

Outstanding Concrete Strength Test Results Using Talga Graphene

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www.talgaresources.com**Corporate Information**ASX Codes **TLG, TLGOA**Shares on issue **181.9m**Options (listed) **44.9m**Options (unlisted) **28.7m****Company Directors****Terry Stinson**

Non-Executive Chairman

Mark Thompson

Managing Director

Grant Mooney

Non-Executive Director

Stephen Lowe

Non-Executive Director

- Independent laboratory testing yields significant strength increases using Talga's graphene additives in concrete:

~**26% increase in flexural strength** at 28 days cure time~**14% increase in compressive strength** at 28 days cure time

- Enhanced strength can produce lighter and longer life concrete products sought by industry to meet increasing global urbanisation and infrastructure demand
- Concrete prototype results advance product commercialisation to the stage where construction industry development partners can be sought
- Builds on previously announced successful concrete thermal conductivity results with electrically conductive concrete work underway

Australian technology minerals company, Talga Resources Ltd ("**Talga**" or "**the Company**") (ASX: TLG), has achieved outstanding initial concrete prototype strength results from trials undertaken at the commercial concrete/cement laboratory of Betotech Baustofflabor GmbH ("Betotech") in Germany. Graphene and graphite enhanced cement and concrete are key priority product targets within Talga's four prime industry sectors, being; construction materials, coatings, composites and energy storage.

Concrete test prototypes were formulated with Talga graphene and graphite additives combined with a European industry cement and aggregate mixture. Results from the trial showed significant increases, circa 26% in flexural strength and 14% in compressive strength, using Talga materials over reference concrete at 28 days cure time.

The ability to improve concrete strength has significant performance benefits for major industrial applications, particularly in the global construction and infrastructure sectors. Further optimisation of the formulation is planned along with a larger range of performance tests including abrasion, shrinkage and permeability amongst other tests.

Talga Managing Director Mark Thompson commented:

"These results demonstrate not only the ability of our graphene to improve the strength of the world's largest volume construction material, but its sustainability too. Stronger concrete can potentially do the same job for longer, with less weight and volume than standard material. In this way, our graphene based additives can potentially lower costs, increase functionality and reduce environmental impacts along the whole concrete supply chain, which is a globally significant emitter of CO₂.

"Concrete is an exceptionally low cost material. Test results show only a small graphene loading is required to substantially improve performance and make a premium product that could attract a premium price. In addition to successful recent thermal conductivity results, these strength outcomes support the potential for Talga's graphene additives to improve multiple concrete properties from the same ore source material. In this regard, we await the outcomes of upcoming electrical conductivity test work to gauge the full range of market opportunities for our products in the construction materials sector."



“Albeit an early stage, we are particularly encouraged that this concrete prototype program, which was primarily focused on thermal conductivity performance, has also yielded strength results that exceed published information by some other nano-additive product manufacturers.”

Concrete Tests and Next Steps

Talga graphene enhanced concrete prototypes were recently tested at the commercial concrete/cement laboratory Betotech in Erfurt, Germany (see Figure 1). Betotech is an ISO9000 certified independent laboratory and tests were in accordance with German Institute for Standardisation (DIN) standards as follows:

- Preparation and Curing/Storage DIN206-1, DIN12 390-1, DIN12-390-2.
- Flow/Slump DIN 1048-1.
- Flexural Strength DIN 12 390-5.
- Compressive Strength DIN 12 390-3.

Strength tests were designed to industry testing standards and conducted on 150mm x 150mm x 150mm concrete ‘cube’ samples and 160mm x 40mm x 40mm ‘prism’ samples at 28-day cure time utilising a European industry cement, sand, aggregate, tap water and cement lubrication plasticiser.

A range of prototype formulations were prepared using a low concentration of graphene in the final product along with a mixture of some raw and concentrated ultra-thin micrographite from the Company’s 100% owned Vittangi graphite deposit. The cement, aggregates and Talga solid additives were pre-mixed with water followed by addition of Talga liquid additives and remaining ingredients. The new formulation was successfully evaluated for flow characteristics before curing. Strength results are summarised below and compared to the same concrete without Talga products (control reference) using the same materials (see Figure 2).

Strength results of the Talga concrete ranged up to 60.5 newton/mm² (“N/mm²”) in compression strength tests and 8.2 N/mm² in flexural strength tests. The metric strength measurement 1.0 N/mm² is approximately equal to 145 pounds per square inch (“psi”) in the imperial system.

