

March | 2020

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INTRODUCTION

WELCOME

Welcome to this latest Mobility Newsletter from CBMM.

The purpose of this Newsletter is to share news, information and insights – with partners and stakeholders who are interested and involved in progressing important Mobility matters.

This issue explores a number of important trends impacting on the development and growth of the mobility sector including... the rapidly changing EV landscape, the importance of benchmarking, insights and ideas around battery recycling, how to achieve sustainable mobility, and the continued drive towards autonomous vehicles. The Newsletter also outlines the potential and value of Niobium Materials Technology in a range of applications including... in exciting new graphene technologies, low-weight and high-performance containers, and in the new and exciting Extreme E race vehicles. There is also a look at the current Formula E Season including CBMM's outline plans for the season ahead.

CBMM is committed to developing mutual understanding and partnerships to explore and develop new and effective approaches to... Materials Technology Innovation, and Safe and Sustainable Mobility. It is only possible to cover chosen subjects in the Newsletter in high-level detail, so for most subjects

contact information is provided, to encourage further subject exploration, communication and understanding.

We hope that you find this communication interesting and valuable, and so we look forward to receiving any feedback on this Newsletter issue.



Rodrigo Amado

Head of Mobility CBMM



THE 3 HIDDEN KEYS TO NEW MOBILITY

PLATFORMS, CONSUMER SENTIMENT AND HARDWARE

The coming of Future of Mobility is an extremely exciting, once in a lifetime change that will greatly alter our transportation and the way society thinks about getting around. Typical of great change comes industry disruption; fortunes will be won and lost, making it imperative that every company understands how these changes will impact their business.



As you may have heard from industry leaders, this New Mobility future is summarised by 4 key technology groups – Connected, Autonomous, Shared, Electric (CASE or ACES). While this is largely true, there are 3 other pieces that are absolutely critical to understanding how New Mobility will roll out.

The first is **platforms**. The platform that truly started the New Mobility revolution is the smartphone as this allowed the easy development of Apps to control the function of new ideas. Uber and Lyft are classic examples of enablement, and Mobility as a Service (MaaS) is the logical, multi modal extension of this concept.

The second is **changing consumer sentiment**. Millennials and Gen Z are far more open to new technologies and sharing transportation than previous generations. The large cost of buying a car is not something they find appealing when Uber, public transport and shared bikes / cars / scooters suffice more than adequately, particularly for urban dwellers.

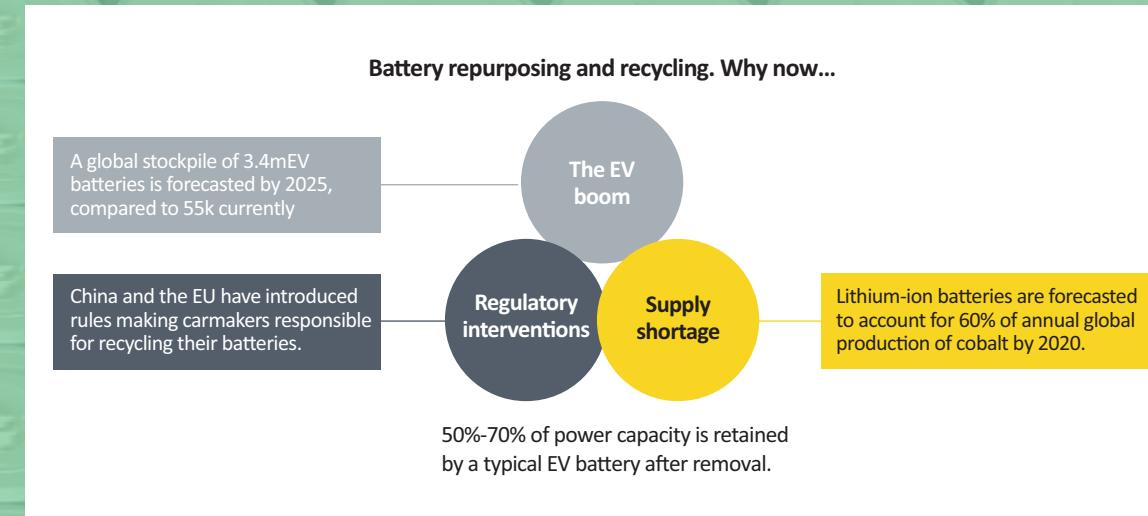
Younger generations also lead with openness to Electric Vehicles, rooted in an environmental conscience. Thus, the latest EVs from Audi, Tesla, Nissan, Hyundai, Kia and General Motors offer aspirational appeal as well as long range, very low running costs, and few inconveniences.

The third is new **hardware technologies**. For many, software is a “be all, end all”; however, the truth is that software is nothing without hardware – there’s a symbiotic relationship. Therefore, advancement in hardware is critical. Tesla, for example, recognizes that materials science is a key hardware element, and they regularly use sister company SpaceX’s Materials Science division to improve materials, prove out new ideas and test for potential problems. For them, it’s a hidden super power.

