Program Book

World Brewing Congress 2012
July 28 – August 1
Oregon Convention Center
Portland, Oregon, U.S.A.

Hosted by:

American Society of Brewing Chemists

Master Brewers Association of the Americas

With active participation by:

Brewery Convention of Japan
European Brewery Convention
Institute of Brewing & Distilling

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Karen DeVries
AB InBev

Kathy Kinton
MillerCoors (retired)

Technical Program Committee Members

Susan Welch
Malteurop North America

Christine White
Molson Coors Brewing Company

Welcome from the WBC Planning Committee

Karen DeVries

Kathy Kinton

Welcome to the fourth World Brewing Congress! Thank you so much for joining us as we "Imagine Our Brewing Future: 2020." It's hard to hide our excitement as five international brewing associations are once again coming together to learn, explore, and determine where the industry will go in this coming decade. The WBC Planning Committee is pleased to welcome you to this epic event.

What better place for WBC 2012 than Portland! Attendees will never go thirsty in this city full of breweries and can appreciate the beautiful Pacific Northwest blessed with all the ingredients to make beer. This is the perfect setting for our worldwide gathering of brewing professionals.

The unique combination of attendees and the global nature of the program make WBC 2012 a meeting that will leave us with valuable information, new ideas, insights to emerging issues that could affect the industry, global contacts, and lifelong friends who share a passion for the art and science of brewing. At WBC 2012 you will find more than 250 technical presentations, over 100 leading suppliers, five workshops, four global conversations on future trends, three symposia, and two keynote speakers who will give us a better look at the future.

Finally, we would like to recognize all the organizations that have made this event possible. Our sincere thank you to the American Society of Brewing Chemists, Brewery Convention of Japan, European Brewery Convention, Institute of Brewing & Distilling, and Master Brewers Association of the Americas.

Welcome again to Portland and World Brewing Congress 2012. We know you will enjoy your time at the congress and while visiting the city referred to as "Beervana."

WBC 2012 Planning Committee Chairs

Karen DeVries Kathy Kinton

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About Each Organization

American Society of Brewing Chemists

An Event Worth Waiting For

The World Brewing Congress comes around once every four years and has become an event worth waiting for. On behalf of the American Society of Brewing Chemists, I'm very happy to welcome you to WBC 2012.

Each congress builds on the success of the last, and ASBC is proud to once again co-host this "epic" event! The opportunity to bring together the brewing community from all over the world is not one to pass up. I personally am looking forward to seeing my colleagues from around the globe and to learning as much as possible about the latest research and technology. This year's program is impressive, with more than 250 technical presentations, along with Global Conversations on different facets of brewing and a glimpse into the future of brewing. This year's program co-chairs, Karen DeVries and Kathy Kinton, along with the ASBC Program Committee and the MBAA Technical Committee, have created strong scientific sessions, insightful workshops, and pre-congress courses and invited exciting keynote speakers.

How timely that the theme for WBC 2012 is "Imagine Our Brewing Future: 2020." ASBC has been re-imagining its future, as well. We've been busy moving brewing science into the future with the development of many new products and bringing current products to higher technical standards to meet the needs of our members and the brewing industry today and for years to come. For example, our *Methods of Analysis* is now entirely online, and we've recently launched the new *Fishbone References*. Stop by the ASBC booth to see these products and learn about what the Society has to offer, including the chance to chat with author and "Pope of Foam" Professor Charlie Bamforth.

It's such a pleasure for ASBC to co-host WBC 2012 in Portland, OR, this year. I hope you'll take full advantage of being in one of the great brewing cities in the US. Thanks for being part of this amazing event!

On behalf of ASBC,
Cindy-Lou Lakenburges
President, American Society of Brewing Chemists

American Society of Brewing Chemists

The American Society of Brewing Chemists (ASBC) was founded in 1934 with the main objective to improve and bring uniformity to the brewing industry on a scientific level. Today, ASBC concentrates on the science of beer, with the primary objectives to provide analytical, scientific process control methods to ensure high quality and safety standards; encourage problem solving on industry-wide issues using chemistry and microbiology; and develop scientific support to evaluate raw materials for optimum performance.

ASBC members can be found on nearly every continent and are primarily employed by the brewing industry and allied industries. Some members work as consultants to the industry and others work in government and academia.

ASBC produces the Journal of the ASBC, *a quarterly refereed journal that concentrates on original research findings, new applications, and symposium topics, as well as review articles. Members receive a complimentary subscription. In addition, members are informed of society activities through their monthly member e-newsletter, the* ASBC Buzz.

In addition to these publications, ASBC brings uniformity to the brewing industry through the online Methods of Analysis, *including the unique flavor database. New to its line-up of brewing references, the* Fishbone References *can also help solve your brewing issues. ASBC provides quality services such as check sample and makes available other technical products such as soluble starch and gauges. ASBC offers members professional development through the annual meeting, local section meetings, and various and diverse technical committees. For the most comprehensive and up-to-date ASBC information, visit ASBC*net *at www.asbcnet.org.*

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Brewery Convention of Japan

Greetings from the Brewery Convention of Japan

It is a great honor for us that the Brewery Convention of Japan has been invited to participate in World Brewing Congress 2012, the leading event of the world's brewing industry. We are also very grateful that we have a number of opportunities to give presentations at the BCOJ symposium: Technology for the Future and in technical sessions during WBC 2012.

We would like to gain new knowledge and information and hope that all of us have a mutual and deeper understanding through the congress. We firmly believe that WBC 2012 will be a great opportunity to accelerate the development of brewing technologies around the world.

On behalf of the BCOJ,
Makoto Nagawa
President, Brewery Convention of Japan

Brewery Convention of Japan

Since the early 1980s, Japan's beer specialists achieved a steady improvement in their level of technical know-how. As the result, Japan gained international recognition for its high standard of beer brewing technology, resulting in both the ASBC and EBC expressing a keen interest in the establishment of formal ties with the Japanese organization specializing in the beer brewing.

Under these circumstances, Japanese breweries have initiated the efforts to standardize their beer analysis methods. As part of the general trend toward closer mutual communication, a specialist committee, named the Board Meeting, was established within the Brewers Association of Japan (BAJ) in 1982. This marked the beginning of a process toward the standardization of beer analysis methods and led to the 1990 publication of the Methods of Analysis of BAJ. *After this, the Board Meeting strengthened its international activities, beginning with the reorganization of the Brewery Convention of Japan (BCOJ) in 1992 and has maintained active business relations with international organizations.*

The objectives of the BCOJ are to standardize analytical methods for the evaluation of materials and products adopted in beer brewing and other related industries, to facilitate scientific and technological research through mutual communication among beer brewing industry specialists, and to work in collaboration with other international and domestic organizations.

BCOJ was established within the BAJ, the latter consisting of Japan's 5 major breweries: Kirin Brewery Company, Ltd., Asahi Breweries, Ltd., Sapporo Breweries Ltd., Suntory Liquors Ltd., and Orion Breweries, Ltd. The BCOJ is composed of a Board of Directors, Secretariat, Analysis Committee, and Program Committee. Regional beer producers are not represented by the BAJ.

The activities of each committee are as follows: Analysis Committee—organization and development of analysis methods (domestic collaborative work), activities relating to international methods with the ASBC and EBC and participation in international collaborative work; Program Committee—planning and implementation of the annual meeting.

BCOJ publications include Methods of Analysis of BCOJ (Revised edition), BCOJ Microbiology Methods, BCOJ Sensory Analysis Methods, *and* Brewing and Packaging.

European Brewery Convention

Welcome from the European Brewery Convention

On behalf of the European Brewery Convention, it is a pleasure to invite you to visit Luxembourg in May 2013 for the 34th EBC congress. Our congress will be held at the Luxcongrès facilities overlooking the historical city of Luxembourg on the plateau de Kirchberg, surrounded by the European Court of Justice and other important EU institutions. Historic decisions concerning the European Union have been made in these venues that provide an excellent setting for our technical, technological, and scientific lectures and presentations. Furthermore, in light of our increasingly integrated part within The Brewers of Europe, it is a venue that reflects both our status and relationship within the European framework of industry associations. Please join me and my colleagues from the EBC Executive Committee, as well as The Brewers of Europe, in Luxembourg next year for the 34th EBC congress.

On behalf of EBC,
Stefan Lustig
President, European Brewery Convention

European Brewery Convention

At the end of 2007, the European Brewery Convention (EBC) merged with The Brewers of Europe, the umbrella organisation for the brewing sector in Europe. EBC is now defined as the scientific and technological arm of The Brewers of Europe. EBC enjoys autonomy status and is responsible for the congress, committees and groups, technical symposia, and its own budget within the organisational framework of The Brewers of Europe. EBC is a world-class brand synonymous with technical excellence in brewing and quality assurance of raw materials, process, and product. The merger was marked by the physical move in early 2008 of the EBC secretariat from their former Zoeterwoude offices in The Netherlands to The Brewers of Europe House in Brussels.

EBC's budget is made up mainly by subscriptions paid by the national trade organisations representing brewers in all of the European member states of the EU. Switzerland, Norway, and Turkey (being non-members of the EU) enjoy the benefits of associative membership. In order to reflect the merger that had gone hand-in-hand with a reduction in staff and rental expenses, EBC has reduced its operating budget by more than a third over the last five years, passing on significant savings to the European brewing sector.

The governance of EBC used to rest on the Council and Board, headed by the EBC president and 4 vice presidents. In order to reflect the new EBC, both these bodies were disbanded and replaced by the EBC Executive Committee, with the EBC president and only one vice president. The Executive Committee is composed of members of globally operating major brewers, non-major brewers, academic institutes, and trade organisations. Its membership stands at 15. Currently, the EBC president is Stefan Lustig of Brauholding international (Munich), brewers of well-known brands such as Paulaner, Hacker-Pschorr, and Kulmbacher beers. The vice president is Stefan Kreisz, Carlsberg Research Centre, who is also the EBC symposium chair at this year's WBC.

The EBC Analysis Committee is being restructured at the moment to be aligned with the new ways of working with an electronic platform (Analytica website). The Barley & Malt Committee, which was disbanded in 2009, has been replaced by a collaborative body, the European Barley Variety Network, seeking to coordinate malting barley breeding quality results via an electronic platform of data exchange. The EBC Brewing Science Group continues to be an exclusive forum for brewing, malting, and fermentation scientists working for breweries and academic research institutes across Europe.

Institute of Brewing & Distilling

Welcome from the Institute of Brewing & Distilling

The Institute of Brewing & Distilling is delighted to be part of the organisation of this World Brewing Congress 2012, in partnership with its colleagues from the MBAA, ASBC, EBC, and BCOJ. All our resources have been combined to offer you a truly world-class event, and we are confident that you will find it of considerable value, as well as thoroughly enjoyable.

The organisers have worked hard to bring together a technical programme of the highest quality, and you will also have the opportunity to attend a range of subject-specific sessions and workshops.

WBC 2012 commercial exhibits will provide you with all the up-to-date information you require from brewing industry suppliers from around the world. The venue speaks for itself, and you can avail yourself of every sort of social activity, meet old friends, and establish new contacts.

Thank you for participating in WBC 2012, and the IBD team looks forward to meeting you personally during your time in Portland.

On behalf of the IBD,
Alan Barclay
President, Institute of Brewing & Distilling

Institute of Brewing & Distilling

The Institute of Brewing & Distilling is a members' organisation and registered educational charity. The IBD's Vision Statement is "the advancement of education and professional development in the science and technology of brewing, distilling and related industries."

The IBD has a core focus on education and qualification—its qualifications are internationally recognised. Examinations take place annually at over 60 examination centres around the world. Uptake of the examinations has increased steadily over many years as individuals and employers recognise their importance as measures of underpinning technical and practical knowledge. In 2012 over 2,000 scripts will be written.

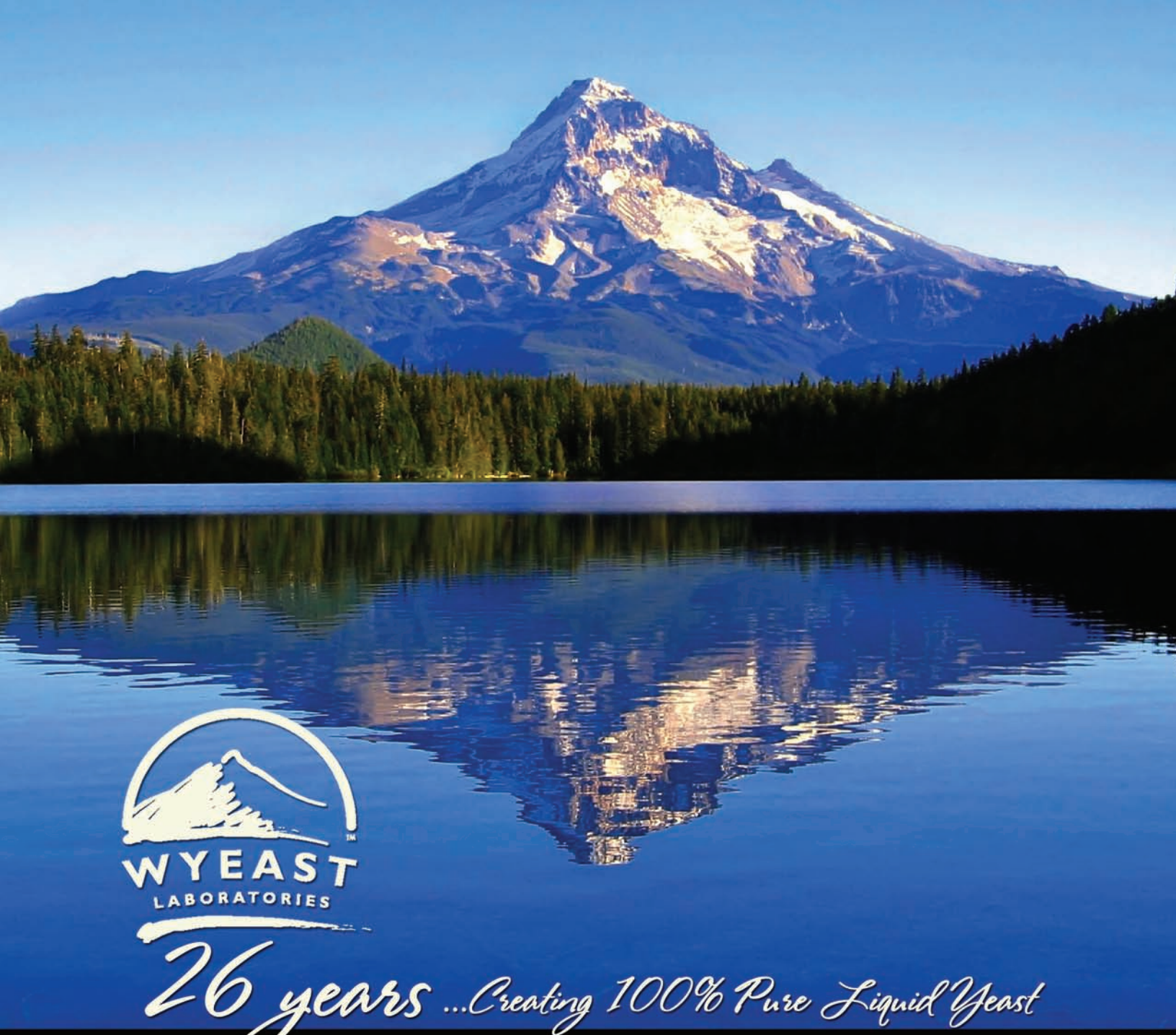
The entry level qualification is the General Certificate—now available as four distinct qualifications for brewing, packaging, distilling, and spirits packaging. The subsequent level is the Diploma— available in brewing, distilling, and beverage packaging. The highest level of qualification is the Master Brewer—currently only available in a brewing option. Training courses and distance learning are available to support those studying towards the IBD qualifications, and the IBD manages a global network of accredited trainers. An introduction Fundamentals level in Brewing and Distilling is now also available and is relevant for non-technical staff or those right at the start of a technical career.

The IBD also produces two highly respected publications. The Journal of the Institute of Brewing *(JIB) is a long-established and respected specialised publication which is devoted to original scientific and technological articles. It is published quarterly and is available online via the IBD website and to subscribers and members in printed form.* The Brewer and Distiller International *is the IBD members' monthly magazine which contains technical and training articles, news and views, and general industry information to keep members abreast of developments in the Brewing and Distilling industries.*

The IBD is organised into eight geographical sections, all of which organise and deliver a range of local events including seminars, technical visits, and specific topic lectures. Major international conventions are also organised by a number of the IBD sections. The Scottish section will be holding their triennial Worldwide Distilled Spirits Convention in Scotland in September 2014. In March 2013, the Africa section will hold their biannual Convention in Accra, Ghana.

The IBD maintains close working relationships with a wide range of organisations and educational establishments and is proud to be a partner with MBAA, ASBC, EBC, and BCOJ in the World Brewing Congress 2012.

The IBD welcomes new members and partners. Please visit the IBD in the exhibition area of the WBC 2012 or find out more about the IBD and its activities at www.ibd.org.uk.



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Master Brewers Association of the Americas

Sharing a Vision

MBAA's vision is to provide technical leadership for the brewing industry. What better venue to share that vision than the World Brewing Congress 2012. I am delighted to welcome you to WBC 2012 and be able to share technical knowledge with brewers from all around the world.

MBAA is thrilled because WBC 2012 encompasses many functions of brewing, as it brings together brewing supply and service industries, research institutions, universities, and government agencies. This true meeting of all minds forces us to step outside our respective niches to understand the process as a whole and start sparking conversations and creativity.