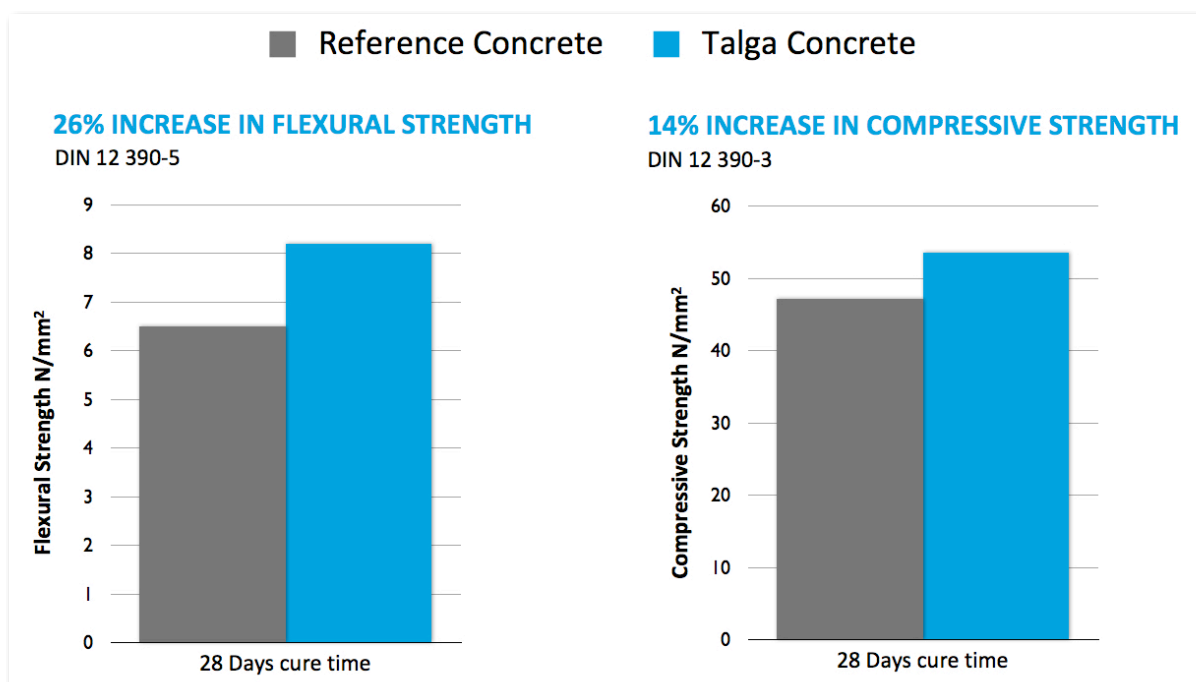
Figure 1 Talga concrete prototypes during compression (L) and flexural strength (R) trials at Betotech, Germany.



Results demonstrate significant increases, circa 26% in flexural strength and 14% in compressive strength, over the reference concrete control without Talga admixture.

Talga technologies will continue development and testing of graphene product formulations focused on improving other key performance attributes such as abrasion, shrinkage, permeability and others. Electrical conductivity tests are underway and results will be reported once analysed. Talga will continue to progress its product and commercialisation strategy in the construction sector using these prototype test results as the catalyst to initiate joint development programs with global suppliers.

Figure 2 Talga concrete prototype test results



See Glossary below for explanation of technical terms.

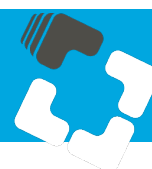
High Strength Concrete

The global concrete/cement additives market¹ is worth over USD\$17 billion/year and forms part of the total concrete and cement market worth over USD\$450 billion/year. This includes specialty concrete sectors and niches such as the fast growing high strength market which has an expected compound annual growth rate of 10.1% to 2021².

High strength concrete is used extensively in the European and North American regions for various construction activities, primarily in high-rise building, offshore structures, elevated railways and highways (see Figure 3). High strength concrete is also a requirement for blast and ballistic resistance by the defence sector and provides earthquake resistance in tectonically active countries. High strength concrete is stronger than standard concrete and can be used as an alternative to make structures smaller and lighter.

The rise in global urbanisation is driving increased demand for high strength concrete. This is most visible in heavily populated cities where high

Figure 3 High strength concrete bridge, Sweden.



performance concrete is a necessity in 'skyscrapers' to ensure stability, safety and maximise internal work space. Urbanisation means new and taller skyscrapers, more buildings, roads, railways and bridges, driving an increase in global demand for high performance concrete.

Key industry leaders with high strength performance concrete/cement products include companies like Heidelberg Cement Group, Lafarge-Holcim, Ultratech Cement, Votorantim Group, Eurocement Group, Cemex, China National Building Material Company, CRH (Oldcastle), Martin Marietta and Anhui Conch Cement Company.

Talga's market opportunity could span the total performance concrete sector with multiple potential products emerging from the one Talga ore source precursor material.

