

V Strength

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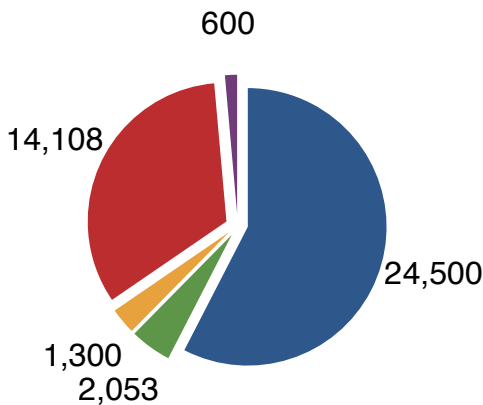
GLOBAL RESOURCE FOR VANADIUM TECHNOLOGY

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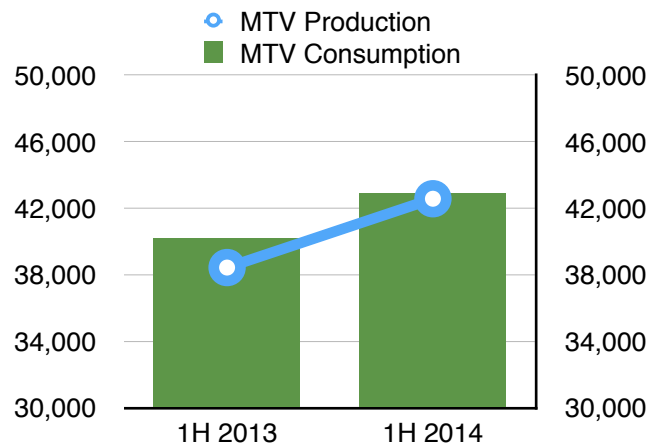
World Vanadium Production & Consumption Show Continued Growth

First half 2014 production and consumption [statistics](#) were recently released by Vanitec. In the first 6 months of 2014 production was 42,561 metric tons of vanadium and consumption was 42,900 metric tons.

- China
- Pacific Rim
- India
- North America
- EU/RSA/Russia



First Half 2014 MTV Production



Vanitec began collecting full year data in 2011 and started collecting first half data in 2013; 2 six-month periods of comparison are available. Worldwide production was up 10.8%.

Consumption was also stronger worldwide; up 7% over 2013. Consumption grew or remained steady in every region of the world.

Full details were made available at Vanitec's [website](#) for production in the five global regions allowable under antitrust guidelines. Also included were more detailed consumption estimates for 11 separate worldwide regions.

For the first time, Vanitec also began tracking specific consumption rates of vanadium based on world steel production statistics.

In its reporting, Vanitec defines vanadium production as MTV in all oxides produced, plus MTV in other v-compounds not produced via oxide route, plus MTV FeV not produced via V2Ox-route.

The data is not disseminated by Vanitec nor used for any purpose other than compiling overall statistics for the vanadium industry.



“Vanitec is extremely grateful for the lifetime dedication of Michael Korchynsky’s efforts on behalf of Vanadium.”

- David Milbourn, CEO

V Symposium Held at MS&T

A Symposium in Memory of Michael Korchynsky was held as part of the MS&T 2014 Conference at the David L. Lawrence Convention Center in Pittsburgh, PA from 13-15 October 2014.

World class academics and industrial researchers gathered for an important symposium to discuss new findings relating to the metallurgy of vanadium micro alloying in steel. They also reviewed the essential contributions to this field by Michael Korchynsky over several decades. The Symposium was very well attended with over 40 persons taking part in most of the sessions.



Subject matters included:

- Physical Metallurgy
- Applications such as automotive AHSS, automotive forgings, rebar, line pipe, high C rod, and tool steels
- Weldability
- Hot Ductility Bainitic Steels
- Powder Metallurgy

Notable speakers included:

- Tony DeArdo (U. Pittsburgh)
- Bevis Hutchinson (Swerea Kimab)
- Yang Caifu (CISRI)
- Bob Glodowski (Evrax)
- Thomas Sourmail (Ascometal)
- Alison Tuling (U. Pretoria)
- Jose Rodriguez Ibabe (CEIT)
- Colin Scott (Canmet)
- Lin Li (Shanghai U.)
- Yu Li (Vanitec)



Proceedings will be published and available on the Vanitec website. The Kimab Monograph “The Role of Vanadium in Microalloyed Steels” was made available for all delegates and is also available from Vanitec as a hard copy or a pdf from the Vanitec website.

In conjunction with the Symposium on 13 October 2014 Vanitec hosted a dinner of 70 guests at the Duquesne Club in Pittsburgh, PA to honor Michael Korchynsky. 12 family members from around the world were able to attend.

The dinner was a very enjoyable evening and a great opportunity for those close to Mike to meet up and remember him. Notable guests who spoke and shared memories of Mike included Rune Lagneborg (above), Terry Perles, Malcolm Gray, and grandson Michael Korchynsky.

Technology Centre Ramps Up Effort

The VANITEC-CISRI Vanadium Technology Center has been moving quickly since its opening last year.

The Center’s objectives are to promote R&D and application of vanadium technology in China; to better organize and coordinate Vanitec’s activities in China and vanadium technical activities; and to strengthen publicity of vanadium technology and exert more influence in the Chinese steel industry.

The Center has 6 research projects currently underway including:

- Ship plate with high heat input welding
- Non-QT steels in automotive industry



- Q390R steels for pressure vessel
- D40 bulb-flat steels for shipbuilding
- R&D of High Strength Weather-Resistant Hot Rolled Section Steel with 500MPa grade
- Application of VCN, N-FeV and Fe-V in Steel

A technical exchange was held 27 June 2014 at Shanghai University where Professor Yang made a presentation on Microalloying and its applications.