Program Chairs Kathy Kinton and Karen DeVries have developed a program designed to do just that. This is truly a world-class lineup of speakers and topics—you may find yourself wanting more time to take it all in. And at the end of each day I hope to see you in the Congress Hospitality Suite at the Portland Hilton—this is the perfect chance to discuss findings of the day, make new contacts, and relax a bit.

MBAA is particularly excited this year as we are celebrating a milestone—our 125th anniversary! While we are extremely proud of our rich history and all we have accomplished, we know we must continue moving forward. A new mission and vision have been developed, which should lead us into this coming decade. To support the changes, a new website is being created and will be launched in the coming months, which should allow for more community interaction and give a new face to MBAA. We are poised to move forward and excited to be a part of the conversation here at WBC 2012 of what the future holds for both MBAA and the industry. Stop by the MBAA booth to learn more about our growing association.

Be sure to take advantage of everything a unique event like WBC 2012 has to offer. Not only is this an opportunity to share in the visions of brewers worldwide, but also the chance to take in the beautiful city of Portland, enjoy the sessions, visit with the exhibitors, and build relationships with brewing industry professionals from around the world.

Cheers!
Mike Sutton
President, Master Brewers Association of the Americas

Master Brewers Association of the Americas

The Master Brewers Association of the Americas (MBAA) was formed in 1887 with the purpose of promoting, advancing, and improving the professional interest of brew and malt house production and technical personnel. Today, MBAA is a dynamic, global community working to provide technical leadership for the brewing industry. As such, MBAA members work to advance the brewing, fermentation, and allied industries by advocating the exchange of knowledge; creating, assembling, interpreting, and disseminating credible and beneficial information; and offering professional enrichment opportunities.

MBAA offers the journal, Technical Quarterly, *which is included in MBAA membership. The* Technical Quarterly *features both reviewed and nonreviewed papers covering wide technical aspects of brewing ingredients, the brewing process, brewing by-products, brewery ecological matters, beer packaging, and beer flavor and physical stability. Members can stay up-to-date with the latest MBAA news, including association reports, district updates, and upcoming events with the monthly e-newsletter, The MBAA Communicator.*

MBAA offers many opportunities for member involvement and interaction. Active member participation has resulted in vibrant, growing Districts that meet regularly to network and share industry news and advancements. Members are also encouraged to participate on committees and attend technical courses and the annual conference. MBAA has also recently launched the Beer Steward Program, giving wholesalers, retailers, bar staff, and others a new appreciation of the varied beer styles and the tools to better showcase and sell the many brews.

MBAA offers the best opportunity to interact with other brewing professionals and to learn practical solutions, resourceful safeguards, and innovative technologies to strengthen your ability to succeed. For more information about MBAA, visit the MBAA website at www.mbaa.com.

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General Information

All technical sessions, workshops, symposia, opening and closing sessions, supplier sessions, and the exhibition will be held at the Oregon Convention Center (OCC). The pre-congress courses, welcome reception, hospitality lounge, guest hospitality lounge, and After Glow will be held at the Hilton Portland and Executive Towers (HP). The Global Gathering event will be held at the World Trade Center (WTC).

Registration Hours

Pre-function A

Saturday, July28	10:00 a.m. – 4:00 p.m.
Sunday, July 29	7:30 a.m. – 5:00 p.m.
Monday, July 30	7:30 a.m. – 2:00 p.m.
Tuesday, July 31	7:30 a.m. – 5:00 p.m.
Wednesday, August 1	7:30 a.m. – 12:00 p.m.

Tote bags are sponsored by DSM Food Specialties, and lanyards are sponsored by Bürkert Fluid Control Systems.

Exhibit Hall

Exhibit Halls A, A1, B

The WBC 2012 Exhibit Hall will be the site for an international gathering of industry suppliers and poster authors. Discover the latest advancements and have your questions answered as you meet with exhibitors and poster authors during the dedicated exhibit/poster hours. The list of exhibiting companies starts on page 50. Poster authors, titles, and poster numbers are listed on pages 38–43.

Exhibit Hall Hours

Saturday, July 28

Exhibit Set Up	10:00 a.m. – 4:00 p.m.
Poster Set Up	1:00 – 4:00 p.m.

Sunday, July 29

Exhibit Set Up	8:00 – 11:00 a.m.
Exhibits & Poster Viewing	11:30 a.m. – 2:00 p.m.
Lunch	11:30 a.m. – 1:00 p.m.
Poster Authors Present	
Odd numbers	11:45 a.m. – 12:45 p.m.
Even numbers	12:45 – 1:45 p.m.

Monday, July 30

Exhibits & Poster Viewing	11:30 a.m. – 2:00 p.m.
Lunch	11:30 a.m. – 1:00 p.m.
Poster Authors Present	
Even numbers	11:45 a.m. – 12:45 p.m.
Odd numbers	12:45 – 1:45 p.m.

Tuesday, July 31

Exhibits & Poster Viewing	11:30 a.m. – 2:00 p.m.
Lunch	11:30 a.m. – 1:00 p.m.
Poster Authors Present	12:30 – 1:30 p.m.
Poster Take Down	2:00 – 3:15 p.m.
Exhibit Take Down	2:00 – 5:00 p.m.

WBC 2012 Silent Auction

Pre-function A

The WBC Silent Auction helps strengthen the future of the brewing industry. The proceeds will be used to support students' educational and research endeavors. This year's auction will not only include donated items from various individuals and companies, but also a raffle for three handmade quilts. Raffle tickets for the quilts will be available for purchase at the Registration Desk, and the raffle will be held at the end of the auction on Tuesday. Stop by Sunday, Monday, and Tuesday to bid on a fun selection of donated items. The auction ends at 1:45 p.m. on Tuesday. Make a difference in a student's life and have fun in the process—place your bids today!

Speaker Ready Kiosk

Pre-function A

Speakers may review their presentations the day before their scheduled talk at the Speaker Ready Kiosk located near the Registration Desk. Presentations will not be available for review on the day the presentation is scheduled. Check the daily schedules for the times the Speaker Ready Kiosk is open.

Supplier Sessions

These sessions offer an in-depth look at products and services for the brewing industry. The presentations offer the latest information on products, applications, and solutions.

Sunday: ABM Equipment Co.; Donaldson Co.; EV Container Corporation; IMERYS Filtration Minerals; Lallemand Brewing
Monday: Anton Paar USA, FlavorActiv, NovaTech, Pall Corporation, Thermo Scientific, Vorne Industries
Tuesday: ACM GmbH; American Society of Brewing Chemists; Charm Sciences Inc.; The Dow Chemical Company; DSM Food Specialties; Plastic Kegs America; Steinfurth, Inc.; Verde Environmental Services LLC

Check the daily schedules for the times and locations of these sessions.

Open Meeting Room

A meeting room is available for attendee use throughout the congress. To reserve a meeting time, please stop by the Registration Desk.

Congress Hospitality Lounge

Alexander's Lounge (HP)

Situated on the 23rd floor of the Hilton Portland and Executive Towers, the Congress Hospitality Lounge in Alexander's Lounge is the perfect place to meet before or after a night out in Portland. Enjoy nearly 360 degree views of many Oregon and Washington landmarks, such as Mt. Saint Helens, Mt. Hood, and the Willamette River. Join your colleagues for conversation and refreshments as the sun sets on downtown Portland and the city lights come on.

Congress Hospitality Lounge Hours

Saturday, July 28	2:00 – 7:00 p.m. and 10:00 – 11:30 p.m.
Sunday, July 29	6:00 – 11:00 p.m.
Monday, July 30	5:00-11:00 p.m.

Guest Hospitality Lounge

Broadway I (HP)

Connect with fellow registered guests in the comfortable Guest Hospitality Lounge, which will be open on Sunday from 8:00 – 11:00 a.m. and 1:00 – 3:00 p.m. Beverages will be available.

WBC 2012 Mobile App

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Access the congress with the WBC 2012 mobile app. Browse the schedule, explore abstracts, create your personal schedule and to-do list, receive announcements, view exhibiting companies, and network with fellow attendees. Download the WBC 2012 mobile app by searching for "WBC Meeting" in the iTunes Store or the Android App Store/Google Play. Reach the mobile app from your Blackberry or laptop via the mobile app website **mobileapp.worldbrewingcongress.org**.

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WBC 2012 Abstracts

WBC 2012 abstracts can be accessed in three ways. The WBC 2012 mobile app provides access via your mobile device or laptop; simply click on the Posters icon to begin viewing poster abstracts or click on Program Guide icon to view abstracts from the technical sessions or symposia directly from the schedule. Abstracts can also be searched and viewed on the WBC 2012 website. While at the congress, you can view and print abstracts at the Abstract Printing Stations located near the Registration Desk.

WBC 2012 E–Proceedings

New this year the WBC 2012 E-Proceedings will be an easy-to-use online resource containing all abstracts plus the posters and oral presentations submitted for inclusion in the proceedings. Posters can be magnified to focus on specific text, figures, images, tables, and graphs. Oral presentations will include the author's full slide show complete with graphics. Citable abstracts of all presentations will be included. Access to the WBC 2012 E–Proceedings can be purchased at the Registration Desk.

Non-smoking Environment

WBC 2012 is a smoke-free meeting. Smoking is prohibited in the Oregon Convention Center, Hilton Portland and Executive Towers, World Trade Center, and outdoor event spaces.

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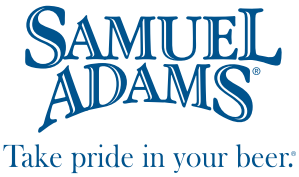

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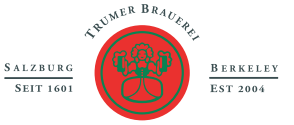

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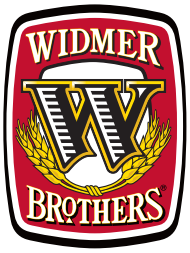

Calling All
Beer Geeks!

ASBC members are unique—able to detect issues in beer quality in a few steps or sips. Show off your scientific abilities and your passion: pose as a beer geek and become a part of the show! Plus get your own "Beer Geek" t-shirt.

Visit Booth #654 for Your Brewing Science Needs

- Get a demonstration of the new *Fishbone References*
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- Start planning for the 2013 ASBC Annual Meeting in Tucson, Arizona

Can't Miss Opportunities at the ASBC Booth

Get a Signed Copy of the *FOAM* book

Stop by the ASBC Booth on Sunday from 11:30 a.m. to 2:00 p.m. to get a *FOAM* book signed by author Charlie Bamforth, also known as the "Pope of Foam."

Meet with *Fishbone References* Creator

Get a personal demonstration of the new *Fishbone References* from creator Greg Casey at the ASBC booth and join the *Fishbone References* session July 31, from 9:45-10:45 a.m. in Room C126.

Get a Beer Geek t-shirt free with any purchase!

ASBC

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Program at a Glance

All events are at the Oregon Convention Center unless otherwise noted. HP denotes Hilton Portland and Executive Towers.

	Saturday	Sunday
8:00 a.m.	Pre-congress Courses: *Full day, 8:00 a.m. – 5:00 p.m.* **Beer Canning and Double Seaming Technology*** • Galleria III (HP) **Beer Steward Seminar: Understanding Beer*** • Parlor AB (HP) **Sensory Application and Quality Control*** • Galleria II (HP) **Setting Up a Brewery Quality Assurance Program*** • Galleria I (HP)	**Opening Session and Keynote Address** • Oregon Ballrooms 202-203
Break		
9:45 a.m.		BCOJ Symposium: **Technology for the Future** • Oregon Ballrooms 202-203 Technical Session 1: **Hops I** • Oregon Ballroom 201
11:30 a.m.	*Half day, 1:00 – 5:00 p.m.* **Design of Experiments/Response Surface Modeling*** • Salon I (HP)	**Exhibits, Posters, and Lunch** • Exhibit Halls A, A1, B
2:00 p.m.		Global Conversation: **Raw Materials of the Future** • Oregon Ballroom 201 Global Conversation: **Packaging of the Future** • A105-106 Technical Session 2: **Analytical I** • Oregon Ballrooms 202-203 Technical Session 3: **Yeast I** • B110-112
Break		
3:35 p.m.		Technical Session 4: **Hops II** • Oregon Ballrooms 202-203 Technical Session 5: **Malts and Grain** • A105-106 Technical Session 6: **Quality Considerations** • B110-112 Workshop: **The Trilogy of Barrel Aging** • B113-114

**Additional registration required for this event.*

***Exhibitors and guests must purchase a ticket to attend this event.*

Monday	Tuesday	Wednesday
EBC Symposium: **Resources for the Future** • Oregon Ballrooms 202-203 Technical Session 7: **Sustainability** • Oregon Ballroom 201 **Supplier Sessions**	Technical Session 9: **Analytical II** • Oregon Ballrooms 202-203 Technical Session 10: **Microbiology I** • Oregon Ballroom 201 Workshop: **Inline Instrumentation Critical Process Control Points (CPCP)** • B113-114	Technical Session 17: **Mashing** • A105-106 Technical Session 18: **Microbiology II** • B110-112 Technical Session 19: **Outside the Box** • B117-119 Workshop: **Hops for the Future** • B113-114
Technical Session 8: **Sensory** • Oregon Ballrooms 202-203 Global Conversation: **Water & Energy in the Future** • Oregon Ballroom 201 Workshop: **Confabulation into the Realm of *Saccharomyces:* Theoretical and Practical** · B113-114	IBD Symposium: **Workforce of the Future** • Oregon Ballrooms 202-203 Technical Session 11: **Brewhouse Operations** • Oregon Ballroom 201 **Supplier Sessions**	Technical Session 20: **Finishing and Stability** • B117-119 Technical Session 21: **Spent Grains** • A105-106 Technical Session 22: **Yeast IV** • B110-112 Workshop: **Hops for the Future** *(continued)* • B113-114
Exhibits, Posters, and Lunch • Exhibit Halls A, A1, B	**Exhibits, Posters, and Lunch** • Exhibit Halls A, A1, B	**Closing Lunch and Keynote Address**** • Oregon Ballrooms 202-203
Open afternoon	Global Conversation: **Innovation for the Future** • A105-106 Technical Session 12: **Engineering** • Oregon Ballrooms 202-203 Technical Session 13: **Hops III** • Oregon Ballroom 201 Technical Session 14: **Yeast II** • B110-112	
	Technical Session 15: **Packaging and Cleaning** • Oregon Ballroom 201 Technical Session 16: **Yeast III** • Oregon Ballrooms 202-203 Workshop: **Malting Barley for Today's Brewers—A Brave New World** • B113-114	

Daily Schedule

All events are at the Oregon Convention Center (OCC) unless otherwise noted. Events are also scheduled at Hilton Portland and Executive Towers (HP) and World Trade Center (WTC).

Friday, July 27

8:00 a.m. – 5:30 p.m.	Pre-congress Tour: Mount Hood and Brewpubs*	Depart/return HP
8:15 a.m. – 5:30 p.m.	Pre-congress Tour: Hops, Farms, and Fields*	Depart/return HP
10:15 a.m. – 6:00 p.m.	Pre-congress Tour: Oregon Wine Country*	Depart/return HP

**Additional registration required for this event.*

Pre-congress Tour: Mount Hood and Brewpubs

8:00 a.m. – 5:30 p.m. • Depart/return HP

The tour through the Columbia River Gorge and Hood River Valley begins at Multnomah Falls, the tallest waterfall in Oregon and the second tallest year-round waterfall in the United States. The next stop will be at Double Mountain Brewery in beautiful Hood River. Double Mountain was founded in 2007 and considers itself to be a "brewers' brewery," with an uncompromising focus on beer quality. Lunch will be served at the Hood River Marina on the Columbia River. From there you will be off to Logsdon Organic Farmhouse Ales. Their traditional brewery is located on a farm where they grow some of the hops they use in their hand-crafted beers. Your last stop will be at Mt. Hood — Oregon's tallest peak, towering at 11,240 feet.

Pre-congress Tour: Hops, Farms, and Fields

8:15 a.m. – 5:30 p.m. • Depart/return HP

The tour makes its first stop in Corvallis at Oregon State University. Most hop varieties favored today by craft brewers were developed by the USDA-ARS breeding program at Oregon State University. On the way back from Corvallis the tour travels through Oregon's hop-growing region. The group will stop and tour two hop farm facilities near Hubbard, Oregon. The tour will also be visiting Fobert Farms, home to one of the Oregon Hop Commission research plots. With the support of the Hop Research Council, the OHC works with the USDA and WSU public hop breeding programs to grow advanced selections in this hop yard. Lunch will be provided.

Pre-congress Tour: Oregon Wine Country

10:15 a.m. – 6:00 p.m. • Depart/return HP

The Yamhill Valley is central to the burgeoning Oregon wine industry. It's considered, by many, to be the new home of the pinot noir. Visit four different wineries and experience how traditions blend with modern values, including LEED-certified facilities and the production of organic wines. The tour includes transportation to and from the Hilton Portland and Executive Towers, an experienced tour guide, lunch at a wine country bistro, and all tasting fees and gratuities.

Columbia River Gorge courtesy of Travel Portland / Mr. Janis Miglavs

Make Your Bids at the WBC 2012 Silent Auction

Help strengthen the future of the brewing industry by bidding on fabulous items at the WBC 2012 Silent Auction.

In addition to donated items from various individuals and companies, three unique handmade brewing quilts are being raffled off. Stop by during registration hours Sunday–Tuesday to make your bids and buy raffle tickets. The auction ends at 1:45 p.m. on Tuesday, immediately followed by the quilt raffle.

Proceeds support students' educational and research endeavors. Make a difference in a student's life and have fun in the process—**place your bids today!**

Master Brewers Association of the Americas: Celebrating 125 Years

Come help celebrate 125 years of dedication to brewing technology!

Stop by Booth #455 and sign up to win one of three $125 MBAA Gift Certificates and get your 125th badge sticker to wear with pride!