At the end of the day, transportation still requires a major hardware play, and making vehicles lighter, stronger, more efficient, more capable and more powerful all requires developments in metals, plastics and other mediums to maintain a competitive advantage.

Thus, as New Mobility is driven forward by CASE technologies, platforms and consumer demand; hardware will play a critical enabling role in this development, it’s potentially a big competitive advantage, and that’s a key insight for the future success of any company.

By James Carter, Mobility Futurist, Thought Leader and Influencer – Principal Consultant at Vision Mobility
jcarter@visionmobility.ca



WHY THE EV BATTERY LIFE CYCLE IS MORE IMPORTANT THAN THE BATTERY LIFE?

NEW THINKING, NEW OPPORTUNITIES

With global EV sales forecast to hit 11m by 2025, the question of how to deal with an increasing stockpile of EV batteries is set to become a very urgent one, from both a commercial and environmental point of view. Managing the battery life cycle effectively is potentially the key to the future of EVs.

EV batteries are costly, but their value chain — use, reuse, recycle — offers revenue potential.

Simply throwing away battery packs that are no longer fit for their original purpose is clearly a nonstarter for any sustainable technology. EV batteries are expensive, packed with scarce raw materials and are environmentally tricky to dispose of, and disposal economics are currently unattractive.

Battery life cycle management is a huge emerging opportunity that could solve the

issue of how to stop EV batteries ending up as expensive and toxic landfill waste. However, making the most of the opportunity will require new levels of collaboration within not only the battery manufacturing, automotive, utilities, and metals and mining sectors, but also R&D institutes and the startup community.

But the prize is great: battery life cycle management offers a great chance to flip what looks like a brake on the progress of EVs into something that could accelerate and increase EV sales in the future.

The battery is an asset too.

The battery is an asset and should be recognized as such, rather than as a component of a vehicle. This recognition would ensure that it is developed as an important source of additional revenues over a full-term life, one that could last several decades.

Consider, for example:

New batteries currently cost around US\$200 per usable kWh (with the battery accounting for over 50% of the cost of an EV). Second-life batteries repurposed from EVs could slash that cost to only US\$49 per usable kWh.

■ WHY THE EV BATTERY LIFE CYCLE IS MORE IMPORTANT THAN THE BATTERY LIFE?

The used battery market opportunity.

Developing a used battery market presents a major opportunity for industry participants to create new assets, access valuable new revenue streams, secure supplies of raw materials and drive EV use. It's a critical aspect of the future viability of EVs and will be a major competitive differentiator for those that drive the market as opposed to those that sit on the sideline.

Through partnerships and new business models, automakers can deliver consumer value and stand apart.

To make the most of the opportunities presented by battery life cycle management, there are three key aspects for industry participants to bear in mind.

1. Alliances hold the key. Automakers should partner with a variety of industries, including battery manufacturers; those in the battery repurpose space, such as utilities and smart-power startups; recyclers; and tech providers, to track, record and reconcile the whole process. Identifying and implementing these alliances will call for new skill sets and a new, more open mindset because in a circular value chain, no one is at the top of the pile, and no one is on the bottom.

2. New business models. The trend toward decoupling the ownership of the EV and the battery must accelerate. New, more flexible and multistage leasing deals not only for first-life applications but also for second, third and fourth lives must be developed. This will need new management and information systems to handle battery tracking, including charging history, ownership and related transactions. Here, it's envisaged that blockchain platforms with smart contracting would be deployed.

3. Customer value. The revenues that will accrue from the reuse and ultimate recycling of spent batteries must be priced in and used to improve value offered to new EV customers. Reducing the up-front cost of EV ownership and use is vital to boosting affordability, which will also increase consumer confidence and sales.

For more information contact John Simlett
EY Global Future of Mobility Leader –
jsimlett@uk.ey.com



Such dramatic savings are achieved by:

1

Managing the battery through its full life, with separate ownership and tracking models for the vehicle and battery pack – potentially leveraging blockchain and smart contracting

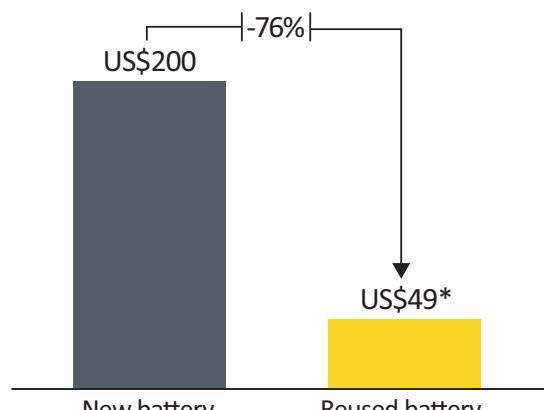
2

Creating a marketplace to enable easy movement into other economically viable alternative uses, including storage of power generated by solar and wind, grid stabilization, back-up power supplies and even EV charging

3

Enabling new business models, such as “storage on demand” and “storage as a service,” which would allow emerging energy companies to generate new revenue streams without spending on asset building

Cost comparison (US\$kWh)



*Source Bloomberg

BENCHMARKING FROM DATA TO KNOWLEDGE

INSIGHTS TO INSPIRE R&D

Backed by over 20 years of proven experience, A2Mac1 has become the global standard in benchmarking. Today's automotive manufacturing process is more sophisticated, complex and exciting than ever before, and we are proud to be at the epicenter partnering with OEMs and suppliers worldwide to advance vehicle design and manufacturing.

