

Passing a milestone: the successful WCSB9

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On 7–9 May 2019, 555 delegates from 23 countries gathered in Beijing for the 9th World Conference on Sampling and Blending (WCSB9), the latest in the successful conference series which commenced in Denmark in 2003 (WCSB1), followed by Australia in 2005 (WCSB2), Brazil in 2007 (WCSB3), South Africa in 2009 (WCSB4), Chile in 2011 (WCSB5), Peru in 2013 (WCSB6), France in 2015 (WCSB7) and Australia in 2017 (WCSB8). WCSB9 took place in the Beijing International Conference Center and had the highest attendance of any preceding conference, the highest number of accepted papers in the Proceedings and the highest number of exhibitors as well. This event marks a welcome culmination of the first 20 years of organised activities for the International Pierre Gy Sampling Association.

Readers can find *links* to the Conference presentations (in *.pdf versions by kind permission from almost all authors), Conference Proceedings (Open Access and directly downloadable) and a large collection of photos from the conference at the end of this report. The next (WCSB10) conference will take place in Kristiansand, Norway in 2021.

Host and organisation

WCSB9 was hosted by BGRIMM Technology Group and jointly organised by BGRIMM MTC Technology Co., Ltd. and Unismart Events Ltd, with support from China Mining Association, China Association for Instrumental Analysis and The Chinese Society for Metals. WCSB9 had five sponsors: platinum sponsor Nanjing Yinmao Lead-zinc Mining Co. Ltd, silver sponsors FLSmidth, Yosion Laboratory Technologies Co. Ltd (Name

Tags), Jiangxi Naipu Mining Machinery and New Materials Co. Ltd (Note Pads) and Agilent Technologies Inc. (Drinks for Gala Dinner).

WCSB9 aimed to discuss, in depth, cutting-edge academic and technological research results and commercial developments in the fields of sampling and blending, to share the latest technical knowledge, practical experience and technological progress, and to foster a communication and exchange platform for regulatory and authentication bodies, end users, relevant service enterprises, and educational and scientific research institutions.

The conference gathered the world's top sampling experts, scholars and delegates from well-known enterprises from all over the world covering mining, metallurgy, cement, food, pharmacy, agriculture, environmental protection and process industry in general. WCSB9 attracted 555 delegates from 23 countries; this was the highest ever in WCSB history. There is a good reason for this veritable quantum leap in relation to all

preceding conferences—in one word: China.

China has become the world's largest importer of oil, agricultural products, mineral products and other bulk commodities. Moreover, China is now the largest trading partner of dozens of countries, as well as a major producer and consumer of non-ferrous metals, steel, gold and cement in the world. As an important world economy and a major goods manufacturer, China has realised a critical need for proper sampling and blending technologies to assist in global trade, product quality control and environmental protection. As well as carrying on the well-established scientific objectives of the WCSB series, the 9th edition thus also had a national aim, to contribute to promoting the upgrading and further development of China's own sampling competence and technologies. The organisers spared no efforts in order to facilitate a constructive synergy between all these goals—and their success was resounding. Congratulations are in order!



WCSB9 organising committee and volunteers. Centre (from left) Mr Li, Mr Han long, Mr Roy Xu (see text and WCSB9 website for full descriptions and affiliations of all the organisational and scientific committees, including Unismart Events).

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Conference programme

Two pre-conference workshops complemented the main technical programme and exhibitions. The first, *Sampling Theory, Sampling Practices and Their Economic Impact*, was presented by Dr Dominique François-Bongarçon and Dr Francis F. Pitard. The second, *Sampling for Industrial Process & Product Manufacturing, Processing, Monitoring and Quality Control—TOS applications in commodity industries: pharma, food, feed, agriculture, environmental monitoring*, was given by Dr Kim H. Esbensen.