While you're there, talk with MBAA Technical Director Karl Ockert, browse MBAA titles and MBAA gear, discover the new Beer Steward program, save on MBAA membership, and learn about the 2013 Annual Conference in Austin, Texas.

Get a free MBAA Tasting Journal with your purchase!

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Saturday, July 28

8:00 a.m. – 5:00 p.m.	Pre-congress Course: Beer Canning and Double Seaming Technology*	Galleria III (HP)
8:00 a.m. – 5:00 p.m.	Pre-congress Course: Beer Steward Seminar: Understanding Beer*	Parlor AB (HP)
8:00 a.m. – 5:00 p.m.	Pre-congress Course: Sensory Application and Quality Control*	Galleria II (HP)
8:00 a.m. – 5:00 p.m.	Pre-congress Course: Setting Up a Brewery Quality Assurance Program*	Galleria I (HP)
10:00 a.m. – 4:00 p.m.	Registration	Pre-function A
10:00 a.m. – 4:00 p.m.	Speaker Ready Kiosk	Pre-function A
10:00 a.m. – 4:00 p.m.	Exhibit Set Up	Exhibit Halls A, A1, B
1:00 – 4:00 p.m.	Poster Set Up	Exhibit Halls A, A1, B
1:00 – 5:00 p.m.	Pre-congress Course: Design of Experiments/Response Surface Modeling*	Salon I (HP)
2:00 – 7:00 p.m.	Congress Hospitality Lounge	Alexander's Lounge (HP)
7:00 – 10:00 p.m.	Welcome Reception**	Grand Ballroom (HP)
10:00 – 11:30 p.m.	Congress Hospitality Lounge	Alexander's Lounge (HP)

** Additional registration required for this event.*
*** Guests must purchase a ticket to attend this event.*

Saturday Highlights

Pre-congress Course: Beer Canning and Double Seaming Technology

Organized by MBAA

8:00 a.m. – 5:00 p.m. • Galleria III (HP)

Randy Dillman, KHS; James Gordon, Cask Brewing Systems; Ashley Martin and Darryl Hoffinger, Widmer Bros. Brewing Company; David Schuerman, Ball Can Company

Beer packaging has included metal cans since the early 1930s. Cans have steadily increased their presence in the beer market and are now the most common form of packaged beer in the United States. Craft brewers are discovering some of the benefits of canned beer: low oxygen pick up, complete protection from UV light, simpler line layouts, and savings on shipping costs due to reduced package weight. This course teaches you everything about beer canning from can and end-manufacture through line layouts, can handling, common defects, filling, double seaming on both large and small equipment, common QA checks for maintaining can integrity, and product quality.

Pre-congress Course: Beer Steward Seminar: Understanding Beer

Organized by MBAA

8:00 a.m. – 5:00 p.m. • Parlor AB (HP)

Rick Seemueller; Bill White

The MBAA Beer Steward Program is aimed at educating beer professionals about beer after it leaves the brewery and enters the wholesale and retail markets. The program entails attendance at the seminar, study of the *Beer Steward Handbook*, and successful completion of the program's online examination. The seminar is an all-day flavor- and sensory-intensive class that will walk you through understanding basic sensory systems, a sensory tour of the brewing process, learning how presentation lets customers sense with their eyes, and exploring beer's four major flavor-driven groups to which all styles (lager or ale) belong. The seminar culminates with a final flavor-intensive section on pairing beer with foods.

Pre-congress Course: Sensory Application and Quality Control

Organized by ASBC

8:00 a.m. – 5:00 p.m. • Galleria II (HP)

Annette Fritsch, Boston Beer Company; Teri Horner, MillerCoors; Amanda Benson, Deschutes Brewery; Lauren Woods Salazar, New Belgium Brewing Company; Cathy Haddock, Sierra Nevada Brewing Company; Gwen Conley, Port Brewing Company and The Lost Abbey

Maintaining beer quality and consistency can strongly benefit from a sensory evaluation program in your brewery. This course will give you the fundamental tools needed to build your own testing program customized to your brewery needs. We will address testing methods for both production consistency and shelf-life stability, including industry examples. Hands-on exercises and interactive tastings will support the presented methods. We will finish the day with a panel of experts (the staff of instructors). This will allow you to ask questions of a team of individuals who currently work in the brewing industry.

Pre-congress Course: Setting Up a Brewery Quality Assurance Program

Organized by MBAA

8:00 a.m. – 5:00 p.m. • Galleria I (HP)

Lynn Kruger, Siebel Institute of Technology; Jonathan Dicks and Mona Wolf, The Wolf Group; Jaime Schier, Harpoon Brewing Company; Jeff Edgerton, BridgePort Brewing Company

Brewers of all sizes strive to bring to market beers of consistently high quality. This course is designed to help brewers understand the facets of monitoring process quality from brewing microbiology to fundamental lab checks. The experienced instructors will show you how to set up product specifications, sampling plans, requirements for a basic laboratory, micro-checks, and a sensory program with a demonstration of sensory training. The course covers everything you need to know about setting up a quality assurance program.

Pre-congress Course: Design of Experiments/Response Surface Modeling

Organized by ASBC

1:00 – 5:00 p.m. • Salon I (HP)
Karl Siebert, Cornell University

It is widely recognized that most real systems (such as unit operations, analytical methods, or product composition to property relationships) are affected by multiple factors. One variable at a time experimentation does not work well with this situation, as it ignores large regions of possible interest and is not mathematically capable of detecting interactions between factors (such as enhancement or suppression). Combinatorial experiment designs enable efficient collection of the data most useful for gaining an understanding of system behavior and optimization. Constructing a mathematical model that describes system behavior is done with response surface methodology (RSM). Modeling is typically performed with a multivariate regression procedure such as multiple linear regression or (preferably) partial least squares regression. Evaluating model validity and quality will be described and examples will be presented.

Welcome Reception

7:00 – 10:00 p.m. • Grand Ballroom (HP)

Explore a slice of the Portland experience from food carts to street scenes during the Welcome Reception. Bringing this international audience together in one place sets the stage for a great kick-off to WBC 2012. Guests must purchase a ticket to attend this event. Sponsored in part by Siemens Industry, Inc.

Daily Schedule

Sunday, July 29

7:00 – 7:45 a.m.	Presenters' Breakfast	A107-109
7:30 a.m. – 5:00 p.m.	Registration	Pre-function A
8:00 – 9:30 a.m.	**Opening Session and Keynote Address**	Oregon Ballrooms 202-203
8:00 – 11:00 a.m.	Exhibit Set Up	Exhibit Halls A, A1, B
8:30 a.m. – 5:00 p.m.	Speaker Ready Kiosk	Pre-function A
9:00 a.m. – 5:00 p.m.	Silent Auction	Pre-function A
9:30 – 9:40 a.m.	Break	Lobby B
9:45 – 10:45 a.m.	**Supplier Sessions**	
	9:45 – 10:15 a.m. Lallemand Brewing	C126
	9:45 – 10:45 a.m. ABM Equipment Company	C120
	9:45 – 10:45 a.m. Donaldson Company	C122
	9:45 – 10:45 a.m. EV Container Corporation	C121
	9:45 – 10:45 a.m. IMERYS Filtration Minerals	C125
9:45 – 11:30 a.m.	**BCOJ Symposium: Technology for the Future**	Oregon Ballrooms 202-203
	9:50 a.m. S-1. Yeast comprehensive analysis system for evaluating fermentation performance. *Hiroyuki Yoshimoto, Kirin Brewery Company, Limited, Yokohama, Kanagawa, Japan*	
	10:15 a.m. S-2. Research of brewer's yeast based on genome information. *Tomoo Ogata, Asahi Breweries, Ltd., Moriya, Ibaraki, Japan*	
	10:40 a.m. S-3. Study on the attractive hop aroma for beer. *Takako Inui, Suntory Liquors Limited, Osaka, Japan*	
	11:05 a.m. S-4. The effects of insufficient nutrition on flavor compounds production, propagation, and fermentation of yeast. *Masahide Sato, Sapporo Breweries Ltd., Shizuoka, Japan*	
9:45 – 11:30 a.m.	**Technical Session 1: Hops I**	Oregon Ballroom 201
	Moderator: *Leif Garbe, TU Berlin/VLB Berlin*	
	9:50 a.m. 1. Influence of fermentation compounds from yeast on the quality of hop aroma. *Hitoshi Takemura, Kirin Brewery Company, Limited, Japan*	
	10:15 a.m. 2. Hop aroma and harvest maturity. *Daniel Sharp, Oregon State University, Corvallis, OR, USA*	
	10:40 a.m. 3. Phenolic profiling of lager beer during aging in relation to hopping technology. *Patricia Aron, MillerCoors, Milwaukee, WI, USA*	
	11:05 a.m. 4. Contributions to hop aroma in beer from the water-soluble fraction of hops. *Thomas Shellhammer, Oregon State University, Corvallis, OR, USA*	
11:30 a.m. – 2:00 p.m.	**Exhibits, Poster Viewing, Networking, and Lunch** (*served 11:30 a.m. – 1:00 p.m.*)	Exhibit Halls A, A1, B
	11:45 a.m. – 12:45 p.m. Poster authors present, odd numbers	
	12:45 – 1:45 p.m. Poster authors present, even numbers	
2:00 – 3:15 p.m.	**Global Conversation: Raw Materials of the Future**	Oregon Ballroom 201
2:00 – 3:15 p.m.	**Global Conversation: Packaging of the Future**	A105-106
2:00 – 3:20 p.m.	**Technical Session 2: Analytical I**	Oregon Ballrooms 202-203
	Moderator: Aaron MacLeod, Canadian Grain Commission	
	2:05 p.m. 5. Brewing with barley: Comparing protease activities with the resulting proteins and peptides in beer using activity-based protein profiling and LC-MS/MS. *Lone Baekgaard, Novozymes A/S, Bagsvaerd, Denmark*	
	2:30 p.m. 6. Monitoring flavor active epoxydecenals during beer storage at ppt levels. *Nils Rettberg, TU Berlin/VLB Berlin, Germany*	
	2:55 p.m. 7. Analysis of Michigan hop varieties and easy and direct typification by paper spray ionization mass spectrometry and principal component analysis. *Andre Venter, Western Michigan University, MI, USA*	

2:00 – 3:20 p.m. **Technical Session 3: Yeast I** B110-112

Moderator: *Alex Speers, Dalhousie University*

2:05 p.m. 8. Heterogeneous fermentation method in multi-filling cylindroconical vessels for high quality beer. *Yuichi Nakamura, Asahi Breweries, Ltd., Japan*

2:30 p.m. 9. New insights into the mechanisms underpinning diacetyl formation and reduction in large-capacity cylindroconical fermentations. *Christopher Boulton, University of Nottingham, UK*

2:55 p.m. 10. "Static" storage of a spiced beer—When is the beer mature? *Urs Wellhoener, Boston Beer Company, Boston, MA, USA*

3:20 – 3:30 p.m. Break Lobby B

3:35 – 5:20 p.m. **Technical Session 4: Hops II** Oregon Ballrooms 202-203

Moderator: *Matt Brynildson, Firestone Walker Brewing Co.*

3:40 p.m. 11. Increasing the hop alpha-acids utilization by hop pre-isomerization and the evaluation of the bitter quality of beer. *Seiichi Takishita, Asahi Breweries, Ltd., Japan*

4:05 p.m. 12. Hop oil analysis—The power of stable isotope dilution assays for quantification at trace levels. *Leif Garbe, TU Berlin/VLB Berlin, Germany*

4:30 p.m. 13. The role of "unknown" hop proteins. *Martina Gastl, Lehrstuhl für Brau- und Getränketechnologie, Freising, Germany*

4:55 p.m. 14. A study of the functionality of hop epsilon-resins as a novel brewing product. *Cynthia Almaguer, TU-München, Germany*

3:35 – 5:45 p.m. **Technical Session 5: Malts and Grain** A105-106

Moderator: *Amy Germershausen, Malteurop North America*

3:40 p.m. 15. Performance of LOX-1-less malting barley—Sapporo's worldwide strategy for development of high quality malting barley varieties. *Wataru Saito, Sapporo Breweries Ltd., Japan*

4:05 p.m. 16. Trends in the incidence of Fusarium and Microdochium species in UK malting barley: Impacts for malting and brewing quality. *David Cook, University of Nottingham, UK*

4:30 p.m. 17. Studies on the kilning conditions of teff (Eragrostis tef) malt as alternative raw material for gluten free foods and beverages. *Mekonnen Gebremariam, Technische Universität München, Freising, Germany*

4:55 p.m. 18. A comparative study of oat (Avena sativa L.) cultivars as brewing adjuncts. *Birgit Schnitzenbaumer, University College Cork, Cork, Ireland*

5:20 p.m. 19. Toward a DNA fingerprint to identify barley cultivars that fit specific brewers' needs. *Richard Horsley, North Dakota State University, Fargo, ND, USA*

3:35 – 5:20 p.m. **Technical Session 6: Quality Considerations** B110-112

Moderator: *John Engel, MillerCoors*

3:40 p.m. 20. The equipment to sample the fermenting beer from four positions in the cylindroconical vessel and its practical application to flavor improvement in the brewery. *Hisao Koizumi, Asahi Breweries, Ltd., Suita Brewery, Japan*

4:05 p.m. 21. Primary gushing: The explosive love story between CO_2 and hydrophobin. *Christina Schönberger, Joh. Barth und Sohn, Germany*

4:30 p.m. 22. Mid-infrared sensors: Testing in-progress product quality at critical process control points (CPCP) in the brewing and packaging processes. *Robert O'Leary, VitalSensors Technologies LLC, USA*

4:55 p.m. 23. 35 years of malting and brewing—Experience with improvements in quality characteristics of raw materials and changes in technologies in maltery and brewhouse. *Udo Kattein, Technische Universität München (retired), Germany*

3:35 – 5:45 p.m. **Workshop: The Trilogy of Barrel Aging** B113-114

6:00 – 11:00 p.m. Congress Hospitality Lounge Alexander's Lounge (HP)

Sunday Highlights

Opening Session Keynote Address

8:00 – 9:30 a.m. • Oregon Ballrooms 202-203

Tim Boyle, Columbia Sportswear Company

Tim Boyle has served as president and chief executive officer of Columbia Sportswear Company since 1989 and oversees operations of the active outdoor company from its Portland, Oregon, headquarters. Tim's career with Columbia Sportswear began in 1971 when, during his senior year at The University of Oregon, his father who had been running the company since 1964 died suddenly of a heart attack. In order to continue the aggressive expansion that had increased the company's sales that year to $1 million, Tim's mother, Gert, quickly enlisted his help. After struggling for two years to regain momentum, the company began to grow. By March 1998, when the company went public, sales had grown to $427 million and surpassed $1 billion in 2004. Tim will share his views on the important role that product differentiation plays in building and growing a brand, using Columbia Sportswear's history as an example.

BCOJ Symposium: Technology for the Future

Organized by Brewery Convention of Japan

9:45 – 11:30 a.m. • Oregon Ballrooms 202-203

This symposium will address the newest breakthrough technologies for the future. Topics will include the comprehensive diagnosis system for evaluation of yeast brewing performance, research on yeast brewing performance by genome engineering technology, regulation of complex hop aroma compounds through the brewing process by a food metabolomics approach, and studies on the effects of insufficient nutrition on off-flavors and its application to no- and less-malt beer production.

Global Conversation: Raw Materials of the Future

2:00 – 3:15 p.m. • Oregon Ballroom 201

Mont Stuart, MillerCoors (moderator); Scott Helstad, Cargill Corn Milling North America; Bruce French, Canada Malting/Great Western Malting; Nigel Davies, Muntons plc; Charlie Bamforth, UC-Davis

This global conversation will cover a wide range of raw materials, principally focusing on sources of carbohydrates for brewing. The speakers will elucidate on the potential of liquid adjuncts, other sweeteners, diverse grain products, specialty malts, along with grain and malt extracts for brewed products of the future. The speakers will not only discuss the technical aspects, but also the benefits from a cost and sustainability viewpoint. What will these different raw materials allow the brewer of the future to manufacture and what forces might drive a brewer to utilize novel or revolutionary raw materials?

Global Conversation: Packaging of the Future

2:00 – 3:15 p.m. • A105-106

Ray Toms, MillerCoors, and Dan Ahern, Graphic Packaging International

Packaging innovation is an essential and complex part of any consumer goods business. The critical elements include not only design, engineering, and manufacturing, but also what value-add the packaging brings from ensuring product integrity to understanding, attracting, and meeting the needs of consumers. This global conversation will focus on future innovations and trends in package materials and design. The following topic areas will be discussed with Q&A following each section:

- Global consumer package goods (CPG) trends – How will consumers be buying products in the future?
- Sustainability Impact – How sustainability will be shaping consumer goods package buying choices in the future?
- Packaging structures, materials, design – What will be the beer package of the future?

Workshop: The Trilogy of Barrel Aging

3:35 – 5:45 p.m. • B113-114

Jen Talley, Redhook Brewery (moderator); James P. Osborne, Oregon State University; David Rosenthal, Chateau Ste. Michelle; Femke Sterckx, AB-Inbev

As brewers we often think of beer containing four main ingredients: malted barley, hops, water, and yeast. However, for brewers who use barrels, the barrel becomes a dynamic fifth element in our beer. The more we can appreciate and understand our barrel partner, the better our beer will be. Our expert panelists will dig deep into the three leading components of aging beer in oak:

- The complexity of flavors the wood contributes.
- The impact of material previously housed in the barrel.
- The microflora offerings—present or absent.