Thanks to our matchless methodology, our customers gain invaluable insight derived from 700+ vehicle disassemblies, enabling them to optimize materials and design, identify critical opportunities and fully exploit their value engineering envelope.

Electrification is on the rise. Smart decisions are required. Fortunately, HEV's, PHEV's, and BEV's offer a great variety of technologies to OEMs and their suppliers. Multiple packaging options help balance weight, cost and additional functions such as energy regeneration through coasting and braking.

Early market announcements are now materializing into new and exciting vehicles in all segments. With the support

of our customers, we carefully select more than 80 vehicles that are among the most relevant in the market. 2020 will be a remarkable year, we will be looking into:

- EV architecture, OEM & suppliers strategies, packaging impacts and how our 3D-based Virtual Collaborative Workshop service helps to visualize them.
- Innovative technology and its implementation in terms of e-powertrain, material, and battery engineering from a packaging and chemistry standpoint, and how the customers benefits from increased electric range.
- Design efficiency from a costing standpoint, as well as a performance / weight perspective as we launch new Dynamic Benchmarking programs, both

physical and virtual in 2020.
 • Commonality across brands and models between platform and upper body components to optimize component sharing and preserve vehicle identity.

A2Mac1 benchmarks 80+ vehicles each year globally, ranging from established OEM's to the new startup OEM's. Through the use of our 3D AutoReverse program, customers will be able to perform a detailed benchmarking analysis on our global program. 3D AutoReverse enables customers to efficiently and effectively discover insights on some of the most sought vehicles in 2020.

For further information about A2Mac1 visit www.a2mac1.com



HELPING TO DELIVER SMART SUSTAINABLE MOBILITY

REDUCING MATERIALS AND IMPACT

The drive to save the world's resources is on.

Governments are legislating, OEMs are rethinking their products and their businesses, mobility suppliers are accelerating technical innovations – and consumers, citizens, people are demanding sustainable and affordable mobility... as soon as possible.

Electric vehicles and NextGen battery technology are central to meeting the desires for sustainable mobility – however, proven materials innovation, using tailored Niobium Technology applications, also have a vital role to play in...

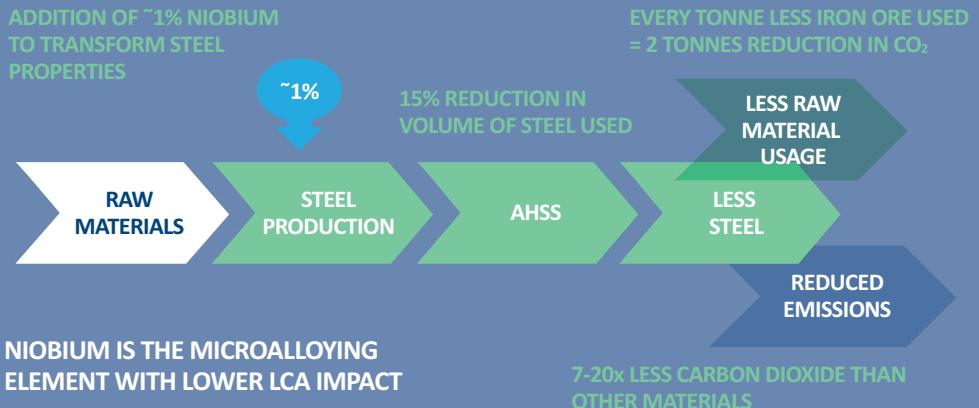
Saving Materials... Lowering Weight... Reducing Emissions... Improving Recyclability... and at the same time... Improving Safety and Reducing Production Costs

Advanced Niobium Materials Technology already helps to deliver more sustainable cars, vans, trucks, buses, industrial vehicles, shipping containers – as well as a range of Micromobility products; however, the potential to make a much bigger impact on saving the planet's resources and reducing vehicle emissions is both exciting and highly achievable. Working with partners, customers and traditional and new-entrant OEMs – CBMM undertakes an ongoing quest to ensure Niobium plays its part in helping to deliver the essential transition from simply providing Automotive Products, to delivering Smart Sustainable Mobility.

For further information about how Advanced Niobium Materials Technology can deliver the benefits above, please click [here](#).