Eight keynote presentations were made by international sampling experts who shared their knowledge and views on various aspects of sampling and blending over the three-day conference. Dr Francis Pitard: *Minimising Extreme Empiricism to Preserve the Logical Structure of the Theory of Sampling*; Professor Pentti Minkinen: *Sampling Close to the Aliquot Stage—Theoretical Modifications and Consequences*; Dr Dominique François-Bongarçon: *The Liberation Factor—Are We at the End of the Journey?*; Dr Li Huachang: *Development of Online Sampling, Blending and Analytical Technology in China*; Dr Ralph Holmes: *Best Practice in Sampling Iron Ore Shipments*; Dr Ana Chierigati: *The Advances in Drill Hole Sampling*; Dr Kim H. Esbensen: *Theory of sampling (TOS)—What's Next?*; and Charles Ramsey: *Theory of Sampling Applied to Food Safety and Environmental Protection*.

After scientific review of a large number of submitted abstracts, the review team of international and Chinese experts accepted 100 papers for the WCSB Proceedings: 57 papers from China and 43 papers from Australia, Brazil, Canada, Denmark, Finland, France, Germany, Norway, South Africa, Sweden and the United States. Reviewing criteria were two-fold: i) scientific value, presentation quality and/or innovation; ii) showcasing the current state and level of sampling and blending in China in theory and practice.

Pierre Gy Sampling Gold Medal

At the official conference dinner, Dr Geoffrey Lyman was awarded the Pierre

Gy Sampling Gold Medal to honour his outstanding contributions in the teaching and application of the Theory of Sampling. Dr Lyman is the Principal of Materials Sampling & Consulting Pty Ltd in Brisbane, Australia. He has carried out consultancies in particulate sampling for over 32 years for clients in Australia and overseas. He has worked in the areas of precious metals (Au and PGMs), diamonds, coal, iron ore, sulphides and spent auto catalysts, and grain and meat. For some years, he consulted for Anglo Platinum in South Africa, working on sampling and metallurgical accounting. The work also involved QA/QC within laboratories and general advice on and mathematical solutions to special statistical problems. He has also worked with the Canadian Grain Commission on the sampling of grain for mycotoxins and other types of contamination and has been involved in sampling/geostatistical simulation for diamond exploration with DeBeers.

CSTM Material Sampling and Blending Technical Committee

In order to promote the exchange and advancement of sampling science and related technologies and industries in China, as well as to participate more in international sampling science and technology communication, China's first sampling-related academic organisation, the "CSTM Material Sampling and Blending Technical Committee",

was formally established at the official conference dinner. Affiliated to the China Materials and Testing Standards Committee, it will function as an academic and non-profit social organisation, the main functions of which will be in establishment of appropriate new standards, revision and promotion of sampling technology and equipment, while also working to prepare for future WCSB events in China, all in order to promote increased interaction and international exchanges regarding sampling and related fields in China and abroad. The members of the First CSTM Material Sampling and Blending Technical Committee include:

Chinese consultants: Academician Wang Haizhou (China Iron & Steel Research Institute Group), Academician Sun Chuanyao (BGRIMM Technology Group) and Professor Han Long (General Manager of BGRIMM Technology Group).

Foreign consultants: Dr Ralph Holmes [President of the International Pierre Gy Sampling Association (IPGSA) Council], Dr Kim H. Esbensen (member of the IPGSA Council, Treasurer and Editor of *TOS Forum*) and Dr Francis Pitard (member of the IPGSA Advisory Group).

Dr Li Huachang (General Manager of BGRIMM MTC Technology Co., Ltd) will hold the post as Director of the committee and Mr Bao Lei (Deputy General Manager of NCS Testing Technology Co., Ltd) will act as Deputy Director. The secretariat is located in BGRIMM MTC Technology Co., Ltd,



The Pierre Gy Sampling Gold Medal committee awarding the WCSB9 (2019) Medal to Dr Geoff Lyman.

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and 21 other members have been formally enrolled in the First Technical Committee as well.