We will also look at what inhibits or encourages the growth of lactic acid bacteria and yeasts, such as *Brettanomyces* in the barrel; how wood chemistry and micro oxidation of various phenols form targeted flavors; and how different types of oak and toasting regimes play out in wine flavor. We will then have taste tests to work through the outcomes.

Brewery Convention of Japan

2-8-18, KYOBASHI, CHUO-KU, TOKYO 104-0031 JAPAN
TEL.81-3-3561-8386 FAX.81-3-3561-8380

Organization

The BCOJ was established within the BAJ, the latter consisting of Japan's 5 major breweries, Kirin Brewery Company, Limited, ASAHI BREWERIES, LTD., SAPPORO BREWERIES LTD., SUNTORY LIQUORS LTD., and ORION BREWERIES, LTD. The BCOJ is composed of Board of Directors, Secretariat, Analysis Committee, and Program Committee. Regional beer producers are not represented by the BAJ.

Objectives and Activities

(1) To standardize analytical methods for the evaluation of materials and products adopted in beer brewing and other related industries

- Publication of Methods of Analysis of BCOJ (Revised edition)
- Publication of BCOJ Microbiology Methods
- Publication of BCOJ Sensory Analysis Methods
- Publication of Brewing and Packaging

(2) To facilitate scientific and technological research through mutual communication among beer brewing industry specialists

- Organization of the Annual Meeting (1991-)

(3) To work in collaboration with other foreign and domestic organizations

- Cooperative Agreement with ASBC (1998-)
- Declaration of Partnership with EBC (2001-)

The 22nd Annual Meeting

(1) Schedule: Thursday 8 and Friday 9 of November 2012

(2) Site: Seiryo Kaikan

- 2-16-2, Nagatacho, Chiyodaku, Tokyo 100-0014, Japan
- TEL/ +81-3-3581-5650

For further information, please contact the BCOJ.

http://www.brewers.or.jp/bcoj/bcoj-en.html

Daily Schedule

Monday, July 30

7:00 – 7:45 a.m.	Presenters' Breakfast	A107-109
7:30 a.m. – 2:00 p.m.	Registration	Pre-function A
8:30 a.m. – 2:00 p.m.	Speaker Ready Kiosk	Pre-function A
8:00 – 9:30 a.m.	**EBC Symposium: Resources for the Future** Moderator: *Stefan Kreisz, Carlsberg* 8:00 a.m. S-7. Four years past the mergwith The Brewers of Europe: What's new at EBC. *John Brauer, EBC* 8:20 a.m. S-8. The EBC Brewing ScienceGroup: A different concept of scientific exchange. *Carsten Zufall, Cerveceria Polar Los Cortijos, Caracas, Venezuela* 8:45 a.m. S-5. Visualizing fermentation in living yeast cells. *Sebastian Meier, Carlsberg Laboratory, Copenhagen, Denmark* 9:10 a.m. S-6. Influence of different hop products on the cis/trans ratio of iso-alpha-acids in beer and changes in key aroma and bitter taste molecules during beer aging. *Martin Biendl, Hopsteiner HHV GmbH., Mainburg, Germany*	Oregon Ballrooms 202-203
8:00 – 9:20 a.m.	**Technical Session 7: Sustainability** Moderator: *Vince Coonce, MillerCoors* 8:05 a.m. 24. High rate anaerobic digester systems for brewery wastewater treatment and electricity generation: Engineering design factors and cost benefit analysis. *Manaf Farhan, EMG International, Inc., Media, PA, USA* 8:30 a.m. 25. Malt manufacture: Being practically sustainable. *Nigel Davies, Muntons, UK* 8:55 a.m. 26. Brewery wastewater recycling: A case study. *Michael Eumann, EUWA Water Treatment Plants, Gaertringen, Germany*	Oregon Ballroom 201
8:00 – 9:30 a.m.	**Supplier Sessions** 8:00 – 8:30 a.m. FlavorActiv 8:00 – 9:00 a.m. Anton Paar USA 8:00 – 9:00 a.m. Pall Corporation 8:00 – 9:00 a.m. Thermo Scientific 8:00 – 9:00 a.m. Vorne Industries 9:00 – 9:30 a.m. NovaTech	 C126 C120 C125 C122 C121 C126
9:00 a.m. – 2:00 p.m.	Silent Auction	Pre-function A
9:30 – 9:40 a.m.	Break	Lobby B
9:45 – 11:30 a.m.	**Technical Session 8: Sensory** Moderator: *Suzanne Thompson, MillerCoors* 9:50 a.m. 27. Impact of fermentable and non-fermentable sugars on oxidative processes during brewing, SO2 formation, palate fullness, and flavor stability. *Thomas Kunz, Technische Universität Berlin, Berlin, Germany* 10:15 a.m. 28. Going the last mile: Better draft beer presentation. *Michael Lewis, UC Davis Extension, Davis, CA, USA* 10:40 a.m. 29. Influence of maltodextrins on palate fullness of beer. *Heinrich Rübsam, TUM-Weihenstephan, Freising, Germany* 11:05 a.m. 30. Sensory evaluation of Belgian and U.S. red/brown sour beers. *Jeff Clawson, Oregon State University, Corvallis, OR, USA*	Oregon Ballrooms 202-203
9:45 – 11:00 a.m.	**Global Conversation: Water & Energy in the Future**	Oregon Ballroom 201
9:45 – 11:30 a.m.	**Workshop: Confabulation into the Realm of *Saccharomyces*: Theoretical and Practical**	B113-114
11:30 a.m. – 2:00 p.m.	**Exhibits, Poster Viewing, Networking, and Lunch** *(served 11:30 a.m. – 1:00 p.m.)* 11:45 a.m. – 12:45 p.m. Poster authors present, even numbers 12:45 – 1:45 p.m. Poster authors present, odd numbers *Lunch includes a taste of Oregon, featuring beers from Oregon Brewers Guild members.*	Exhibit Halls A, A1, B

2:00 – 6:00 p.m.	Open afternoon	
2:15 – 5:15 p.m.	Craft Distillery Tour*	
2:30 – 6:00 p.m.	City Tour*	
5:00 – 11:00 p.m.	Congress Hospitality Lounge	Alexander's Lounge (HP)

* *Additional registration required for this event.*

Monday Highlights

EBC Symposium: Resources for the Future

Organized by European Brewery Convention

8:00 – 9:30 a.m. • Oregon Ballrooms 202-203

This symposium will give an update on EBC, the EBC Science Group, and the Brewers of Europe and the technical resources they provide. Technical topics include strategies to decrease LOX activity in pilsner malts to improve beer flavor stability and the influence of different hop products on key aroma and bitter taste molecules during beer aging.

Global Conversation: Water & Energy in the Future

9:45 – 11:00 a.m. • Oregon Ballroom 201

Kathy Kinton, MillerCoors retired (moderator); Tom Collins, MillerCoors; Cheri Chastain, Sierra Nevada Brewing Company; Gordon Jackson, BRI; Anastassia Johnson, BRI

Reducing the brewery carbon footprint is a global concern. This global conversation will explore unique engineering/procedure/practices to reduce water and energy requirements of the overall process.

Workshop: Confabulation into the Realm of *Saccharomyces*: Theoretical and Practical

9:45 – 11:30 a.m. • B113-114

David Ryder, MillerCoors (moderator); Bill Maca, MillerCoors; Tom Pugh, Gallo Wines; Barbara Dunn, Stanford University; Guido Aerts, University Katholiek Leuven

Some say "beer is magic in a glass." As brewers and scientists, we venture to qualify and quantify parameters that create this magic. Be it lager, ale, Belgian specialty beer, or wine, it is the yeast that makes the difference. Join our international panel of experts as we confabulate theoretically and practically through the realm of *Saccharomyces*. Topics include:

- Managing multiple yeast strains for a large brewery
- Wine and beer: Contrasting ingredient and flora composition
- Lager yeast genome
- Belgian beers: Flora, flavor, and science

Craft Distillery Tour

2:15– 5:15 p.m. • Depart OCC/Return HP

This tour will allow you to ask questions, sample spirits, and learn about the world of distilleries. The tour bus will pick you up at the Oregon Convention Center, and you will be able to explore two nearby distilleries. See how Bull Run Distilling Company uses pure water, raw grains, sugar, barrel aging, and a blend of art and science to produce craft-distilled rum, whiskey, and other spirits. From there, visit Clear Creek Distillery, which has used the traditional European pot still, along with techniques learned in Alsace and Switzerland, to make world-class eau de vie, grappa, and liqueurs for over 26 years. The bus will drop you off at the Hilton Portland and Executive Towers.

City Tour

2:30 – 6:00 p.m. • Depart OCC/Return HP

See all the many and varied attractions the "Rose City" has to offer onboard the Big Pink Sightseeing Trolley Tour. The trolley will pick up the tour at the Oregon Convention Center. This expertly narrated tour is an excellent way to experience Portland at your own pace with carefully chosen stops where you can hop off and see the sights and then reboard later. Spend the afternoon exploring all the highlights of Portland and then let the trolley take you back to the Hilton Portland and Executive Towers.

Portland Skyline courtesy of Travel Portland

Daily Schedule

Tuesday, July 31

7:00 – 7:45 a.m.	Presenters' Breakfast	A107-109
7:30 a.m. – 5:00 p.m.	Registration	Pre-function A
8:00 a.m. – 1:45 p.m.	Silent Auction	Pre-function A
8:00 – 9:30 a.m.	**Technical Session 9: Analytical II** Moderator: *F. Juergen Methner, TU Berlin* 8:05 a.m. 31. Recent discoveries in beer foam. *Karl Siebert, Cornell University, Geneva, NY, USA* 8:30 a.m. 32. The measurement of carbon dioxide in packaged beer: A critical review. *Donald Hutchinson, Anheuser-Busch InBev, St. Louis, MO, USA* 8:55 a.m. 33. Carbon dioxide solubility in wort and beer. *Alex Speers, Dalhousie University, Halifax, NS, Canada*	Oregon Ballrooms 202-203
8:00 – 9:30 a.m.	**Technical Session 10: Microbiology I** Moderator: *Chris Powell, University of Nottingham* 8:05 a.m. 34. Investigation into the antibacterial activity of mesoporous zirconium phosphate against beer-spoilage bacteria. *Guangtian Zhou, Shandong Institute of Light Industry, Jinan, China* 8:30 a.m. 35. *Pediococcus claussenii* genetic expression during growth in beer assessed by transcriptome sequencing (RNA-seq). *Vanessa Pittet, University of Saskatchewan, Saskatoon, SK, Canada* 8:55 a.m. 61. Impact of *Fusarium culmorum* infection on barley malt protein fractions, brewing process, and beer quality. *Pedro Oliveira, University College Cork, Cork, Ireland*	Oregon Ballroom 201
8:00 – 9:30 a.m.	**Workshop: Inline Instrumentation Critical Process Control Points (CPCP)**	B113-114
8:30 a.m. – 5:00 p.m.	Speaker Ready Kiosk	Pre-function A
9:25 – 9:40 a.m.	Break	Lobby B
9:45 – 11:30 a.m.	**Supplier Sessions** 9:45 – 10:45 a.m. ACM GmbH 9:45 – 10:45 a.m. American Society of Brewing Chemists 9:45 – 10:45 a.m. The Dow Chemical Company 9:45 – 10:45 a.m. Steinfurth, Inc. 9:45 – 10:45 a.m. Verde Environmental Services LLC 11:00 – 11:30 a.m. Charm Sciences, Inc. 11:00 – 11:30 a.m. Plastic Kegs America 11:00 – 11:30 a.m. DSM Food Specialties	C120 C126 C125 C122 C121 C120 C121 C122
9:45 – 11:30 a.m.	**IBD Symposium: Workforce of the Future** 9:50 a.m. Welcome. *Simon Jackson, IBD, and Charlie Bamforth, UC-Davis and IBD (moderator)* 9:55 a.m. Shooting for the stars. *Michaela Miedl, IBD* 10:10 a.m. Guess what, Execs—There is no panacea solution to building organisational capability. *Iain Clarke, Competitive Capabilities International* 10:25 a.m. The MillerCoors journey. *Toby Eppard and Randal Burroughs, MillerCoors* 10:55 a.m. Q&A and discussion. *Panel includes speakers and David Cook, University of Nottingham and Graham Stewart, GGStewart Associates*	Oregon Ballrooms 202-203
9:45 – 11:30 a.m.	**Technical Session 11: Brewhouse Operations** Moderator: *John Mallett, Bell's Brewery* 9:50 a.m. 37. The influence of nitrogen compounds on beer characteristics. *Taichi Maruhashi, Suntory Liquors Limited, Osaka, Japan* 10:15 a.m. 38. Increasing brewhouse throughput whilst improving sustainability and product quality. *Paul Dowd, Briggs of Burton, Burton on Trent, UK* 10:40 a.m. 39. Brewing intensification—Successes and failures. *Graham Stewart, GGStewart Associates, UK* 11:05 a.m. 40. Optimized conditions for pre-treatment of hops in the brewhouse to maximize utilization rate without a decrease in beer quality. *Sebastian Kappler, Technische Universität München, Germany*	Oregon Ballroom 201
11:30 a.m. – 2:00 p.m.	**Exhibits, Poster Viewing, Networking, and Lunch** *(served 11:30 a.m. – 1:00 p.m.)* 12:30 – 1:30 p.m. All poster authors present	Exhibit Halls A, A1, B
2:00 – 3:15 p.m.	Poster Take Down	Exhibit Halls A, A1, B

2:00 – 3:15 p.m.	**Global Conversation: Innovation for the Future**	A105-106
2:00 – 3:20 p.m.	**Technical Session 12: Engineering** Moderator: *Mitch Steele, Stone Brewing Co.* 2:05 p.m. 41. Future brewery concepts and upcoming streams. *Roland Folz, VLB-Berlin, Berlin, Germany* 2:30 p.m. TBA 2:55 p.m. 43. Passivation of austenitic stainless steels for the purpose of manufacturing and handling beer. *Harvey Claussen, The Zythos Project LLC, Portland, OR, USA*	Oregon Ballrooms 202-203
2:00 – 3:20 p.m.	**Technical Session 13: Hops III** Moderator: *Robert Foster, MillerCoors* 2:05 p.m. 44. Development of SNP-based identification method of hop varieties. *Hiromasa Yamauchi, Suntory Business Expert Ltd., Kawasaki, Japan* 2:30 p.m. 45. Growing hops is stressful! *Douglas Walsh, Washington State University, Prosser, WA, USA* 2:55 p.m. 46. Development of new hops varieties in the Czech Republic and new opportunities in brewing. *Jiri Smetana, ARIX Co., Zatec, Czech Republic*	Oregon Ballroom 201
2:00 – 3:20 p.m.	**Technical Session 14: Yeast II** Moderator: *David Ryder, MillerCoors* 2:05 p.m. 47. Effects of non-sugar nutrient concentrations on fermentation and beer flavor. *Takeshi Kawakubo, Kirin Brewery Company, Japan* 2:30 p.m. 48. Bottle conditioning of beer: Strategies to improve yeast refermentation performance. *Tinne Dekoninck, Catholic University of Leuven, Heverlee, Belgium* 2:55 p.m. 49. Genetic roots of lager-brewing yeast: *Saccharomyces eubayanus* and the Patagonian hypothesis. *Diego Libkind, INIBIOMA, Bariloche, Argentina*	B110-112
2:00 – 5:00 p.m.	Exhibit Take Down	Exhibit Halls A, A1, B
3:20-3:30 p.m.	Break	Lobby B
3:35 – 5:20 p.m.	**Technical Session 15: Packaging & Cleaning** Moderator: *Cecil Giarratano, MillerCoors* 3:40 p.m. 50. Keg cleaning and root cause analysis. *Jeffrey Hutchison, Ecolab, St. Paul, MN, USA; Kenny Gunderman, Summit Brewing Company, St. Paul, MN, USA* 4:05 p.m. 51. Conveyor lubricant for stainless steel chains that saves water. *Chad Thompson, Ecolab, USA* 4:30 p.m. 52. Utilizing ozone: Energy savings in automated CIP sanitization. *Lars Larson, Trumer Brauerei, Berkeley, CA, USA* 4:55 p.m. 53. A novel air ingress test method. *Eric Samp, MillerCoors, Golden, CO, USA*	Oregon Ballroom 201
3:35 – 5:20 p.m.	**Technical Session 16: Yeast III** Moderator: *Sylvie Van Zandycke, DSM Food Specialties* 3:40 p.m. 54. Observation of flocculation protein during propagation of brewing yeasts. *Kei Asada, Sapporo Breweries Ltd., Yaizu, Japan* 4:05 p.m. 55. The effect on fermentation by-products of the amino acids in wort. *Takuya Hashimoto, Suntory Liquors Limited, Osaka, Japan* 4:30 p.m. 56. Standardized fermentation parameter for probiotic and non-probiotic lactic acid bacteria in barley malt wort. *Martin Zarnkow, TU München, Germany* 4:55 p.m. 57. Mechanism of suppression of pyruvate and acetolactate formation by use of yeast of modified mitochondrial transportation system. *Hiroshi Kitagaki, National Saga University, Japan*	Oregon Ballrooms 202-203
3:35 – 5:45 p.m.	**Workshop: Malting Barley for Today's Brewers—A Brave New World**	B113-114
7:00 – 10:00 p.m.	**The Global Gathering*****	World Trade Center (WTC)
9:30 – 11:30 p.m.	**After Glow**	Alexander's Lounge (HP)

*** *Exhibitors, Students, Single-Day Registrants, and Guests must purchase a ticket to attend this event.*

Workshop: Inline Instrumentation Critical Process Control Points (CPCP)

8:00 – 9:30 a.m. • B113-114

Darren L. Goodlin, AB InBev (moderator); Wayne Brinkman, Emerson Process Management; Phillip Goodloe, MillerCoors; Will Kemper, Chuckanut Brewery; Daniel Gore, Anton Paar GmbH

Those working in brewery maintenance, quality assurance, or brewery process design in any size brewery will gain a general understanding of the traditional locations of inline instrumentation and analyzers in the brewing process. When considering inline instrumentation selection and location, each location has its own challenges, from environmental and process influences and hydraulic conditions to the need for sanitation. (Additionally, the inline measurement has to be periodically validated and the accuracy of the measurement checked.) Other factors include reoccurring costs and skill set required to operate and maintain the instrument, the needed standard reference device, and consideration of the total cost of ownership (TCO). The tradeoffs to having inline measurements versus using a portable meter or offline options are important considerations when implementing any solution.