REDUCING THE ENVIRONMENTAL IMPACT OF MATERIAL PRODUCTION

NIOBium STEELS ARE HIGHER STRENGTH AND HARDER WEARING. THIS ENABLES A REDUCTION IN BOTH MATERIALS USAGE AND EMISSIONS FROM PRODUCTION



NIOBium IS THE MICROALLOYING ELEMENT WITH LOWER LCA IMPACT

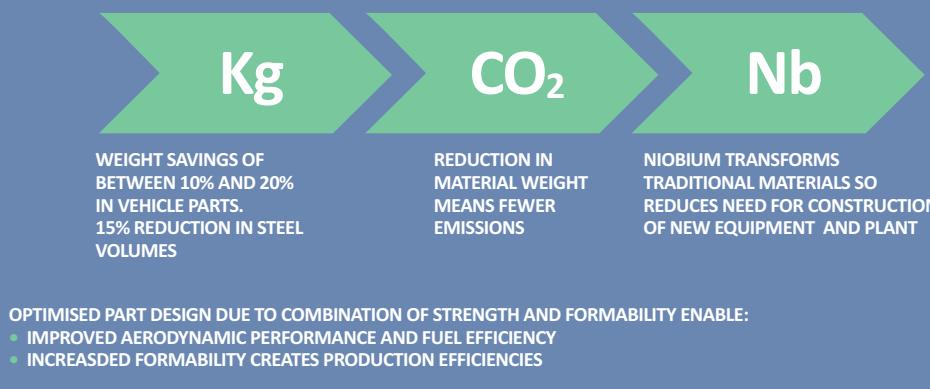
ENABLING MORE EFFICIENT VEHICLE PRODUCTION

WHEN MEASURED ACROSS THE AUTOMOTIVE SUPPLY CHAIN,
1 TONNE OF NIOBium:

- REDUCES GREENHOUSE GAS EMISSIONS BY 600 TONNES
- SAVES 4 MILLION LITERS OF WATER

BETTER WELDABILITY AND FORMABILITY REDUCES DEFECTS AND WASTE IN MANUFACTURING PARTS AND BODIES

HIGHER TOUGHNESS AND WEAR RESISTANCE IMPROVES LIFESPAN



WEIGHT SAVINGS OF
BETWEEN 10% AND 20%
IN VEHICLE PARTS.
15% REDUCTION IN STEEL
VOLUMES

REDUCTION IN
MATERIAL WEIGHT
MEANS FEWER
EMISSIONS

NIOBium TRANSFORMS
TRADITIONAL MATERIALS SO
REDUCES NEED FOR CONSTRUCTION
OF NEW EQUIPMENT AND PLANT

OPTIMISED PART DESIGN DUE TO COMBINATION OF STRENGTH AND FORMABILITY ENABLE:
• IMPROVED AERODYNAMIC PERFORMANCE AND FUEL EFFICIENCY
• INCREASED FORMABILITY CREATES PRODUCTION EFFICIENCIES



WHO IS DRIVING THE FUTURE OF MOTORSPORT?

AI TO AI = EXCITING SUSTAINABLE ENTERTAINMENT

As Formula E have pioneered the direction of motorsport into fully electric to advance electric drive-trains and promote a new direction for mobility, there remains an opportunity to do the same for autonomous vehicles too. Enter Roborace, the world's first racing series for self-driving cars.

The series, which sees AI take on AI in a competition of intelligence, uses standardised hardware for teams developing the self-driving software to test their algorithms

to the absolute limit in controlled environments. The aim is to advance the software at a faster rate in order to bring it to our roads sooner bringing with it a new era of mobility that will bring us ever closer to the UN goals of zero emissions and zero fatalities.

Although the series has the important challenge of advancing the technologies for autonomous vehicles, it also has another important function in developing a new entertainment product for a new generation.

The competition, which has the enviable position of

a blank sheet to create this entertainment proposition from, is looking to bring the virtual and real worlds together in a sport that allows the fans to really immerse themselves in the action.

The company had their first prototype season in 2019, and sees the second, Season Beta, start in 2020 with teams from around the world competing to prove their algorithms are the best in the world.

For more information visit: <https://roborace.com>



ROBORACE

I USING THE BEST STEEL PRODUCT FOR THE RIGHT APPLICATION

WORKING WITH PARTNERS TO FIND SOLUTIONS

Press Hardened Steel (PHS) or Hot Formed Steels undergo a unique manufacturing process where the steel is heated to a temperature of 900°C then formed to a final shape in water cooled dies that control the rates of cooling / quench to ensure desired properties are met

Steel is the most widely used material for Body In White (BIW) Structure and has been since the beginning of the automotive industry. Starting from the 1990's, the BIW materials used started to change with the use of High Strength Low Alloy (HSLA) becoming very common and HSLA being

developed. In order to satisfy safety targets that have become more and more stringent, Advanced High Strength Steels (AHSS) were also developed. All these materials are cold formed; at the same time the hot forming concept was also imported into the automotive industry from another sector. 22MnB5 was the first hot formed material used for automotive structures.