By combining the various improvements in functionality (increased strength, improved thermal efficiency, and improved electrical conductivity) Talga aims to create an enhanced selling proposition for customers in the premium concrete products including:

- High strength concrete for better buildings, roads and bridges;
- Thermal concrete for heat dissipation of underground power cables; and
- Electrically conductive concrete for solid state underfloor heating, snow/ice free roads and structural monitoring.

For further information visit www.talgaresources.com or contact:

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2. Global High Strength Concrete Market - Trends and Forecasts (2016 - 2021), Research & Markets.

About Talga

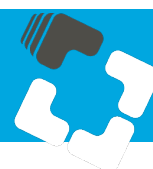
Talga Resources Ltd (ASX: TLG) is a technology minerals company enabling stronger, lighter and faster products for the coatings, battery, construction and carbon composites markets using graphene and graphite. Talga has significant advantages owing to 100% owned unique high grade conductive deposits in Sweden, a pilot test facility in Germany and in-house graphene product technology. Testing of Talga materials and products is underway with a range of corporations including industrial conglomerates Tata and BASF subsidiary Chemetall, UK listed Haydale and German based Jena Batteries.



TECHNICAL GLOSSARY

The following is a summary of technical terms:

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| Admixture | Material, other than water, aggregate, and cement, used as an ingredient of concrete and added to the batch immediately before or during mixing. |
| Backfill Material | Materials used to fill an open void once the structure has been installed. |
| Bedding Material | Material placed over a sub-base to hold and support a layer above, ensuring the layers above or surface is level and even. |
| Betotech | Betotech Baustofflabor GmbH, an independent ISO certified cement and concrete testing group. |
| Cement | A powdery substance made by calcining lime and clay, mixed with water to form mortar or mixed with sand, gravel, and water to make concrete. |
| Concrete | A building material made from a mixture of broken stone or gravel, sand, cement, and water, which can be spread or poured into moulds and forms a stone-like mass on hardening. |
| Compressive Strength | Maximum resistance that a concrete specimen will sustain when loaded axially in compression in a testing machine at a specified rate; usually expressed as force per unit of cross sectional area. |
| DIN Standards | Deutsches Institut für Normung e.V. (German Institute for Standardisation) develops standards for rationalisation, quality assurance, environmental protection, safety and communication in industry, technology, science, and government, as well as the public domain. DIN standards provide companies a basis for quality, safety and minimum functionality expectations. |
| Energy Infrastructure | The basic physical and organisational structures and facilities needed for the operation of energy supply. |
| Electrical Strength | The maximum voltage sustainable by an insulating material, after which it loses its insulating properties. |
| Flexural Strength | The maximum stress that, under a gradually applied load, a given solid material can resist bending. |
| Footprint | The impact on the environment by human activity in terms of pollution, damage to ecosystems, and the depletion of natural resources. |
| Formulations | A material or mixture prepared according to a formula. |
| Graphene | A single atom thick layer of crystalline carbon, with properties of strength, conductivity and transparency that stem from its unique 2D structure. |
| Graphite | An allotrope of carbon in which carbon has sp^2 hybridisation. Can be found as a natural mineral or can be synthesised using great pressure and temperature. Natural graphite consists of many stacked layers of Graphene, approximately 3 million layers of Graphene per millimetre of Graphite. |
| Geothermal Power | A renewable energy source produced from utilising temperature gradients in the ground versus the surface. |
| High Voltage Power Cable | Cables intended for electrical power transmission with rated nominal voltages between 35kV - 220kV. |



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| ISO9000 | International standards for quality assurance set by the International Standards Organisation. It includes some 20 elements of quality process performance, and is a prerequisite for delivering predictable, quality products to customers. |
| Isomet 2104 | A multifunctional instrument (Applied Precision Ltd) for measuring thermal conductivity, thermal diffusivity, and volume heat capacity. |
| Magnetic Field Effects | The effects of the lines of force that exist around an energised electrical conductor, magnet, or inductor on objects near current-carrying conductors. |
| N/mm² | Newton per square millimetre. A derived metric measurement unit of pressure applied by force of one newton on a surface of one square millimetre. 1 N/mm ² is equivalent to approximately 145 psi. |
| Power Capacity | In terms of generation, the capacity of a power plant is the maximum power that installation is capable of producing. |
| PSI | Pounds per square inch. 1 psi is the pressure exerted by one pound-force of force being applied to an area of one square inch. 145psi = 1N/mm ² . |
| Thermal Conductivity | A measure of heat flow through a specific material independent of its thickness, the greater the value the lesser the resistance. Can be expressed as (λ) or (W/m.K). |
| (W/m.K) | Watts per metre-Kelvin, a measure of Thermal Conductivity. |