IBD Symposium: Workforce of the Future

Organized by Institute of Brewing & Distilling
9:45 – 11:30 a.m. · Oregon Ballrooms 202-203

This symposium will address the upcoming challenges of training and educating the workforce of the future in the brewing industry. What will they need to know? How do they learn? How will they be trained? What skill sets will be important? This is guaranteed to be a lively discussion, so come and share your insights.

Global Conversation: Innovation for the Future

2:00 – 3:15 p.m. • A105-106

Mary Lachnit, M² Professional Solutions

Developing an early, intimate interaction platform with consumers drives innovation in marketing and product development. Constant consumer contact throughout the product development cycle uncovers key insights, critical product attributes, impactful design elements, and meaningful marketing messages that, when brought together, provide a total product experience that delivers on consumer needs, exceeds consumer expectations, and ensures the success of your product in the marketplace.

Workshop: Malting Barley for Today's Brewers — A Brave New World

3:35 – 5:45 p.m. • B113-114

Susan Welch, Malteurop North America (moderator); Nigel Davies, Muntons plc; Dale West, Malteurop North America; Xiang Yin, Cargill; Pat Hayes, Oregon State University; Doyle Lentz, grower

A panel of industry experts will present on various barley-related issues that both challenge and create opportunities for the malting and brewing industries. The workshop will be an opportunity to share knowledge and concerns that can protect our raw materials and maintain a long-standing heritage of malting excellence. Topics include:

- New developments in sustainability
- Malting barley market dynamics: Post single desk (CWB) control in Canada
- Technological developments to meet brewers' needs: LOXless barley from a maltster's perspective
- New varieties for malting barley
- The outlook for barley: A grower's perspective

The Global Gathering

7:00 – 10:00 p.m. • World Trade Center

The outside pavilion at the World Trade Center is in the heart of downtown Portland and is the perfect place to celebrate the global connections made during WBC 2012. There will be international fare, and all can enjoy and dance to the music of Pressure Point. Guests, students, single-day registrants, and exhibitors must purchase a ticket to attend this event.

After Glow

9:30 – 11:30 p.m. • Alexander's Lounge (HP)

What better way to close out a fun evening than to join your friends and colleagues for this popular event that features hospitality and Irish coffee. Irish coffee sponsored by Malteurop North America and S. S. Steiner Inc.

Institute of Brewing & Distilling

www.ibd.org.uk

The Institute of Brewing & Distilling is a membership organisation recognised worldwide throughout the professions of brewing and distilling.

The IBD Vision Statement:

The advancement of education and professional development in the science and technology of brewing, distilling and related industries.

Don't miss out on your opportunity to certify your industry knowledge – sign up for one of the IBD's professional qualifications.

The IBD offers a number of services but its core activity is the suite of examinations which provide professional qualifications for those working in the Brewing and Distilling sectors.

Future examination dates are as follows:

13th November 2012 and 7th May 2013
Fundamentals of Brewing & Packaging
Fundamentals of Distilling
General Certificate in Brewing
General Certificate in Packaging Beer
General Certificate in Distilling
General Certificate in Packaging Spirits

4th–6th June 2013
Diploma in Brewing
Diploma in Distilling

4th–7th June 2013
Master Brewer

11th–13th June 2013
Diploma in Packaging

For more information about examinations and other resources visit:
www.ibd.org.uk /qualifications

For more information about IBD learning resources visit:
www.ibd.org.uk /learning

The IBD publishes:
- *The Journal of the Institute of Brewing*
- *The Brewer & Distiller International*

For further information, visit us on our stand at World Brewing Congress or visit our website.

The Institute of Brewing & Distilling
33 Clarges Street, London, W1J 7EE, UK
T: +44 (0) 20 7499 8144 E: enquiries@ibd.org.uk www.ibd.org.uk

Daily Schedule

Wednesday, August 1

7:00 – 7:45 a.m.	Presenters' Breakfast	A107-109
7:30 a.m. – 12:00 p.m.	Registration	Pre-function A
8:00 – 9:20 a.m.	**Technical Session 17: Mashing** Moderator: *Mary-Jane Maurice, Malteurop North America* 8:05 a.m. 58. About the influence of different mashing methods on the beer quality of classical beer styles. *Jens Voigt, Technische Universität München, Weihenstephan, Germany* 8:30 a.m. 59. Mashing without primary energy—The path to an autarchic brewery. *Peter Gattermeyer, Krones AG, Freising, Germany* 8:55 a.m. 60. Monitoring of the mashing process by viscosity measurements. *Simon Henke, TU München, Chair of Process Engineering of Disperse Systems, Weihenstephan, Germany*	A105-106
8:00 – 9:20 a.m.	**Technical Session 18: Microbiology II** Moderator: *Rebecca Jennings, Rahr Malting Company* 8:05 a.m. 36. Comparative genomics enables a genetic barcode to discriminate and score beer-spoiling and non-spoiling *Lactobacillus brevis*. *Rudi Vogel, Technische Universität München, Freising, Germany* 8:30 a.m. 175. Quantitative evaluation of biofilm composition using realtime-PCR. *Robert Riedl, TU Muenchen, Freising, Germany* 8:55 a.m. 63. Investigating the possibility to control brewery biofilms by inhibiting quorum sensing. *Erna Storgårds, VTT Technical Research Centre of Finland, Finland*	B110-112
8:00 – 9:20 a.m.	**Technical Session 19: Outside the Box** Moderator: *David Maradyn, Novozymes North America* 8:05 a.m. 124. Energy conservation decisions germane to the small brewery. *Jaime Jurado, Susquehanna Brewing Company, Pittston, PA, USA* 8:30 a.m. 65. Putting science to work in the brewery. *Alastair Pringle, Pringle-Scott LLC, St. Louis, MO, USA* 8:55 a.m. 66. Oat: Substrate for malted cereal fermented beverages. *Alicia Muñoz Insa, Lehrstuhl für Brau- und Getränketechnologie, Technische Universität München, Freising, Germany*	B117-119
8:00 – 11:30 a.m.	**Workshop: Hops for the Future**	B113-114
9:25 – 9:40 a.m.	Break	Lobby B
9:45 – 11:30 a.m.	**Technical Session 20: Finishing and Stability** Moderator: *Jens Voigt, Technische Universität München Weihenstephan* 9:50 a.m. 67. Analysis of the control factor concerning beer filterability and establishment of the method for controlling filterability. *Tomoyuki Nakahama, Suntory Liquors Ltd., Ohra-gun, Japan* 10:15 a.m. 68. The foaming properties of pale and specialty malts. *Alexander Combe, University of California, Davis, CA, USA* 10:40 a.m. 69. Thiols during production and storage of beer. *Marianne Lund, University of Copenhagen, Denmark* 11:05 a.m. 70. Evaluation of pre-isomerized hop extracts and their influence on the long-term stability of beer by using a charge titration method. *Jean Titze, University College Cork, Cork, Ireland*	B117-119
9:45 – 11:30 a.m.	**Technical Session 21: Spent Grains** Moderator: *Martin Zarnkow, TU München, Germany* 9:50 a.m. 71. A new approach for sustainable utilization of spent grains to develop a profitable process. *Benjamin Haeffner, TU München, Weihenstephan, Germany* 10:15 a.m. 72. Ultrasonic treatment of brewer's spent grains for bioethanol production. *Jason Bennett, University of Abertay, Dundee, Scotland* 10:40 a.m. 73. Treatment of spent grains by hydrothermal cleavage to purify dietary fibers. *Julia Steiner, TU München, Freising, Germany*	A105-106

11:05 a.m. 74. From spent grain to "bio-coal"—Is hydrothermal carbonization (HTC) an unvalued key technology? *Heinz Dauth, Münster University of Applied Sciences, Steinfurt, Germany*

9:45 – 11:30 a.m. **Technical Session 22: Yeast IV** B110-112

Moderator: *Katherine Smart, SABMiller*

9:50 a.m. 228. A novel method of inducing and retaining cell cycle synchronization in cultures of *Saccharomyces cerevisiae*. *Johnathon Layfield, NC State University, Raleigh, NC, USA*

10:15 a.m. 76. Sub-genomic cooperation in the hybrid lager yeast *Saccharomyces pastorianus*. *Brian Gibson, VTT, Espoo, Finland*

10:40 a.m. 77. Large-scale systems biology approach to select and create novel yeast strains with superior fermentation characteristics. *Kevin Verstrepen, CMPG Laboratory for Genetics and Genomics, Leuven, Belgium*

11:05 a.m. 78. Genetic drift and variation in brewing yeast cultures. *Chris Powell, University of Nottingham, UK*

11:45 a.m. – 1:30 p.m. **Closing Lunch and Keynote Address***** Oregon Ballrooms 202-203

*** *Exhibitors, Students, Single-Day Registrants, and Guests must purchase a ticket to attend this event.*

Wednesday Highlights

Workshop: Hops for the Future

8:00 – 11:30 a.m. • B113-114

Jason Perrault, Select Botanicals Group, LLC; Christina Schönberger, Barth Innovations; Martin Zarnkow, Technical University Weihenstephan; Gene Probasco, Barth Haas Group; Roland Schmidt, NATECO2 GmbH & Co.; David Grinnell, Boston Beer Company; Guy Derdelinckx, Katholieke Universiteit Leuven; Jean Marie Rock, Orval Brewery; John Henning, USDA Hop Breeding & Genetics; Erik Smith, Washington State University; David Gent, USDA-ARS, Oregon State University; Ken Eastwell, Washington State University; Doug Walsh, Washington State University; Tom Shellhammer, Oregon State University

Photo by Greg Robeson/Oregon Bounty, courtesy of Travel Oregon

Hops are the spice of beer, and defining future spice is an opportunity for brewers. As the brewing landscape changes, so does the climate for hop acreage and variety. We have created a workshop that brings together hop research and the USDA/Washington State University breeding programs of the northwest United States, interwoven with regulatory and analytical perspectives of the European hop industry, along with insight from those who brew without fear. Defining the future of hops is shared from field to glass. At the end of the workshop we will experience the taste of single-variety hop beers: hops of the past, present, and future.

Closing Lunch and Keynote Address

11:45 a.m. – 1:30 p.m. • Oregon Ballrooms 202-203

Jack Uldrich, Global futurist

Jack Uldrich is a renowned global futurist, independent scholar, sought-after business speaker, and best-selling author. His books include the best-selling and award-winning *Into the Unknown: Leadership Lessons from Lewis & Clark's Daring Westward Expedition* and *Jump the Curve: 50 Essential Strategies to Help Your Company Stay Ahead of Emerging Technologies*. His most recent works include *Higher Unlearning: 39 Post-Requisite Lessons for Achieving a Successful Future* and *Unlearning 101: 101 Lessons in Thinking Inside-Out the Box*.

Jack's other written works have appeared in *The Wall Street Journal*, *BusinessWeek*, *The Futurist*, *Future Quarterly Research*, and hundreds of other newspapers and publications. In addition to speaking on future trends, change management, and leadership, Jack is a leading expert on how businesses adapt. He is noted for his ability to deliver provocative, new perspectives on competitive advantage, organizational change, and transformational leadership.

Poster Session

Exhibit Halls A, A1, B

Posters are on display from 11:30 a.m. to 2:00 p.m., Sunday through Tuesday. Check the daily schedules to see when poster authors will be present each day.

Poster Session Chairs: *Kelly Tretter, New Belgium Brewing Company, and Susan Welch, Malteurop North America*

Analytical

Moderator: *Cecil Giarratano, MillerCoors*

79. A glimpse of craft beer over the past 6 years through large scale analytical testing. *Kara Taylor, White Labs, USA*
80. A new and improved method for monitoring beer vicinal diketones as maturation markers. *Greg Rahn, Hamilton College, USA*
81. A novel gas chromatographic system to characterize hop aroma. *Andrew Tipler, PerkinElmer, Shelton, CT, USA*
82. Analysis of volatile thiols in beer with on-fiber derivatization and GC/MS determination. *Minoru Kobayashi, Asahi Breweries, Ltd., Moriya-Shi, Japan*
83. Assessment of instruments for use in breweries. *Catharine O'Shaughnessy, Campden BRI, Nutfield, UK*
84. Beverage antioxidative index (BAX)—An advantageous tool for the evaluation of beer flavor stability. *Frank-Jürgen Methner, Technische Universität Berlin, Berlin, Germany*
85. Carbohydrate analysis using HPLC with PAD, FLD, CAD, and MS detectors. *David Thomas, Thermo Fisher Scientific, Chelmsford, MA, USA*
86. Comparing optical versus traditional measurement technology in the brewery. *Daniel Gore, Anton Paar, Graz, Austria*
87. Complex evaluation of technological changes—Impact on foam. *Adam Broz, Budejovicky Budvar, n.p., Ceske Budejovice, Czech Republic*
88. Determination of isoxanthohumol, xanthohumol, alpha and beta bitter acids, and *trans*- and *cis*-iso-alpha-acids in beer using HPLC with UV and electrochemical detection. *David Thomas, Thermo Fisher Scientific, Chelmsford, MA, USA*
89. Determining flavors and "defects" in beer by headspace trap/gas chromatography/mass spectrometry (HStrap/GC/MS). *Lee Marotta, PerkinElmer, USA*
90. Development and validation of an assay method for phenolic flavor compounds in beer flavor standards. *Boris Gadzov, FlavorActiV Limited, Chinnor, UK*
91. Development of a fast and reliable microwave-based assay for measurement of malt color. *Yin Li, Malteurop North America Inc., Milwaukee, WI, USA*
92. Development of a microplate FAN method—Not always as straightforward as expected. *Mark Schmitt, USDA Agricultural Research Service, Madison, WI, USA*
93. Ensuring product quality, efficiency, consistency, and safety through advanced process analytics. *John Morgan, Mettler Toledo, Bedford, MA, USA*
94. Fast GC-FID method for the analysis of primary hop essential oils. *Cheryl Ermey, John I. Haas, Inc., Yakima, WA, USA*
95. Fate of mycotoxins during beer brewing. *Yasushi Nagatomi, Asahi Group Holdings, Ltd., Moriya, Japan*
96. Free and oxidized fatty acids: Comprehensive strategies for separation and quantification from hops, malt, wort, and beer. *Nils Rettberg, TU Berlin/VLB Berlin, Germany*
97. Hop aroma analysis in beer using PDMS-stir bar sorptive extraction-GC-MS. *Yanping Qian, Oregon State University, Corvallis, OR, USA*
98. Indirect detection of microbial contamination in beer by chemical fingerprints. *Jennifer Koob, TU Muenchen, Freising, Germany*
99. Matrix effect and practical considerations for accurate quantification of acetaldehyde and higher alcohols in beer using headspace GC-FID. *Qin Zhou, Oregon State University, Corvallis, OR, USA*
100. "Just shoot"—Quick and easy determination of hop iso-alpha-acids in beer. *Michael Heidorn, Thermo Fisher Scientific, Germering, Germany*
102. Near real-time monitoring of carbohydrates during beer processing by a microchip capillary electrophoresis technology. *Dale Willard, Carbo Analytics, LLC, Fort Collins, CO, USA*
103. New insights on preservation of beer with a high oxygen reduction potential. *Frank Verkoelen, Pentair Haffmans, Venlo, Netherlands*
104. Owlstone's FAIMS-based ("field asymmetric ion mobility spectrometry") chemical analyzer quantifies diacetyl, contaminants, VOCs, and much more in real-time right at the point of need. *Steven Freshman, Owlstone Inc., USA*
105. Rapid determination of high molecular weight 1,3/1,4-beta-D-glucan by a novel photometric method. *Sari Tikanoja, Thermo Fisher Scientific, Vantaa, Finland*
106. Resonance light scattering technique for the determination of proteinase A activity. *Qun Song, Jiangnan University, Wuxi, China*
107. SBU—A new and rapid method for determining bitterness in beer. *Philip Wietstock, Technische Universität Berlin, Berlin, Germany*
108. Stale aldehyde analysis by in-solution PFBHA derivatization and SPME-GC-ECD. *Qin Zhou, Oregon State University, Corvallis, OR, USA*
109. The effect of hop processing and exposure time on dry hop aroma extraction. *Peter Wolfe, Oregon State University, Corvallis, OR, USA*
110. Thermodynamic properties of primary gushing of beer. *Guy Derdelinckx, KU Leuven, Belgium*
111. Turbidity and haze identification in beer—An overview. *Martina Gastl, Lehrstuhl für Brau- und Getränketechnologie, Freising, Germany*

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Moderators: *Cecil Giarratano, MillerCoors, and Kimberly Bacigalupo, Sierra Nevada Brewing Company*

112. Compact brewhouse for up to ten brews/day and 250,000 hL/year. *Fred Scheer, Krones Inc., Franklin, TN, USA*
113. Craft brewing on a shoestring. *Mark Wagner, Westport Brewing Company, Westport, WA, USA*
115. New results of procedural analysis methods for mash characterization. *Johannes Tippmann, TU München, Freising, Germany*
116. The false bottom's free passage area—Important feature or negligible? *Simon Henke, TU München, Weihenstephan, Germany*
117. The mechanical principles of the whirlpool. *Udo Funk, GEA Brewery Systems, USA*