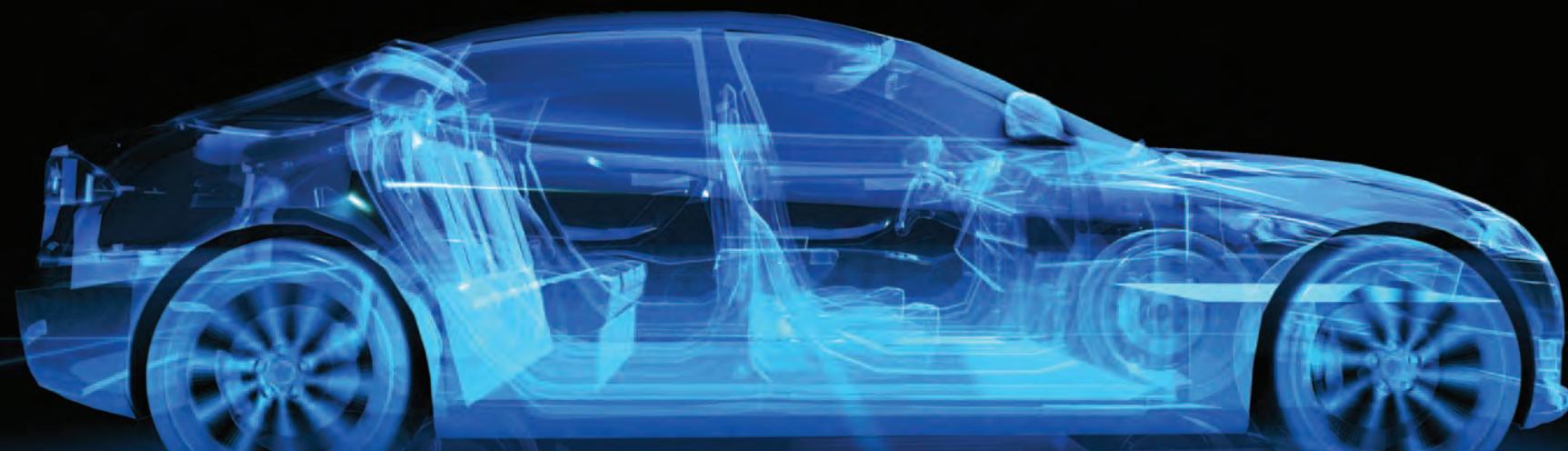
The hot forming process (HF) reduces springback issue because the components are quenched in a closed die and formability is good because it takes place starting from 900°C. HF became increasingly used and today in EMEA some models have more than 30% of PHS in the BIW structure. Chinese

OEMs starting using PHS and models presented in 2019 had an average of 15% of BIW structure designed with PHS. 22MnB5 achieves 1500MPa of ultimate strength, but development is pushing the evolution of the steels to 2000MPa and in 2020 we will see the first industrial applications for this grade.

Niobium has a key role in PHS because it precipitates as NbC and facilitates grain refinement. Precipitation and grain refinement provide increased strength, enhanced crack propagation resistance and reduces sensitivity to intergranular fracture. NbC act as hydrogen traps and enhances resistance to hydrogen induced delayed cracking.

CBMM and Fiat Chrysler Automobiles started a collaboration to develop new materials and solutions and FCA was one of the first OEMs to validate PHS2000 with Niobium. According to the tests performed, Niobium is mandatory for 2000MPa and important for 1500MPa, in order to prevent hydrogen embrittlement and achieve more robust designs.

For more information please contact
Fabio D'Aiuto: fabio.daiuto@cbmm.com
Or Michele Tedesco at CRF – and FCA company: michelemaria.tedesco@crf.it
www.crf.it/EN www.fcagroup.com/en-US/Pages/home.aspx



NIOBIUM LOW-WEIGHT HIGH-PERFORMANCE CONTAINERS

THE BENEFITS ARE CLEAR AND IRRESISTIBLE

With over 30 million 20' equivalent trailers (TEU) in use globally and 3-4 million new TEU containers produced each year, there is a tremendous business opportunity if the performance of containers can be improved. Niobium container technology can deliver dramatically improved container performance and qualities.

Over the last 4 years CBMM has been working with a range of highly experienced specialist partners on the technical development, testing and certification of Niobium Low-weight High-performance containers. Singamas, one of the largest container manufacturers in the world, have been a key member of the technical project team and leading steel companies and academic institutions have also played important roles – along with CBMM's partner in China, CITIC Metals.

The results achieved for the project are impressive and the potential container manufacturer and operator benefits include:

LIGHTER CONTAINERS – TARE weights down 14% so 240kg for 20' and 380kg for 40' containers

INCREASED CONTAINER PAYLOAD – reflecting reduced TARE weights

POTENTIAL* FOR REDUCED OPERATING COSTS – through reduced TARE weights

POTENTIAL* FOR REDUCED EMISSIONS – through reduced TARE weights

INCREASED STRENGTH – to both container structure and joints

MORE CORROSION RESISTANT – weather resistance improvements of between 8% and 13%

ALL FOR LOW/NO COST INCREASE – subject to container production volumes and process

BUILDING A POSITIVE REPUTATION – positioning the company as a sustainable business

In summary, Niobium Low-cost High-performance Containers present a clear, powerful and compelling case to save on operating costs and reduce material use and all-important emissions.