Special Panel of differences and practices between China and other countries

Today, China is the world's largest importer and consumer of bulk commodities. The total value of China's foreign trade in 2018 is US\$4.62 trillion. China has a huge demand for proper sampling and blending knowledge and expertise. In the trading of bulk commodities between China and other countries, there are often differences regarding the understanding of proper sampling and blending. To throw light on this issue, the organisers invited representatives and guests from all parties and stakeholders involved to discuss the differences between China and other countries regarding sampling and blending theories and practices for bulk commodity trading. The special panel was hosted by Han Long (chairman of the WCSB9 organising committee), who was joined by six guests: Mr Oscar Dominguez (BHP Group Limited), Mr Aldwin Vogel (Bureau Veritas), Dr Li Huachang (BGRIMM MTC Technology Co., Ltd), Dr Ana Carolina Chierigati (São Paulo State University), Reinaldo Dantas Novaes (FLSmidth) and Mr Gao Zhengbao (Shandong Humon Smelting Co., Ltd). This special panel was an innovation to the World Conference on Sampling and Blending. The invited guests voiced their opinions and had in-depth exchanges with participating delegates, and also advised all delegates to make full use of the platform of the 9th World Conference on Sampling and Blending to exchanges ideas on aspects of theory, academic study, technology, equipment and application practice, and enhance mutual understanding, so as to make positive contributions to reducing trade frictions and achieving win-win outcomes.

Exhibition

The associated exhibition attracted 43 exhibitors, including 29 Chinese exhibitors and 14 foreign exhibitors, which can all be found on the conference website:

Closing speech by Han Long, chairman of WCSB9 organising committee

Dear Dr Ralph Holmes, Ladies and Gentlemen!

With the joint efforts of all the participants, 9th World Conference on Sampling and Blending has successfully completed its agenda. On behalf of the 9th WCSB Organising Committee and BGRIMM Technology Group, I would like to extend my warm congratulations to the successful holding of this conference, and congratulations to all the awards winners, you really deserve it, and your great achievement and performance really add glory to this event.

By the time of conference closing, I would like to summarise a few highlights of 9th WCSB.

The biggest highlight is the conference attendance. 555 registered delegates, 100 papers, 12 sessions, 50 oral presentations. All these numbers are record high in WCSB history.

Another highlight is the Chinese factors in the conference. You have seen the majority delegates and authors are from China. Yes, normally local participants should be involved more, the point is, 4 years ago, in 7th WCSB, there is only one Chinese delegate, Dr Li Huachang, and 2 years ago, in 8th WCSB, there are only three Chinese delegates, Dr Li, Roy Xu and Ms Tang. Obviously it is a milestone for WCSB, it means the event popularity in China has increased dramatically from now on. More important is the establishment of China's first academic organisation for sampling—the CSTM Material Sampling and Blending Technical Committee, which paves the way for Chinese professionals in sampling field to connect with the international sampling community.

The third highlight I would like to mention is that, we follow all the traditions of previous WCSB, we also initiate something new, such as special Panel on Wednesday, focus on the "Differences between China and Other Countries in Sampling and Blending Theories and Practices for Bulk Commodity Trading", aiming to enhance the understanding among parties involved in commodity trading sampling.

In summary, I would say, the conference has achieved great success, hopefully all the delegates and participants have got what they expect by intensive exchanges, discussion, demonstration and communication.

The success of the conference is the result of the active efforts and strong support of all parties involved. First of all, I would like to express my sincere gratitude to IPGSA Council, it was your wise decision two years ago in Perth, that brings WCSB to China for the first time. In particular, I want to thank Dr Ralph Holmes for his great contributions to 9th WCSB, as the president of IPGSA and the senior advisor for 9th WCSB, he made tremendous efforts from time to time in the entire process of conference preparation. Thank you Ralph!

My gratitude also goes to the other experts involved, Academician Wang Haizhou, Sun Chuanyao, Dr Kim H. Esbensen and Dr Francis Pitard for their remarkable contribution to the conference and establishment of CSTM Material Sampling and Blending Technical Committee. My appreciation also goes to all the keynote speakers, oral presenters, all the authors who delivered high quality papers, representing world class academic level in sampling and blending field. I would also like to thank all the sponsors and supporting institutions, without our contribution, the conference wouldn't be possible. Thanks to all the delegates, exhibitors, medias, volunteers, your participation is also critical for conference success. Special thanks to BGRIMM MTC, and Unismart Events Limited, the organiser of the conference, who have been working hard for two years, numerous work have been done and finally led to the success of the conference, Thank you Mr Li, Mr Xu and your team. Well done and good job!