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Moderator: *Kimberly Bacigalupo, Sierra Nevada Brewing Company*

118. Clean—What does it mean? CCP control with ultraviolet: Where, when, how? What are the controls and solutions gained? *Troy Smith, Radiant Industrial Solutions, Houston, TX, USA*
119. Sanitation challenges for the growing brewery. *Dirk Loeffler, Loeffler Chemical Corporation Atlanta, GA, USA*
120. The Food and Drug Act of 2010—What effects can we expect on the brewing industry? *David Radzanowski, Radzan Associates, Madison, WI, USA*

Engineering

Moderator: *Kimberly Bacigalupo, Sierra Nevada Brewing Company*

121. A guide to understanding the brewery flash pasteurization process, determining the most appropriate operational requirements, and selecting the equipment that best fits your brewery application. *J. David Duff, FleetwoodGoldcoWyard, USA*
122. A small brewing plant for product development whose initial cost could be reduced dramatically by using recycled equipment. *Atsushi Suzuki, Orion Breweries, Ltd., Nago-city, Japan*
123. Beer clarification with modern centrifugal separators. *Alexander Gertsman, Flottweg, Independence, KY, USA*
125. Removal of volatiles from beer by gas (N_2) stripping coupled with high-vacuum. *Luis Castro, Washington State University, USA*
126. Wort stripping based on thermal desorption supports the classic boiling process with a more efficient evaporation and without using additional thermal energy. *Roland Feilner, Krones AG, Neutaubling, Germany*

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Moderator: *Kimberly Bacigalupo, Sierra Nevada Brewing Company*

127. Brewing with unmalted barley and Ondea Pro® enzyme technology: The science and the economic potential. *Kevin Redd, University of Tasmania, Hobart, Australia*
128. Development of 100% wheat brewing by optimizing the selection of wheat raw materials and the enzyme composition. *Katsuya Sasaki, Asahi Breweries, Ltd., Japan*
129. Enzymatic production of gluten-free beers from conventional grains. *Aaron Hanson, BunsenBrewers, Estacada, OR, USA*
130. Optimization of the application of commercial enzymes in sorghum mashes. *Birgit Schnitzenbaumer, University College Cork, Cork, Ireland*
131. Pitfalls and gains from applying xylanases in brewing. *Lars Boe Larsen, Danisco A/S, Brabrand, Denmark*

Finishing and Stability

Moderator: *Kimberly Bacigalupo, Sierra Nevada Brewing Company*

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134. Influencing factors of hydrogen bonding intensity in beer. *Qi Li, Jiangnan University, China*
135. Laboratory tests of beer aging under aerobic and anaerobic conditions. *Petr Kosin, Budejovicky Budvar, n.p., Ceske Budejovice, Czech Republic*
136. New approaches for kieselguhr-free filtration and characterization of filter aids. *Alexander Scheidel, Technische Universität München Weihenstephan, Germany*
137. Recent findings on the mechanism of chill haze—A physico-chemical explanatory approach. *Jean Titze, University College Cork, Cork, Ireland*
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Hops

Moderator: *Kimberly Bacigalupo, Sierra Nevada Brewing Company*

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143. Analysis of hop-derived flavor compounds in U.S. hops. *Kiyoshi Takoi, Sapporo Breweries Ltd., Yaizu, Japan*
144. Comparative analysis of North Carolina and Pacific Northwest grown hops by brewing science students at Appalachian State. *Brett Taubman, Appalachian State University, Boone, NC, USA*
145. Degradation kinetics of iso-alpha-acids. *Mekonnen Gebremariam, Technical University Munich, Freising-Weihenstephan, Germany*
146. Dry hopping—The history and its current importance. *Christina Schönberger, Barth Innovations, Nuremberg, Germany*
147. HBC 369—A new flavor hop variety. *Gene Probasco John I. Haas, Inc., Yakima, WA, USA*
148. Hop and hop substances—Induction, reduction, or suppression of gushing? *Antonie Herrmann, Hochschule Weihenstephan-Triesdorf, Institut für Lebensmitteltechnologie, Freising, Germany*
149. Identification of hop cultivars using high resolution melt curve analysis. *William Deutschman, Westminster College, Salt Lake City, UT, USA*

Malt and Grains

Moderators: *Kimberly Bacigalupo, Sierra Nevada Brewing Company, and Ian Stanners, Molson (retired)*

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151. 5% > extract and more $ for brewers—Hulless barley malt a dramatic difference. *Brian Rossnagel, University of Saskatchewan, Canada*
152. Characteristics of ascorbate peroxidase in malt. *Makoto Kanauchi, Miyagi University, Sendai, Japan*
153. Developing an NIRS method for assessing black point in single kernels of malting barley. *Glen Fox, University of Queensland, Toowoomba, Australia*
154. Fermentability of Canadian two row malting barley varieties: Wort turbidity, density, and sugar content as measures of fermentation potential. *Chris Bourque, Dalhousie University, Halifax, NS, Canada*
155. Improvement of beer flavor stability through the LOX-less barley approach. *Junhong Yu, Tsingtao Brewery Co., Ltd., Qingdao, China*
156. Limitations to predicting malt quality by using malt friability analysis during breeding of malting barley. *Ramón Huerta, Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP), Texcoco, México*
157. Research on malting technology of hulless barley used for brewing hulless barley beer. *Guangtian Zhou, Shandong Institute of Light Industry, Jinan, China*
158. The relationship between barley starch structure and the sugar profile of wort. *Shang Chu, University of Queensland, Brisbane, Australia*
159. Varietal effect of teff (*Eragrostis tef*) on the dimethyl sulfide (DMS) content and enzyme activities of teff malt. *Mekonnen Gebremariam, TUM, Weihenstephan-Freising, Germany*
160. Wort amino acid composition of new Canadian malt barley varieties and their relationship with grain protein. *Aaron MacLeod, Canadian Grain Commission, Winnipeg, MB, Canada*

Microbiology

Moderator: *Ian Stanners, Molson (retired)*

161. Adaptation of *Lactobacillus brevis* to beer—Role of metal trace elements and membrane lipids. *Patrick Preissler, Technische Universität München, Freising, Germany*
162. Assessment of airborne microorganisms in a craft brewery. *Amanda (Mandy) Miller, Colorado State University, Fort Collins, CO, USA*
163. Assessment of barley malt fungal communities using pyrosequencing. *Mandeep Kaur, University of Tasmania, Australia*
164. Classification, identification, and detection of beer spoiling microorganisms—A review. *Mathias Hutzler, TU Muenchen, Freising, Germany*
165. Differentiation of *Lactobacillus brevis* strains along their beer-spoiling potential using MALDI-TOF MS. *Carola Kern, Technische Universität München, Freising, Germany*
166. Effect of plasmid loss on the beer-spoiling phenotype of *Pediococcus claussenii* ATCC BAA-344T. *Barry Ziola, University of Saskatchewan, Saskatoon, SK, Canada*
167. Effectiveness of a new automatic cell viability counter in comparison to established methods. *Thomas Kunz, Technische Universität Berlin, Berlin, Germany*
168. Exploration of matrix-assisted laser desorption/ionization-time of flight mass spectrometry (MALDI-TOF MS) as a fast identification tool for beer spoilage bacteria. *Anneleen Wieme, University College Ghent, Ghent, Belgium*
169. Fast and reliable identification and differentiation of beverage spoiling yeasts by MALDI-TOF MS. *Julia Usbeck, Technische Universität München, Freising, Germany*
170. Gene expression measurement by real time PCR, relevant for the synthesis and the degradation of acetate esters and 4-vinylguaiacol, in top fermenting yeast. *Hubertus Schneiderbanger, Research Center Weihenstephan for Brewing and Food Quality, Freising, Germany*
171. Identification of bacterial contaminants in beverages by MALDI-TOF MS. *Carola Kern, Technische Universität München, Freising, Germany*
172. Investigation of beer-spoilage ability of *Dekkera*/*Brettanomyces* yeasts and development of multiplex PCR method for beer-spoilage yeasts. *Satoshi Shimotsu, Asahi Breweries, Ltd., Ibaraki, Japan*

173. Methods for induction, separation, and identification of haploid strains of industrial brewer's yeast. *Weina Xu, Jiangnan University, Wuxi, China*
174. Optimizing hops gradient plates for assessing bacterial beer-spoilage potential. *Barry Ziola, University of Saskatchewan, Saskatoon, SK, Canada*
176. Quantitative real-time PCR analysis of putative beer-spoilage associated genes in *Pediococcus claussenii* and *Lactobacillus brevis*. *Jordyn Bergsveinson, University of Saskatchewan, Saskatoon, SK, Canada*
177. The application of antifungal protein (AFP) from *Aspergillus giganteus* to the malting process and its effect on malt and corresponding beer. *Deliang Wang, China National Institute of Food and Fermentation Industries, China*
178. The spoilage of microbrewery beer from *Bacillus* species isolated from pelletized hops. *Nathan Traw, Mother's Brewing Company, Springfield, MO, USA*
179. Using PCR in the brewery routine makes you see microbiology from a new angle. *Gudrun Vogeser, PIKA Weihenstephan GmbH, Pfaffenhofen, Germany*

Nutrition and Health

Moderator: *Ian Stanners, Molson (retired)*

180. Arabinoxylans and fructans in the malting and brewing process. *Moritz Krahl, Radeberger Gruppe, Frankfurt am Main, Germany*
181. Development of 0.00% alcohol beer, focusing on the characteristic bitterness and body of regular beer. *Takayuki Kosugi, Sapporo Breweries Ltd., Yaizu, Japan*
184. OSHA and proposed diacetyl limits in the workplace—What effects can we expect on the brewing industry? *David Radzanowski, Radzan Associates, Madison, WI, USA*
185. Silicon in lager beers and its balance during the brewing process. *Pavel Dostalek, Institute of Chemical Technology, Prague, Czech Republic*
186. The glycemic index—Chance or threat for the beverage industry? *Moritz Krahl, Radeberger Gruppe, Frankfurt am Main, Germany*

Packaging (Bottles, Draft, Cans)

Moderator: *Kelly Tretter, New Belgium Brewing Company*

187. Development of barrier materials for bio-based beverage packages. *Ali Harlin, VTT Technical Research Centre of Finland, Finland*
188. Draught beer equipment and microbiology—Investigations to avoid microbiological contamination. *Johannes Tippmann, TU München, Freising, Germany*
189. Establishment of a new beer canning process based on dew-point temperature filling technology. *Isamu Otake, Asahi Breweries, Ltd., Ibaraki, Japan*
190. IBD Master Brewer Module 5 project: The construction and implementation of a packaging quality laboratory for a large craft. *Gregory Deuhs, Craft Brewers Alliance, USA*
191. Improvement on the oxidative beer flavor stability using active packaging material—Advantages or disadvantages in comparison to SO_2-addition. *Victoria Schiwek, Technische Universität Berlin, Berlin, Germany*
192. LineMET—Efficiency analysis tool in bottling plants. *Stefan Flad, TUM, Freising, Germany*
193. New data on bisphenol A (BPA) concentrations in canned beers. *Leif Garbe, TU Berlin/VLB Berlin, Germany*
194. Science based environmental labeling for beer. *Colleen Barta, Institute for Environmental Research and Education, Vashon Island, WA, USA*

Sensory

Moderator: *Kelly Tretter, New Belgium Brewing Company*

196. A university course on fermentation science in a global society with a study abroad flavor. *Casey Raymond, SUNY Oswego, Oswego, NY, USA*
197. Acceptance of off-flavors in beer by common consumers. *Moritz Krahl, Radeberger Gruppe, Frankfurt, Germany*
198. Beer and cheese: Does the marriage bring equal rights? *Gianluca Donadini, Università Cattolica del Sacro Cuore, Piacenza, Italy*
200. Good sensory techniques for training a beer panel. *Mona Wolf, The Wolf Group, Cincinnati, OH, USA*
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204. Re-inventing the wheel: The intimate sensory links between beer balance, flavor strength, and drinkability. *Alex G. Barlow, ALL BEER, Sheffield, UK*
205. Sensory and chemical differences between naturally and artificially carbonated beer. *Eric Allain, Appalachian State University, Boone, NC, USA*
206. Sensory comprehensive evaluation on beer in China supermarket. *Chunfeng Liu, Jiangnan University, China*
207. Sensory perceptions of people liking or disliking beer. *Hiroko Kanauchi, Miyagi University, Sendai, Japan*
208. Volatile phenols: Emergence of specific profiles among Belgian specialty beers. *Caroline Scholtes, Université Catholique de Louvain, Louvain-la-Neuve, Belgium*

Sustainability

Moderator: *Kelly Tretter, New Belgium Brewing Company*

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212. Customizing sustainability through PET. *Nigel Pritchard, Petainer, Peterborough, UK*
213. Data on energy and water use in breweries. *Gordon Jackson, Campden BRI, Nutfield, UK*
214. Energy efficient hop kilning system with integrated hop oil recovery from the exhaust air. *Ruslan Hofmann, VLB Berlin, Berlin, Germany*
215. Guidelines for efficient water use in the brewery and bottled beverage industries. *Steve Froggett, Froggett & Associates, LLC, USA*
216. Novel approaches to recycling of production waste from yeast propagation. *Neva Parker, White Labs, Inc., San Diego, CA, USA*
217. Optimizing brewing process heating energy management with modular on-demand boiler systems. *Jason Smith, Miura North America, Inc., USA*
218. Replacing COD in breweries with real-time on-line organics monitoring to prevent product loss, reduce water and energy consumption, and minimize waste treatment costs. *Charles Benedict, Hach Company, Loveland, CO, USA*
219. Reuse of brewery wastewater—Aerobic and anaerobic membrane bioreactors. *Bill Musiak, Pentair X-Flow, Rockford, IL, USA*
220. Sustainability for Anheuser-Busch. *Gene Bocis, Anheuser-Busch, Inc., St. Louis, MO, USA*
221. Sustainable value creation with enzyme technology. *Sylvie Van Zandycke, DSM Food Specialties, South Bend, IN, USA*
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World Class Manufacturing

Moderator: *Susan Welch, Malteurop North America*

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225. Identifying critical control points (CCP) and optimizing process and laboratory instrumentation to the brewing process. *Daniel Gore, Anton Paar, Graz, Austria*
226. Managing "by exception": Integrating disparate process control and lab technologies into real-time recipe and specification management systems. *Robert Gates, GE Intelligent Platforms, Charlottesville, VA, USA*

Yeast and Fermentation

Moderator: *Susan Welch, Malteurop North America*

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237. Differentiation of top- and bottom-fermenting brewing yeasts and insight into their metabolic status by MALDI-TOF MS. *Julia Usbeck, Technische Universität München, Freising, Germany*
238. Direct supplementation of yeast with lipids as a means to reduce sulfur dioxide formation. *Michael James, MillerCoors, Milwaukee, WI, USA*
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244. Impact of hops on production of hydrogen sulfide during fermentation: H_2S production from different levels of elemental sulfur. *Seung Park, Kyung Hee University, Yongin-Si, Korea*

245. Investigating the influence of wort amino acid composition on fermentability using a model solution. *Blanca Gómez G., Laboratorio Tecnológico del Uruguay (LATU), Uruguay*

246. Methods and applications for the appropriate characterization of microorganisms. *Konrad* Müller-*Auffermann, Forschungszentrum Weihenstephan, Freising, Germany*

248. Modern brewery yeast management. *Helmut Kuhnl, Esau & Hueber, Schrobenhausen, Germany*

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256. Use of structured problem solving methodology to improve acid wash yeast process. *Sarah Willis, MillerCoors LLC, Milwaukee, WI, USA*

257. Washing recovered yeast with chlorine dioxide. *George Agius, Diversey Inc. (Part of Sealed Air), Oakville, ON, Canada*

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TriMet Rail System

The Oregon Convention Center can be reached via "MAX", Portland's mass transit light-rail line. The MAX stop for the Oregon Convention Center is: Oregon Convention Center.

Hotel	Distance to Oregon Convention Center	Distance to Light Rail	Light Rail Stop Name
Downtown – *Free Rail Zone*			
Hilton Portland & Executive Tower 921 SW 6th Avenue	1.6 Miles 32 minute walk	2 Blocks	**From Hotel:** Red or Blue Line – (15 min.) **Depart Hotel stop:** Pioneer Square South, at Yamhill between Broadway & 6th **Return stop:** Pioneer Square North, at Morrison between Broadway & 6th Green Line – (17 min.) **Depart stop:** Pioneer Courthouse/SW 6th Ave, at 6th between Yamhill & Morrison **Return stop:** Pioneer Place/SW 5th at 5th between Yamhill & Morrison

LIGHT RAIL SERVICE IS COMPLIMENTARY IN ***THE FREE RAIL ZONE!***
The trip from convention hotels to the OCC are in Free Rail Zone.

TriMet MAX: Trains run every 8-15 minutes during most of the day, every day. Operating hours (most days) are 4 a.m. to 12 a.m.

Times are subject to change. Please check for updates or plan your trip on: **www.trimet.org/max**. Trip Planner: **http://trimet.org/**

FROM HILTON TO CONVENTION CENTER:

Monday – Friday — Pioneer Courthouse Square to Convention Center (train heading east):
MAX Blue Line to Gresham – First train arrives Pioneer Courthouse Square 4:56 a.m.
MAX Green Line to Clackamas – First train arrives 6:05 a.m.
MAX Red Line to Airport – First train arrives 4:02 a.m.

Saturday — Pioneer Courthouse Square to Convention Center (train heading east):
MAX Blue Line to Gresham – First train arrives Pioneer Courthouse Square 5:39 a.m.
MAX Green Line to Clackamas – First train arrives 6:45 a.m.
MAX Red Line to Airport – First train arrives 4:03 a.m.