If you would like to know more about CBMM's mobility programmes – please contact:

CBMM Head of Mobility Rodrigo Amado at: rodrigo.amado@cbmm.com



GRAPHENE MEETS NIOBIUM



A PARTNERSHIP FOR TRAILBLAZING MATERIALS R&D EXPLORATION

In late 2019 CBMM made an investment in a successful spin-off from the National University of Singapore – 2DM a company dedicated to graphene technology innovation and product development. The partnership reinforces CBMM's ongoing exploration of new Niobium technology potential and demonstrates further commitment to the development of innovative solutions for its customers.

CBMM has identified a potential application synergy with graphene – since the bidimensional material can be used in areas common to Niobium, such as in the automotive industry (including batteries for electric vehicles), construction and infrastructure, electric/electronic applications, among others.

"We found 2DM to be the perfect choice for us to share our expertise in materials technology and applications, market expansion and development of global customers. CBMM has an accumulated experience of more than 60 years developing technology and market for niobium products. CBMM and 2DM have complementary skills and knowledge to build a successful graphene history", stated Ricardo Lima, Vice President of Operations and Technology of CBMM. "Furthermore, 2DM is also well advised by Konstantin Novoselov, Nobel prize in Physics and the first identifier of graphene, and by the National University of Singapore (NUS), a recognized center in advanced materials technologies."

Thanks to decades of investments in its Niobium processing and application technology program, CBMM has become the world market leader and its history is directly linked to the development of high-performance Niobium product applications. It is with this experience that working closely with

2DM, the Company has begun to explore exciting product development opportunities – potentially combining the positive characteristics and qualities of Graphene and Niobium.

Graphene has been widely recognized for its features as an electricity conductor, and for its thermal properties, strength and lightweight; and other characteristics that place it as one of the most promising materials to support continued materials innovation in the new mobility sector. It is early days in the relationship and technical innovation journey, but watch this space for exciting news in the future.

For more information please take a look here:

[www.cbmm.com/en/Our-Company/Noticias/Articles/
CBMM-investe-em-empresa-de-grafeno](http://www.cbmm.com/en/Our-Company/Noticias/Articles/CBMM-investe-em-empresa-de-grafeno)

Or here: <http://2dmsolutions.com/2dm-closes-investment-round-with-cbmm-niobium-global-leader/>



NIOBIUM ADDING VALUE: APPLICATIONS

STRONGER, LIGHTER, SAFER, CLEANER, SMARTER

EFFICIENT E ENGINES

- Lighter – between 10% and 20% for Niobium in Nanocrystalline
- More efficient process of converting electrical energy from the battery into motion
- Important in electric motors
- Also improving inverters

SAFER BATTERIES

- Increase battery performance
- Improving service life
- Safer Batteries
- Increasing stored energy
- Faster charging times
- Prevent short circuits

BETTER DRIVETRAIN, BRAKES & WHEELS

- Lighter gearboxes, gears, and transmissions
- More fatigue resistant parts with longer service life
- Reduced wear and part failure
- Lighter and stronger aluminium or steel wheels

STRONGER STRUCTURES

- Lighter – between 10% and 20% for some parts
- Stronger and tougher
- Up to 15% reduction in steel volumes
- Benefits for steel and aluminium parts
- More efficient production processes

SMART WINDOWS

- Controlling visible sunlight
- Managing Solar heat
- Improving driver/passenger experience
- Enabling fuel savings
- Reduces CO2 emissions

