our earth.





Galaxy Finance

The major challenge to widespread adoption of magnesium as a standard industrial metal is the limited, inconsistent availability of large quantities of high quality magnesium products at predictable prices.

On the current spot dealer market, with many mines, magnesium types and customers, prices fluctuate from week to week. Some mines withhold supplies anticipating higher prices; some mines cannot meet demanding environmental standards and shut down.

Layers of dealers, local and international shippers, brokers, insurers, tariffs and taxes, warehouses and distributors and shifting currency exchange rates add expense and unpredictability to the global magnesium market.



In this shifting landscape, potential magnesium buyers — engineers and production managers from the automotive, aerospace, construction, energy and pharmaceutical industries — often hold back on large, long-term commitments to magnesium. They recognize the many benefits of magnesium, but they cannot take the risk of inconsistent supplies and pricing in their long, complex supply chains and fast-moving assembly lines.



To mitigate these risks, and offer magnesium supplies that are consistently guaranteed, Galaxy Magnesium has formed a new division, Galaxy Finance. Galaxy has started by consolidating access to 20% of the world's commercially-mineable magnesium.



Galaxy Finance delivers the capital and credit resources needed to deliver the huge reserves that Galaxy Magnesium has developed. Together with the largest magnesium group in the world, the company holds a substantial reserve of thousands of metric tonnes of magnesium, and a network of more than 15 mature, continuously producing mines, along with many refining, alloy and manufacturing facilities.

Galaxy Finance provides magnesium at a reliable, repeatable, consistent quality and price through an alliance with Wisdom Capital, a private equity bank based in New York.

These innovative capital, credit and financial logistics resources serve the customers of all Galaxy Divisions — Motion, Flight, Life, Build, Power and Green — to provide financing vehicles that make the adoption of magnesium a straightforward commercial and fiscal decision.

Galaxy Finance consists of two key financial tools: Galaxy Guarantee, and Galaxy Exchange.

On the other side of the coin, Galaxy Exchange will utilize the Multilateral Trade Facility, a real-time magnesium commodities exchange authorized under the financial market regulations of the European Union.

The MTF is a 24/7 electronic exchange that allows many buyers worldwide to simultaneously see magnesium available that day from many sellers. Both buyers and sellers are pre-authorized, so that an accepted bid is immediately documented, with funds transferred and contracts in place.

Galaxy Exchange, set to be operational before the end of 2021, will list all magnesium products offered by registered global mines, refineries, manufacturers and suppliers. This includes Galaxy Magnesium as a key supplier, but is open to all magnesium product suppliers worldwide. With careful cultivation and continuous investor and supplier education, the Exchange will attract many suppliers and buyers to an open, transparent market.

The continuous dynamic of a real-time electronic bid-ask system, akin to the London Metals Exchange, provides for the most efficient price discovery and consistent value establishment, for all members of the global magnesium community.



Magnesium

In addition to the purchase of physical magnesium directly through the Exchange for industrial use, asset managers and individual investors will be able to implement options strategies, to manage risk and opportunity in the metals marketplace, and diversify their market portfolios with magnesium.



The price of magnesium often moves counter-cyclical to other non-ferrous metals like aluminum, silver, copper, lithium, cobalt and zinc. With magnesium as an additional tool, a hedge that can be positioned long or short and indexed for volatility, the tools for magnesium diversification will be available to asset managers of all types — commercial and merchant banks, mutual funds, index funds, institutional investors, trusts and pension funds.

Adding magnesium to the financial market ecology will open up new market strategies for investors, and lead to more stable, long-term commodities markets.

Finance for the magnesium market.



Magnesium

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