The most recent Expert Committee meeting took place 8 August 2014 in Beijing (pictured below) with 13 experts who reviewed all 6 projects and entertained new project proposals and discussed future R&D research areas of interest.



Vanadium Award Presented in London

The 2014 Vanadium Award was presented to several Korean authors at the Premier Award Dinner, IOM3 (Institute of Materials, Mining and Minerals) in London on 15th July 2014 for their recent publication.

The paper titled "Effect of vanadium addition on the creep resistance of 18Cr9Ni3CuNbN austenitic stainless heat resistant steel" was authored by Dae-Bum Park, Moo-Young Huh, Woo-Sang Jung, Jin-Yoo Suh, Jae-Hyeok Shim, Seung-Cheol Lee and published in the "Journal of Alloys and Compounds" in May of 2013. They found that "vanadium precipitated as a form of Z-phase during early-stage creep deformation was attributed to the improvement in creep strength at 700 degrees C with applied stress higher than 150 MPa."

HSE Research Showing Promise

In conjunction with the U.S. Department of Defense and Food and Drug Administration the Vanitec-supported Vanadium Safety Research Program has just finalized a 18-month nearly \$2M USD research project investigating the Mode of Action of V2O5. The research was conducted in response to a two year National Toxicology Program (NTP) study on V2O5 which found an increased incidence of lung tumors in mice.

The VSR Program has now completed several relevant in-vivo studies in the relevant species, strain, and target tissue following inhalation exposure using state of the art techniques. The results show that V2O5 does not cause a direct genotoxic effect. The lung tumors found in the NTP study are likely due to inflammation caused by the very high exposure levels used by the NTP.

New Members



**Beijing Zhongkaihongde
Technology Co**

Members

AMG Vanadium, Inc.
Atlantic Ltd - Midwest Vanadium Pty Ltd.
Bear Metallurgical Company
Beijing Zhongkaihongde Technology Co
Chengde Iron & Steel Group Co Ltd
China Iron & Steel Research Institute Group
Evraz East Metals AG
Evraz East Metals North America, LLC
Evraz Highveld Steel & Vanadium Limited
Evraz NTMK
Evraz Stratcor, Inc.
Evraz Vanady Tula
Glencore
Gulf Chemical & Metallurgical Corporation
Imergy Power Systems, Inc.
Largo Resources Ltd.
Masterloy Products Company
Mustavaaran Kaivos Oy
New Zealand Steel Ltd.
Panzhuhua Iron & Steel Group
Reed Resources
Riverside Specialty Chemicals Inc.
Scandinavian Steel AB
Syrah Resources
Treibacher Industrie AG
The Ural Institute of Metals
TTP Squared, Inc.
VandiumCorp Resource Inc.
Vanchem Vanadium Products (Pty) Ltd.
Yellow Rock Resources



UPCOMING EVENTS

Energy Materials 2014 Conference

Xian, China
4-6 November 2014

Symposium on Microalloyed Forging Steels

Beijing, China
25 November 2014

88th Vanitec Meeting

Sun City, South Africa
22-24 April 2015

89th Vanitec Meeting

London, UK
October 2015

HSLA 2015 Conference

Hangzhou, China
11-13 November 2015

Automobile project in China leads to increased V usage

Work has begun on a three-year project called "Microalloyed Forging Steels for Chinese Automotive Market" in conjunction with the China Iron & Steel Research Institute through the VANITEC-CISRI Vanadium Technology Center.



The essential aspect of this project relates to domestic Chinese vehicle production which has grown rapidly over the last 10 years and is expected to continue, thereby providing a significant opportunity for vanadium.

The project aims to accelerate the adoption of Vanadium Microalloyed Forging Steels (V-MAFS) as replacements for quench and tempered steels. This has significant economic and environmental benefits due to elimination of heat treatment and also improved machinability. The project was conceived as a collaborative supply chain exercise from the outset, including steelmakers, forging companies and vehicle manufacturers, and organised by CISRI.

Great Wall Motors has taken the initiative and has nominated three hot forged components for investigation - connecting rod,

crankshaft, steering knuckle; all at different stages of development and showing high potential for substitution

The connecting rod based on C70S6 is now undergoing vehicle testing, and higher strength grades with higher V content are being investigated.

The crankshaft and steering knuckle, both using 38MnSiV6, are more complex, requiring some modification of chemical composition, forging processing and material specification in order to achieve satisfactory properties.

Further aims include extension of the programme to other Chinese vehicle makers and supply chain partners, and disseminate the learning as widely as possible in China including the MAFS conference planned for late November in China.

Additional Vanitec Research Projects

- Low Heat Input Welding Part 3 - KIMAB
- Project Extension of High Heat Input Welding for Ship Plate - CISRI
- Low Carbon Dual Phase 980 - University of Pittsburgh
- Microalloyed Non-quenching/Tempering in Automobile - CISRI
- Hydrogen in Metals - University of Cambridge
- Zinc Galvanised High Strength Martensitic Sheet Steel - KIMAB
- Adapting XPF Technology to Thicker Gauge Sheets & Plates - Canmet Materials
- Vanadium Microalloying for Damage Resistant DP Automotive Sheets - Canmet Materials
- Comparative Performance Analysis of High Strength Anti-seismic Rebar - CISRI

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Vanitec is a technical and scientific committee (The Vanadium International Technical Committee), which brings together representatives of companies and organisations involved in the mining, processing, manufacture, research and use of vanadium and vanadium-containing products.

The objective of Vanitec is to promote the use of vanadium bearing materials and thereby to increase the consumption of vanadium across the range of steel, titanium and chemical applications.

Vanitec strives to provide those with a vested interest in Vanadium – users, educators, students, producers – convenient access to research, events, resources and publications regarding Vanadium.