Sunday — Pioneer Courthouse Square to Convention Center (train heading east):
MAX Blue Line to Gresham – First train arrives Pioneer Courthouse Square 6:31 a.m.
MAX Green Line to Clackamas – First train arrives 7:20 a.m.
MAX Red Line to Airport – First train arrives 4:03 a.m.

FROM CONVENTION CENTER TO HILTON:

Monday – Friday — Convention Center to Pioneer Courthouse Square (train heading west)
MAX Blue Line to Portland City Center/Hillsboro – Last train departs 11:54 p.m.
MAX Green Line to Portland City Center/PSU – Last train departs 11:15 p.m.
MAX Red Line to Portland City Center/Beaverton – Last train departs 11:44 p.m.

Saturday — Convention Center to Pioneer Courthouse Square (train heading west)
MAX Blue Line to Portland City Center/Hillsboro – Last train departs 11:55 p.m.
MAX Green Line to Portland City Center/PSU – Last train departs 11:24 p.m.
MAX Red Line to Portland City Center/Beaverton – Last train departs 11:55 p.m.

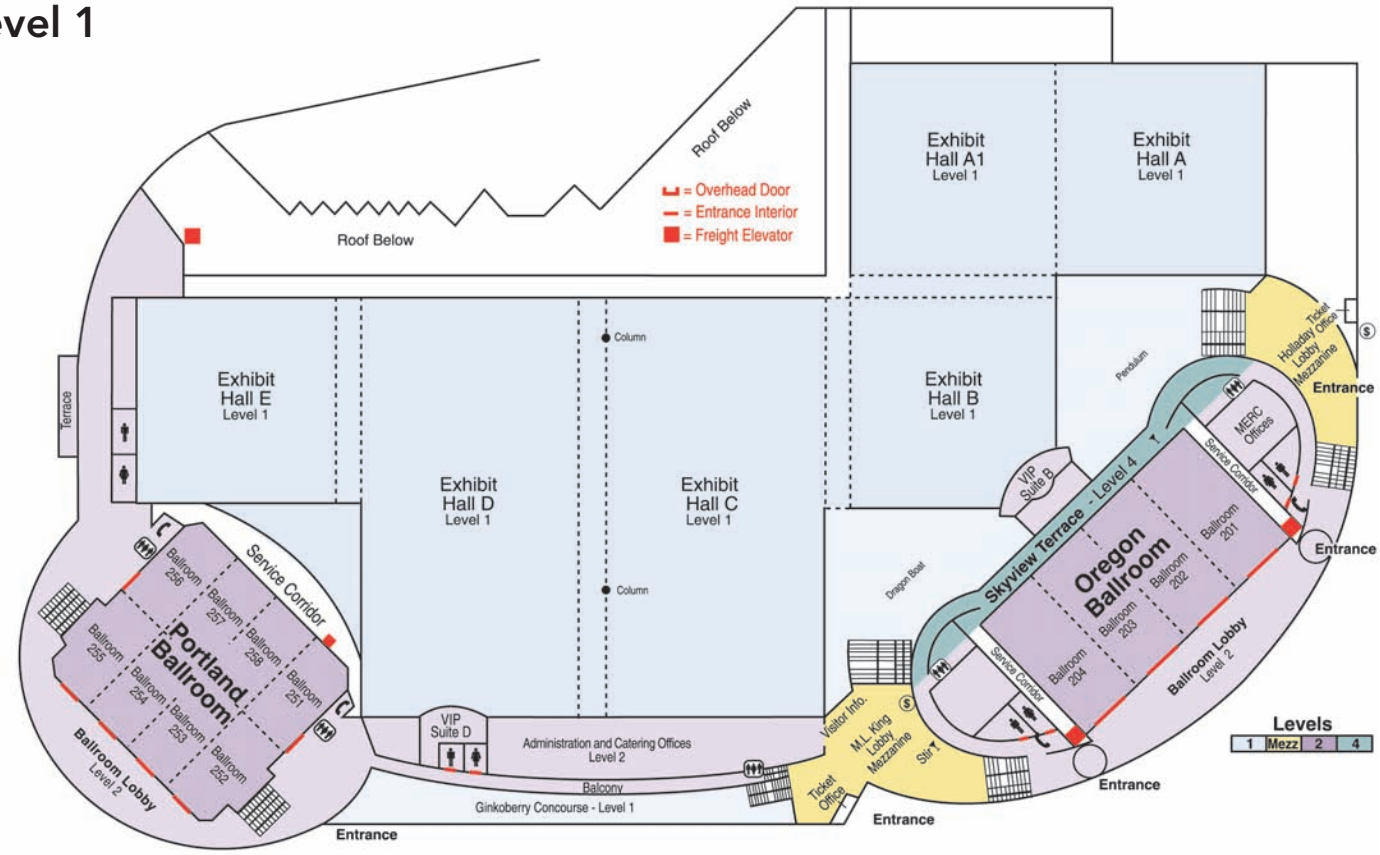
Sunday — Convention Center to Pioneer Courthouse Square (train heading west)
MAX Blue Line to Portland City Center/Hillsboro – Last train departs 11:55 p.m.
MAX Green Line to Portland City Center/PSU – Last train departs 11:24 p.m.
MAX Red Line to Portland City Center/Beaverton – Last train departs 11:55 p.m.

PDX AIRPORT SERVICE:

The trip to/from downtown Portland takes about 38 minutes and requires an "All-Zone" fare ($2.40 Adult, $1 Honored Citizen or $1.50 Youth/Student). The first train of the day arrives at PDX at 4:58 a.m. on weekdays and 5:04 a.m. on weekends. The last Red Line train departs PDX at 11:49 p.m. The MAX station and ticket machines are located near baggage claim on the lower level. (flypdx.com)

Oregon Convention Center

Level 1



Level 2

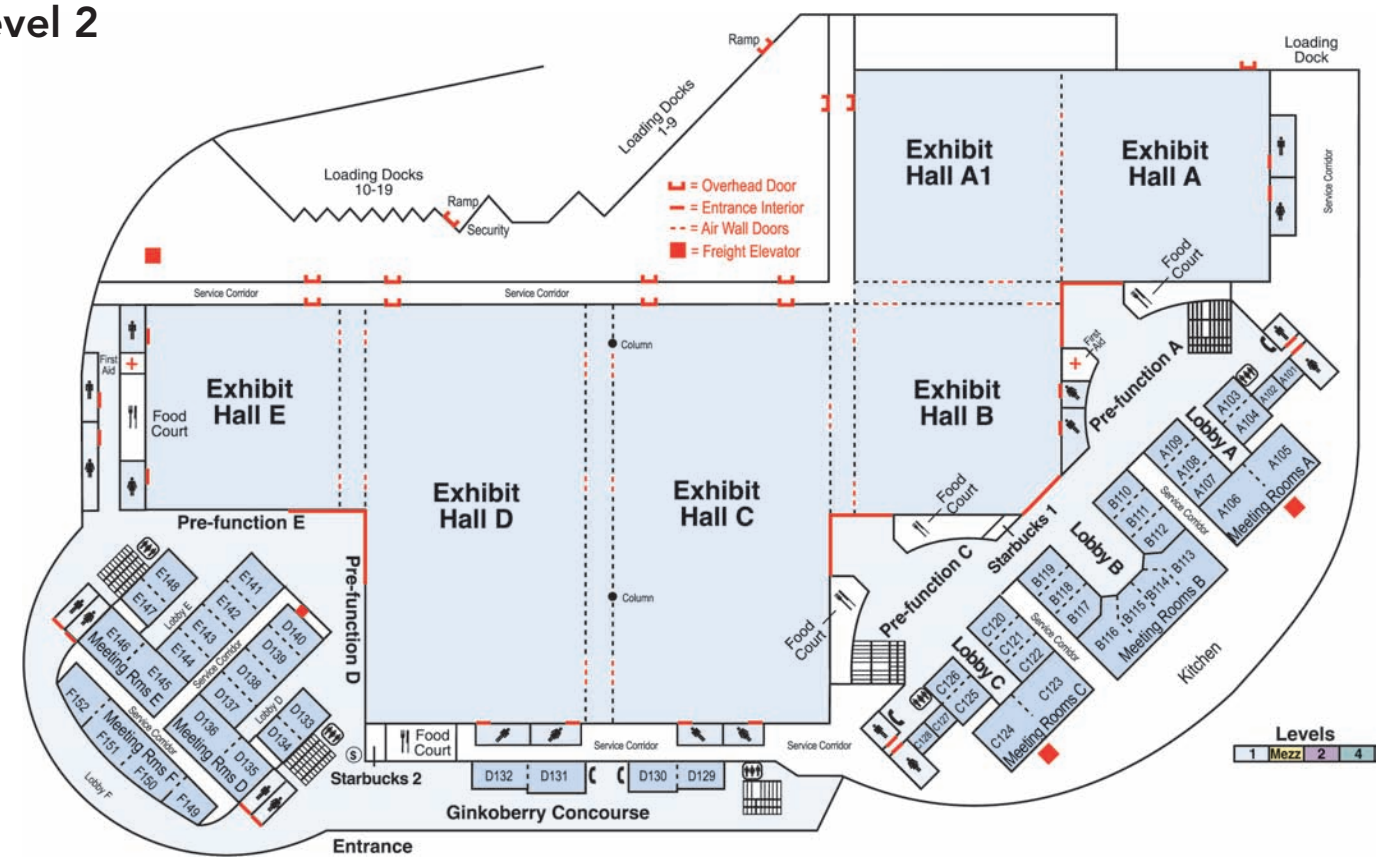
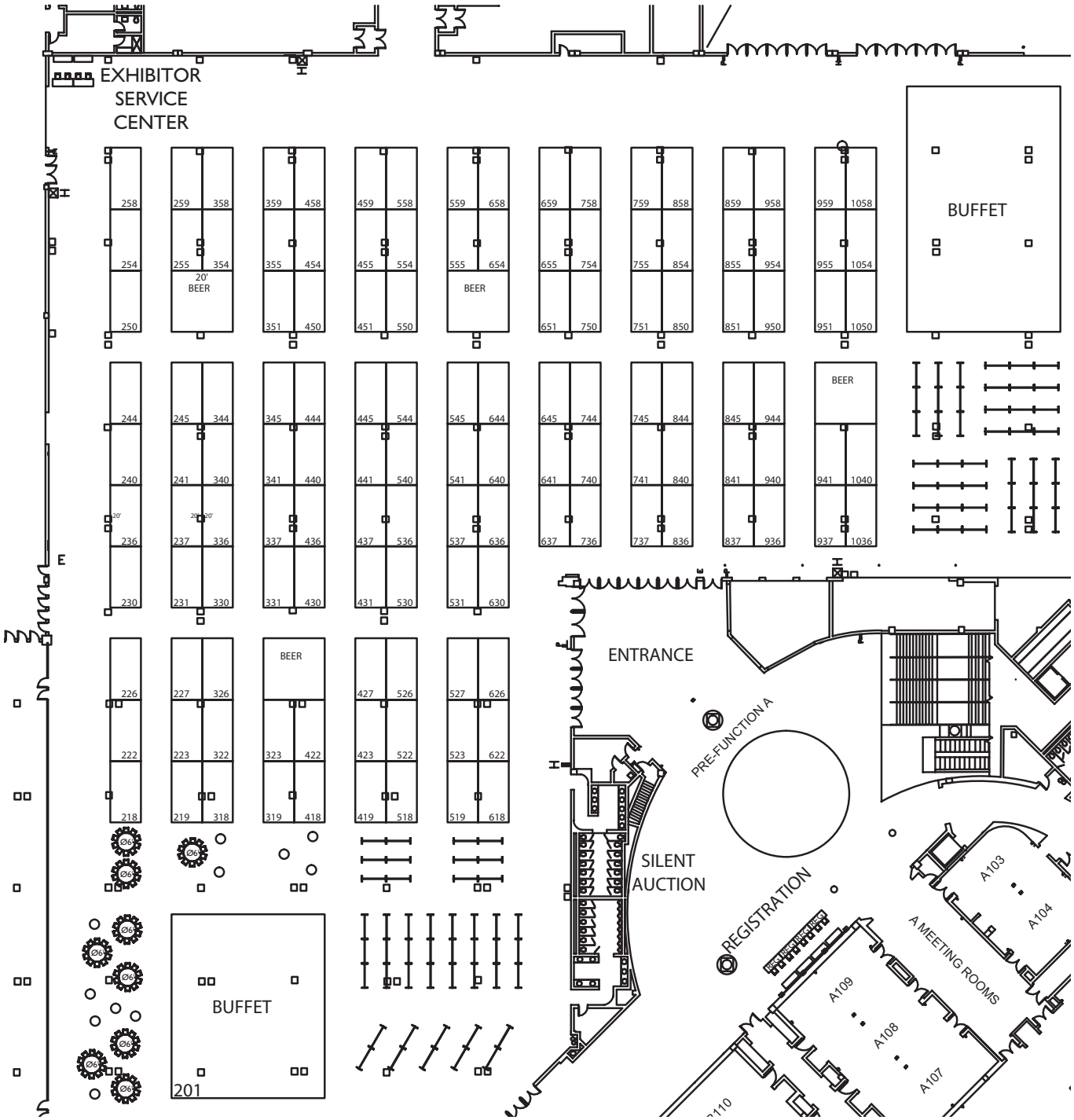


Exhibit Floor Map



WBC 2012 Exhibits

Representatives from more than 100 leading industry suppliers will be available in the WBC 2012 Exhibit Hall. Discover the latest advancements and have your questions answered as you meet with exhibitors during the dedicated exhibit hours.

Exhibit Hours

Exhibit Halls A, A1, B

Sunday, July 29	11:30 a.m. – 2:00 p.m.
Monday, July 30	11:30 a.m. – 2:00 p.m.
Tuesday, July 31	11:30 a.m. – 2:00 p.m.

419 **3M Purification Inc.,** 400 Research Parkway, Meriden, CT 06450; Tel: +1.203.237.5541 or 1.800.243.6894; Web: www.3Mpurification.com. 3M Purification Inc. (formerly CUNO) provides economical solutions for clarification, sterile filtration, DE trap filtration, water filtration, and air and gas filtration in breweries around the world.

430 **ABM Equipment Company,** 2330 NW Raleigh Street, Portland, OR 97210; Tel: +1.503.248.0079 or +1.503.248.0711; Fax: +1.503.248.0715; Web: www.abmequipment.com. ABM has the tools and experience to provide your needs for a single item, complete system, or full plant. We can help with the dry side—the beginning of the brewing process. ABM can provide weigh systems, grain-handling equipment, holding tanks, silos, product movement, blending, packaging systems, and CAD design.

319 **ACM GmbH,** Goldschlagstrasse 172, Vienna, 1140 Austria; Tel: +43 1 7865866; Fax: +43 1 7865866 20; Web: www.acm.co.at. ACM, Vienna, Austria—with more than 25 years successful on world markets!—is focused on supplying the brewing and beverage industries with process instrumentation, parameters OG/Plato, alcohol, CO_2, Brix, and %diet. ACM recently developed the world's first nondestructive laboratory CO_2 meter for beverages bottled in PET and glass.

744 **Albert Handtmann Armaturenfabrik GmbH,** Arthur-Handtmann-Strasse 11, Biberach, 88400 Germany; Tel: +49 (0) 7351 342 0; Fax: +49 (0) 7351 342 4480; Web: www.handtmann.de. From brewhouse to bottling, Handtmann Armaturenfabrik has been a leading supplier of valves, fittings, and complete process equipment for the brewing industry since 1873. Tailor-made product pipework, tank equipment, CIP plants, filtration, and stabilization are our key competencies. It is our passion for your project, from planning to completion.

654 **American Society of Brewing Chemists,** 3340 Pilot Knob Road, St. Paul, MN 55121; Tel: +1.651.454.7250; Fax: +1.651.454.0766; Web: www.asbcnet.org.

540 **American Tartaric Products Inc.,** 1865 Palmer Avenue, Larchmont, NY 10538; Tel: +1.914.834.1881 or +1.815.357.1778; Fax: +1.815.357.6221; Web: www.americantartaric.com. ATP is proud to present a range of products to the brewing industry. Our product range includes brewing process aids, antifoams, centrifuges, cleaning chemicals, clarifiers, DE, filtration aids, stabilizers, filter sheets, cartridges, filtration equipment, keg lines, pasteurizers, packaging equipment, and analytical equipment. ATP represents well-respected and established companies such as Alfatek, Begerow, Birko, EP Minerals, Ashland/ISP, Dextens, Lambrechts, Padovan, Seital, and others.

445 **Andritz Separation Inc.,** 1010 Commercial Boulevard South, Arlington, TX 76001; Tel: +1.817.465.5611; Fax: +1.817.468.3961; Web: www.andritz.com/no-index/pf-detail?productid=12615. Andritz solutions enable efficient operations and high purity of output. Our customers' process requirements and specific product characteristics drive the selection process. We offer a wide range of solid/liquid separation equipment to ensure the optimum choice for your needs—centrifuges, separators, presses, filters, screens, cyclones, and drying/cooling systems.

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523 **Applikon Biotechnology, Inc.,** 1180 Chess Drive, Foster City, CA 94404; Tel: +1.650.578.1396; Web: www.applikonbio.com. Applikon develops and manufactures bioreactor systems for development of new fermentation processes. Systems range from 7 mL to 5,000+ L capacities. For brewing applications, Applikon provides the Alcohol Fermentation Monitor, a small-scale fermentor system that independently monitors off-gas kinetics from up to 6 × 500 mL fermentations operated between 4°C (40°F) and 85°C (185°F); no water baths are necessary!