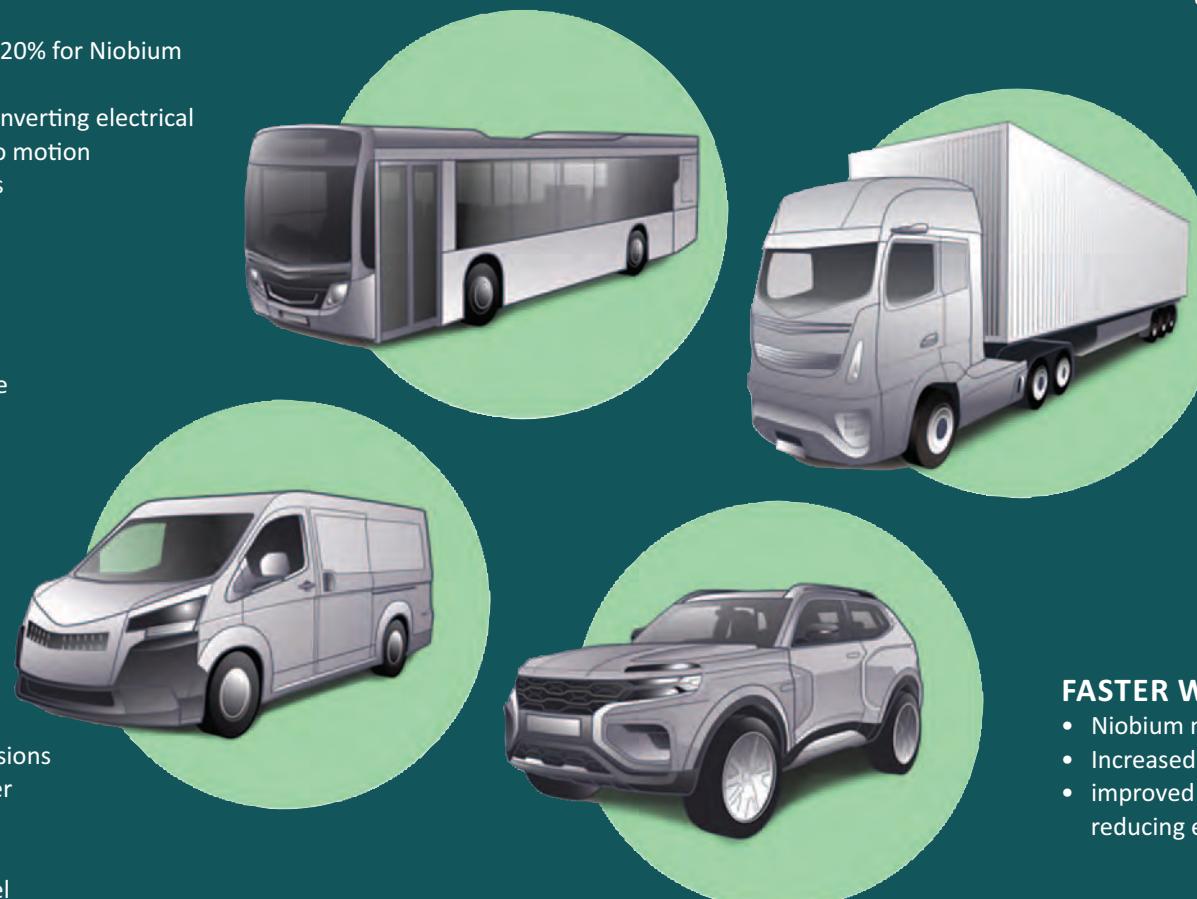
ADVANCED ENGINES & TURBOCHARGERS

- Lighter, stronger engine blocks, and cylinder heads
- Better performing Turbochargers
- Parts more resistant to wear
- Reduced failure rate
- Niobium allows more complex and innovative designs

RESILIENT ELECTRONICS

Niobium improving performance of:

- Capacitors and inductors
- Sensors
- Electric Controls
- Electronic Circuits
- Niobium replacing other hazardous or rare materials



FASTER WIRELESS CHARGING

- Niobium nanocrystalline materials
- Increased magnetic shielding
- improved efficiency of charging, reducing electrical losses

NIOBIUM ADDING VALUE: POSITIVE BENEFITS

IMPROVED PERFORMANCE, BETTER VALUE

Through its own R&D programmes and collaboration with technical partners, CBMM is constantly developing new product applications where Niobium can improve product qualities and performance characteristics.



NIOBIUM ADVANCED MATERIALS TECHNOLOGY DELIVERING POSITIVE BENEFITS AND VALUE



BETTER PERFORMANCE

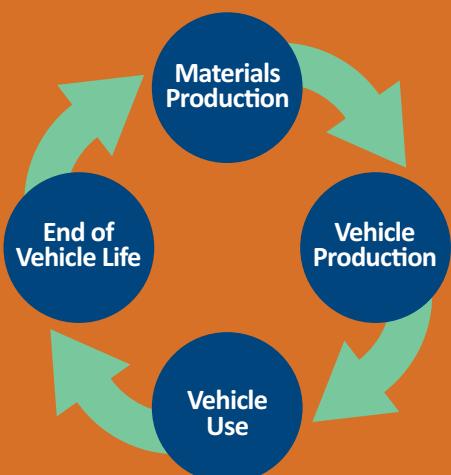
- Niobium produces stronger, lighter and tougher vehicles
- Possible weight savings of between 10% and 20% in vehicle parts
- Up to a 15% reduction in steel volumes
- Vehicles are easier to make and with better product quality



IMPROVED SAFETY

- Niobium components are more wear resistant
- Niobium components are more reliable
- Lightweighting enables additional safety and comfort features

Niobium increases sustainability in all stages of the automotive industry



CLEANER ENVIRONMENT

- Niobium reduces use of materials and emissions
- Niobium reduces fuel consumption due to lightweighting
- Niobium components are 100% recyclable



INCREASED VALUE

- Niobium products last longer
- Lightweighting reduces fuel costs and tyre wear
- Niobium helps to reduce production costs



ADVANCED TECHNOLOGY

- New Niobium applications are continuously being developed
- Stronger, lighter high-performance steels – and innovative Niobium aluminium products
- Niobium technologies are being developed for batteries, sensors, wireless charging and glass

Nb

Niobium

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FORMULA E & CBMM

BUILDING THE RELATIONSHIP IN SEASON 6

Formula E brings racing tech to the road. With some of the biggest car and racing brands going head to head on the streets, Formula E is more than just a racing series – it's a battle for the future. The cars, powered by pure electricity, pave the way for the cars of tomorrow.