Last but not the least, I wish all of you enjoy your stay over the conference in Beijing, I wish you a safe journey back to home, and I wish WCSB a bright future. And I am looking forward to seeing you at the next WCSB in Norway.

Thank you!

<http://www.wcsb9.com> (starting from 2015, by decree from the Council of the IPGSA, conference websites must be kept open and active indefinitely). Coffee breaks and presentation stands for 11 conference posters were all held in the exhibition area, maximising opportunities for networking.

Mid-conference tour

During a mid-conference break, attendees had the opportunity, amongst others, to tour the BGRIMM R&D Centre in the south of Beijing, visiting no less than 14 laboratories located there. BGRIMM expressed its sincere interest in future collaborations at all levels in science and technology, as

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A sight to enjoy: with 555 participants, WCSB9 surpassed all previous conferences, which had boasted 137–235 attendees. The number of oral presentations, Proceedings papers and exhibitors were consequently also record-breaking—to everybody's delight.

well as regarding potential joint industrial and commercial endeavours.

Scientific and social: the final verdict

A complete overview of the scientific and technological achievements associated with WCSB9 can be found via the links in the Further reading section and through the conference website (<http://www.wcsb9.com>). There one will find an abundance of up-to-date information as to the state of the Theory of Sampling (TOS) and its applications, as well as many perspectives attesting to the intended Chinese goals behind taking on hosting and organising the conference. The WCSB9 Proceedings forms a comprehensive platform to gauge the various levels

of current sampling knowledge, competence and technologies available in China and in the 22 other countries represented. There is much interesting work to do in order to reach full TOS-compliance in many different industry sectors and application fields. This task will not necessarily be easy, nor will it be a small one—but this common journey ahead has been made immensely easier by way of the event of WCSB9. The authors strongly recommended that you consult the readily available *complete* record of the conference activities, only a couple of clicks away.

It is safe to say that our Chinese colleagues met all expectations with flying colours. The International Pierre Gy Sampling Association (IPGSA) expresses

its highest praise and **Thank You** to the hosting organisation, BGRIMM Technology Group and to the Organising Committee, authors, paper reviewers, session chairpersons and all sponsors and exhibitors who made it possible to entertain this vastly augmented format for a WCSB. The professional conference hosting and catering company, Unismart Events, played an essential role in making the entire five-day event flow effortlessly and smoothly, for which a similarly very big **XieXie** is in order.

WCSB10

At the last session on the concluding conference working day, the long-awaited announcement was made of the venue and hosting responsibilities for WCSB10 in 2021. The city of Kristiansand, Norway will be the venue, and WCSB10 will be hosted and organised under the leadership of the Eyde Industrial Cluster.

Head of the organising committee will be Elke Thisted, Glencore "Nikkelverk", with Kim H. Esbensen as head of the scientific committee and Editor for the conference Proceedings, which will be published by IMP Open (who published the Proceedings of WCSB7). It is obvious that WCSB10 will in no way even try to match the quantitative achievements of WCSB9, which will likely never be surpassed in the next 20 years. WCSB10 will instead focus on establishing a forward-looking generic framework for WCSBs that is scale-invariant w.r.t to the scientific objectives, but also designed to allow future organisation committees full licence to make their own local, regional and national imprints, as was so prominent in Beijing!

Further reading

General website for WCSB9: www.wcsb9.com

BGRIMM Technology Group: english.bgrimm.com

BGRIMM MTC Technology Co, Ltd: www.analysis-bgrimm.com

Website for UNISMART Events: www.bj-unismart.com/En/index.asp

Eyde Industrial Cluster: www.eydecluster.com/en/

Proceedings of WCSB7: impopen.com/wcsb7



Hand over from WCSB9 conference chairman Dr Han Long to WCSB10 Conference Chairperson Mrs Elke Thisted. At opposite ends, the chairmen of two scientific committees (right: Dr Li, WCSB9, left: Dr Kim H. Esbensen, WCSB10)—presided over by IPGSA President Dr Ralph Holmes.