Formula E Season 6 is now well underway and already after 4 races in 3 locations podium places have gone to 9 different drivers from 8 different teams – Audi, BMW, DS Techeetah, Envision, Mercedes Benz EQ, Nissan, Panasonic Jaguar and Tag Heuer Porsche. Panasonic Jaguar driver Mitch Evans led the race from the first lap to the last with a great display of skill, courage and performance and power management. Formula E is exciting, highly competitive and unique. At the heart of the Formula E competition is the ever evolving vehicle technology behind the Gen2 racing cars. For more information please visit: www.fiaformulae.com/en/discover/cars-and-technology

As the title sponsor of the CBMM Niobium Mexico City E Prix, the CBMM team had a particular interest not only in the race but also as CBMM Niobium presented the BMWi Safety Car experience for the first time in Mexico – a relationship and Safety Experience CBMM is hoping to build on and extend throughout the season. Niobium plays a particular role in making vehicle design and manufacture safer – as Advanced Niobium Materials Technology plays a key role in making critical components stronger, more resilient and safer.

Looking forward, ahead of selected Formula E races, CBMM is planning to run its highly successful Mobility Tech Day Workshop program – in key locations in Europe and Asia. There will be more news about these events in the coming months and the next issue of this Newsletter.

For more information about Advanced Niobium Materials Technology please visit:
<https://niobium.tech/en/Landing-Pages/Mobility/Landing-Page-Mobility>

EXTREME E & CBMM

PREPARATIONS HOTTING UP FOR 2021

Extreme E is a competitive platform for accelerating the development of electric vehicles, to help create a low-carbon future powered by renewable energy. Extreme E is committed to supporting and partnering with organisations working to restore the degraded environments in which races take place, supporting the precious ecosystems within them and the people who live there.

CBMM has been involved in this exciting new initiative from the very beginning, first as a Launch Partner and now as a Founding Supplier. Niobium High Strength Steel will feature in all race vehicles and technical development exploration is also underway to introduce performance enhanced Niobium Brakes and Wheels to future Extreme E race vehicles. In addition, behind the scenes plans are also in hand to ensure that all containers used to move the Extreme E operation around the globe are made from Niobium Low-Cost High-Performance steel – saving on weight, materials and operating costs.

Extreme E prototype vehicles have already undertaken successful tests at the Dakar Rally in Saudi Arabia, and more rigorous testing will take place throughout 2020 – ahead of the first Opening Race in early 2021.

The inaugural season will include ocean, desert, mountain, arctic and rainforest race stages which will throw an extreme variety of terrains at the competitors, whilst introducing audiences to the serious climate issues facing these locations and their communities.



For more information about Extreme E visit:
www.extreme-e.com or follow @extremeelive on socials.



Extreme E's Season 1 calendar:
22-24 January - Lac Rose, Dakar, Senegal
4-6 March - Al-'Ula, Saudi Arabia
6-8 May - Kali Gandaki Valley, Mustang District, Nepal
27-29 August - Kangerlussuaq, Greenland
29-31 October - Santarem, Para, Brazil

OPPORTUNITIES TO COLLABORATE

PARTNERING TO BUILD THE FUTURE TOGETHER

A team of 1,950+ CBMM professionals is committed to providing cutting-edge niobium products and technology to more than 300 customers in 50 countries.

CBMM's technology initiatives and innovations are developed in two ways. First, the company's Technology Center is located at the world leading industrial complex in Araxá, Brazil and focuses on enhancing the production processes of existing niobium products and at the same time developing exciting new products.

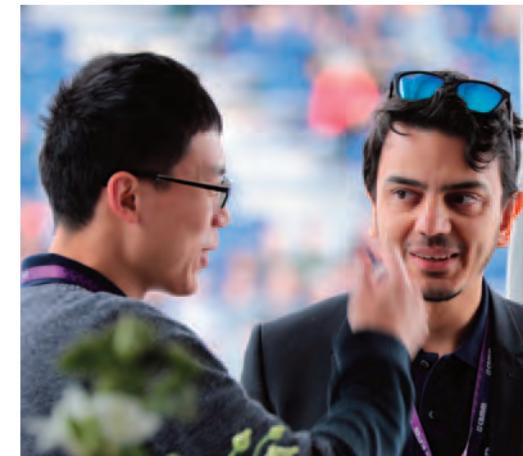
The company also has a technology subsidiary, CBMM Technology Suisse, based in Geneva which coordinates efforts to develop new niobium applications worldwide.

For over 20 years CBMM has successfully partnered with a number of leading international organisations to research, develop and introduce new technologies to automotive, mobility and other markets.

Current partners include:

- Leading Universities in China, Europe and North and South America
- Technology R&D and Innovation Consultancies around the world
- Tier 1 & 2 Suppliers around the globe
- Established OEMs and new entrants into the automotive and mobility sectors.

To explore and discuss opportunities for potential partnership to develop and apply new high-value materials technologies, please contact CBMM Head of Technology [Rafael Mesquita](mailto:Rafael.Mesquita@cbmm.com) at rafael.mesquita@cbmm.com



CONTACT

FOR MORE INFORMATION

If you would like to know more about CBMM's mobility programmes – please contact CBMM Head of Mobility Rodrigo Amado at:
rodrigo.amado@cbmm.com

You can click [here](#) to find out more about niobium technologies and mobility programmes.

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