436 **ARIX Co.,** Anny Letenské 1120/17, Praha 2, 120 00, Czech Republic; Tel: +420 415 212 920; Fax: +420 415 212 920; Web: www.arixhop.cz. ARIX Co. is an important Czech firm supplying the hop and hop-related products market. The company's main sphere of business is the production and sale of the renowned Czech variety Zatecky polorany cervenak (Saaz). Owing to its tradition, quality, and uniqueness, this variety is used by the world's leading breweries.

544 **Ashland Specialty Ingredients,** 1361 Alps Road, Wayne, NJ 07470; Tel: +1.973.628.4000; Web: www.ashland.com. Ashland is the leading supplier of PVPP stabilizers for beer. Polyclar PVPP colloidal stabilizers are used by the world's leading breweries to extend the

shelf life of beer and, thus, improve the quality of beer. In addition, the company provides specialist support service in the field of beverage stabilization.

322 **BMT USA LLC,** 14532 169th Drive SE, Suite 142, Monroe, WA 98290; Tel: +1.360.863.2252; Fax: +1.360.863.2366; Web: www.bmtus.com. BMT USA manufactures equipment utilized in the food and beverage, lab research, and pharmaceutical industries. Our clean steam generators are used in SIP/CIP applications, and our steam sterilizers are used in production and lab settings, while our incubators and drying ovens are used for product testing.

326 **BrauKon GmbH,** Muhlweg 2, Truchtlaching, 83376 Germany; Tel: +1.720.393.9824; Web: www.braukon.com. BrauKon is building turnkey plants for the brewing and beverage industries. We pride ourselves in building high-quality units at an attractive price for our customers. Our common goal is the absolute satisfaction of our customers. We put a high priority on the technology and design behind our systems.

1036 **Brewers Supply Group,** 800 West First Avenue, Shakopee, MN 55379; Tel: 1.800.374.2739; Fax: +1.952.224.1390; Web: www.brewerssupplygroup.com. Brewers Supply Group is the brewing industry's foremost source for the finest domestic and imported malt, hops, stabilizers, and other brewing ingredients. With a network of six company-staffed distribution warehouses, brewers nationwide have come to depend on BSG for quick and reliable delivery of all their brewing ingredient needs.

951 **Brewery Convention of Japan,** 8-18, Kyobashi 2-chome, Chuo-Ku, Tokyo 104-0031, Japan; Tel. +81-3-3561-8386; Fax: +81-3-3561-8380; Web: www.brewers.or.jp

641 **Briggs of Burton Inc.,** 400 Airpark Drive, Suite 40, Rochester, NY 14624; Tel: +1.585.426.2460; Fax: +1.585.426.0250; Web: www.briggsplc.co.uk. Briggs is based in Burton-on-Trent, U.K., and Rochester, NY, U.S.A., and is one of the most experienced brewing process engineering companies anywhere. We think energy, water, and raw material efficiency are key concerns for today's world-class brewer—but come tell us what concerns you about tomorrow—we're listening.

640 **Bruker BioSpin Corporation, EPR Division,** 44 Manning Road, Billerica, MA 01821; Tel: +1.978.663.7406; Fax: +1.978.670.8851; Web: www.bruker-biospin.com. Bruker BioSpin Corporation is the worldwide leader in EPR instrumentation. Bruker's e-scan is a bench-top EPR spectrometer tailored to provide rapid, automated analysis for optimizing your beer's shelf life.

454 **Bühler Inc.,** P.O. Box 9497, Minneapolis, MN 55440; Tel: +1.763.847.9900; Web: www.buhlergroup.com. Bühler specializes in every stage of the grist production process, from malt and grain intake, grain storage, transport, cleaning, and classification, through to preparation of grain by peeling and color sorting, right up to individual grinding of malt and unmalted grain.

626 **Burkert Fluid Control Systems,** 2915 Whitehall Park Drive, Suite 650, Charlotte, NC 28273; Tel: +1.704.504.4440 or 1.800.325.1405; Fax: +1.949.223.3198; Web: www.burkert-usa.com. Burkert Fluid Control Systems is a global system solution provider in the fluid-handling industry with a wide range of knowledge in the food and beverage processing industries for the purpose of offering improved automation, product yield, CIP, and steam handling.

345 **Butterworth Inc.,** 16737 West Hardy Road, Houston, TX 77060; Tel: +1.281.821.7300 ext. 118; Fax: +1.281.821.5550; Web: www.butterworth.com. For more than 85 years, Butterworth has engineered and manufactured automated tank-cleaning devices for all types of tanks and process vessels in a variety of industries with one goal in mind—remove workers from the inside of the tank. Today, we sell, rent, and lease machines and complete systems for any application in vessels from 5 gal up to 10,000,000 gal. Please visit www.butterworth.com.

736 & 740 **Cargill,** 15407 McGinty Road West, Wayzata, MN 55391; Tel: +1.937.237.1236 (sweeteners) or +1.952.742.1527 (malt); Fax: +1.937.237.2529 (sweeteners) or +1.952.742.5050 (malt); Web: www.cargill.com. Cargill is a global supplier of quality brewing ingredients (domestic, imported, and unique malts, liquid adjuncts, etc.) and other support services (cost and risk management offerings) for brewers large and small, global or local. Let Cargill work with you to develop customized solutions to help your unique business profits grow.

759 **Centec LLC,** P.O. Box 820, Germantown, WI 53022; Tel: +1.262.251.8209; Fax: +1.262.251.8376; Web: www.centec-usa.com. Centec is a manufacturer of in-line analytical sensors, processing systems for water/product deaeration, blending, carbonating, nitrogenating, flash pasteurization, and other liquid processing systems.

836 **Charm Sciences Inc.,** 659 Andover Street, Lawrence, MA 01843-1032; Tel: +1.978.687.9200; Web: www.charm.com. Charm's ROSA mycotoxin tests are the leading diagnostic lateral-flow tests, delivering fast, accurate, and quantitative detection in convenient, single-use strips. Charm's grain test portfolio covers "A to Z" in mycotoxins, ranging from aflatoxin to zearalenone, and includes USDA GIPSA-approved tests. Charm tests are synonymous with excellence.

518 **ChemTreat, Inc.,** 5640 Cox Road, Glen Allen, VA 23060; Tel: 1.800.443.8292; Fax: 1.800.648.4577; Web: www.chemtreat.com. ChemTreat, a division of Danaher, is one of the nation's largest and fastest-growing companies in the water treatment industry, as well as a leader in quality and customer satisfaction. Customers benefit from ChemTreat programs through improved operating efficiencies, controlled maintenance costs, and reduced energy and water consumption.

745 **Cloud-Sellers,** 4120 Horizon Lane, San Luis Obispo, CA 93401; Tel: +1.805.549.8093 or +1.805.602.2356; Fax: +1.805.549.0131; Web: www.cloudinc.com and www.sellersclean.com. Cloud-Sellers manufactures a complete line of superior quality and high-performance rotary impingement tank-cleaning machines to effectively clean all storage and process vessels. Some well-known models used worldwide are the Model 360, Tankman, Jumbo, Orbi, and Troll Balls. Visit our website, www.cloudinc.com, for full product data and videos!

750 **Comptoir Agricole,** 35 Route de Strasbourg, Hochfelden, 67270 France; Tel: +33 388 890 909 or +33 388 890 945; Fax: +33 388 890 922; Web: www.comptoiragricole.com. Comptoir Agricole provides noble aroma hops grown in Alsace, France. Authentic terroir, ideal climate conditions, more than 200 years of hop growing, and skilled growers make Strisselspalt, Aramis, and the new Triskel from the finest hops in the world. Seven certified organic hop varieties will complete the range in 2012.

355 **DCI Inc.,** 600 North 54th Avenue, Saint Cloud, MN 56303; Tel: +1.320.252.8200; Fax: +1.320.252.0866; Web: www.dciinc.com. DCI, Inc. has been a leader in design and fabrication of stainless-steel storage, processing vessels, and agitation since 1955. We offer a full range of brewing equipment, including fermentors, bright beer tanks, hot/cold liquor tanks, mash and lauter tuns, brew kettles, and whirlpools.

255 **Desert King International,** 7024 Manya Circle, San Diego, CA 92154; Tel: +1.619.429.5222 or 1.800.982.2235; Fax: +1.619.429.5001; Web: www.desertking.com. Desert King is the world's largest producer of Yucca and Quillaja extracts with facilities in Mexico (Yucca) and Chile (Quillaja). Our production sites are certified by most major soft drink beverage companies, and we're now pleased to offer these natural functional ingredients in beer formulations. Please call for more information.

954 **Diversey Inc.,** 8310 16th Street, P.O. Box 902, Sturtevant, WI 53177; Tel: +1.262.631.4001; Web: www.diversey.com. Right from the beginning of the brewing process, Sealed Air's Diversey brand is involved with cleaning technology and expertise that meet and exceed your hygiene standards for all production applications. This results in a better-looking and better-tasting product, while reducing water, energy, and other utility usage and environmental impact.

844 **Donaldson Co.,** P.O. Box 1299, Minneapolis, MN 55440-1299; Tel: 1.800.543.3634 or 1.800.365.1331; Fax: +1.952.885.4791; Web: www.donaldson.com. Donaldson is a leading worldwide provider of compressed-air purification equipment and process filtration. We provide filtration for sterile air, liquids, and steam used in food and beverage processing and packaging. We are committed to advancing filtration technology and providing quality products and prompt customer service. Think purity. Think Donaldson.

758 **The Dow Chemical Company,** 100 Larkin Center, 1650 N. Swede Road, Midland, MI 48674; Tel: 1.800.447.4369. For more than 50 years, The Dow Chemical Company has been a leader in the development of specialty inhibited glycol-based heat transfer fluids. DOWFROST inhibited propylene glycol-based fluids offer advantages for fermentation cooling applications such as low oral toxicity, non-flammable, non-corrosive, biodegradable, and effective freeze protection and heat transfer over wide temperature ranges.

622 **DSM Food Specialties,** 3502 North Olive Road, South Bend, IN 46628; Tel: +1.574.232.5000; Fax: +1.574.232.2468; Web: www.dsm.com. DSM, your partner for brewing success! Our world-leading portfolio of enzymes for the beer industry enables brewers to desensitize gluten proteins; improve yield and processing times; enhance fermentability; extend beer stability; reduce emissions, water consumption, and waste; and cut operational costs and energy use.

427 **DuPont Industrial Biosciences,** Four New Century Parkway, New Century, KS 66031; Tel: 1.800.255.6837; Web: www2.dupont.com. DuPont Industrial Biosciences (legacy Danisco) helps brewing companies sharpen their competitive edge. Our enzymes enable our customers to keep costs down and yet maintain product quality and profitability. We have developed a specialized range of enzymes that maximizes brewing efficiency and creates stable, high-quality beer with great mouthfeel.

636 **Ecolab Inc.,** 370 Wabasha Street North, St. Paul, MN 55102; Tel: +1.651.293.2233; Web: www.ecolab.com. As the leading global provider of integrated sanitation and total plant water-management products, systems, and services to the brewing industries, Ecolab helps implement and maintain practical solutions to help customers produce safer, high-quality products, continuously improve operational efficiency, and enhance environmental stewardship through best-in-class sustainability programs.

230 **EMG International,** P.O. Box 1600, Media, PA 19063; Tel: +1.484.840.0800 or +1.484.574.7668; Fax: +1.484.840.1996; Web: www.emgint.com. Environmental Management Group International, Inc. (EMG) has developed an anaerobic fluidized bed digester (AFBD) process. The AFBD process is ideally suited for brewery wastewater treatment and energy generation. EMG has the expertise to facilitate the application of AFBD technology by providing turnkey services, including design, fabrication, installation, startup, and operation.

223 **Endress+Hauser Inc.,** 2350 Endress Place, Greenwood, IN 46143; Tel: +1.317.535.7138; Web: www.endress.com. Instrumentation and automation solutions for brewing optimization. We provide services for energy monitoring, wastewater treatment, and measurements in the brewing process. Market leader in flow, Plato, pH, level, pressure, and temperature measurement and a wide range of other measurement solutions.

541 **Enzyme Development Corp.,** 505 8th Avenue, 15th Floor, New York, NY 10018; Tel: +1.212.736.1580 ext. 247; Web: www.enzymedevelopment.com. EDC provides a broad range of enzymes and the experience and knowledge to enhance your operation.

741 **Esau & Hueber GmbH,** Kapellenweg 10, Schrobenhausen, D86529 Germany; Tel: +49 8252 8985 0 or +49 8252 8985 33; Fax: +49 8252 8985 88; Web: www.esau-hueber.de. Esau & Hueber supplies a range of special systems and services to the brewing industry. Turbo air jets are a best practice installation for wort aeration. FLEXIPROP yeast management systems combine the benefits of yeast propagation and revitalization in one plant. EH is represented in the United States by Gusmer Enterprises.

236 **European Brewery Convention,** Rue Caroly 23-25, B – 1050 Brussels, Belgium; Tel: +32 2 551 1810; Fax: +32 2 660 9402; www.europeanbreweryconvention.org.

451 **EUWA Water Treatment Plants,** Daimlerstrasse 2 – 10, Gaertringen, 71116 Germany; Tel: +49 7034 2750; Fax: +49 7034 27590; Web: www.euwa.com. EUWA is the leading specialist in the field of water treatment for the brewing and beverage industries and looks back on many years of experience. Our range of delivered products includes all classical membrane treatment methods, with a special is on water management, water recycling, and wastewater technologies.

231 **EV Container Corporation,** 50 California Street, Suite 1500, San Francisco, CA 94111; Tel: +1.415.460.5341; Web: www.evcontainer.com. EV Container Corporation is the San Francisco-based manufacturer of the innovative, returnable EV keg system, which uses a replaceable liner with every fill, reducing operational costs and saving breweries thousands of gallons of water for keg cleaning. Local manufacturing allows low quantity ordering and low purchase order lead times.

244 **FleetwoodGoldCoWyard,** 1305 Lakeview Drive, Romeoville, IL 60446; Tel: +1.630.759.6800; Fax: +1.630.759.2299; Web: www.FGWA.com. Fleetwood process systems utilizes specialized process solutions inspired by leading industrial technologies to create innovative and customized approaches for brewery and beverage process applications. Part of Barry-Wehmiller, FPS has a long history in beer pasteurization technologies, conveyors, and packaging equipment and now offers a wide range of process equipment and services.

1054 **Flottweg Separation Tech Inc.,** 10700 Toebben Drive, Independence, KY 41051; Tel: +1.859.448.2300; Fax: +1.859.448.2333; Web: www.flottweg.com. Flottweg is a Bavarian company, based in Vilsbiburg, Germany, that specializes in separation equipment. Flottweg manufactures high-quality centrifugal separators for beer clarification, sedicanters for beer recovery from spent yeast, decanter centrifuges for hot wort recovery and waste stream applications, and belt presses for spent grain dewatering.

658 **Franke Beverage Systems,** 166 Jefferson Pike, LaVergne, TN 37086; Tel: +1.615.462.4329 or +1.615.751.7834; Web: www.bc.franke.com. Benefit from the market leader in stainless-steel beverage containers. Franke maintains an inventory of all standard U.S. keg sizes. They are quickly embossed with your brand and ready for duty right away.

341 **G-M-I, Inc.,** 4822 East 355th Street, Willoughby, OH 44094, Tel: +1.440.953.8811; Fax: +1.440.953.9631; Web: www.gmigaskets.com. GMI manufactures quality gaskets and gasket materials for the beverage, bottling, brewery, dairy, distillery, food, healthcare, pharmaceutical, winery, and other industries. All materials are independently tested and certified compliant with FDA/USDA/3-A/USP Class VI regulations/standards, and all are AH/TSE free (animal- and human-derived ingredient free). GMI offers quality products produced by quality people.

936 **GEA Brewery Systems,** 1600 O'Keefe Road, Hudson, WI 54016; Tel: +1.715.386.9371; Fax: +1.715.386.9376; Web: www.niroinc.com. GEA Brewery Systems provides brewery solutions that are customized to your specific requirements. We supply process units, complete brewhouses and cellars, process automation and utilities, training, and consulting, as well as complete turnkey plants. The technology of GEA Brewery Systems has always been the basis for the production of great beers.

944 **GEA Tuchenhagen,** 90 Evergreen Drive, Portland, ME 04103; Tel: +1.207.797.9500; Web: www.tuchenhagen.us. GEA Tuchenhagen is a global leader in manufacturing a wide range of sanitary flow components, including a comprehensive range of mix-proof, single-seat, modulating, butterfly, pressure relief, and sample valves; valve control technology; in-line instrumentation; cleaning devices; vessel protection and cleaning systems; and the innovative and cost-effective ECO-MATRIX piping system.

940 **GEA Westfalia Separator,** 100 Fairway, Northvale, NJ 07647; Tel: +1.201.767.3900; Web: www.wsus.com. GEA Westfalia Separator is a leading manufacturer and distributor of high-quality separators and decanters. The company also offers PROFI, a DE-free technology that combines centrifugal separation with membrane filtration for use in beer production. We offer East and West Coast locations for equipment service and repair.

219 **GF Piping Systems,** 2882 Dow Avenue, Tustin, CA 92780; Tel: +1.714.731.8800; Web: www.gfpiping.com. For cooling applications from GF Piping Systems: COOL-FIT ABS and PE100 piping systems. Corrosion resistant, high-impact resistant (even at very low temperatures), and available preinsulated. COOL-FIT ABS Plus is a complete preinsulated piping system, UV resistant, vapor tight, and 100% water tight. All systems feature ease of installation and are lightweight.

550 **GKD-USA Inc.,** 825 Chesapeake Drive, Cambridge, MD 21613; Tel: +1.410.221.0542 or 1.800.453.8616; Fax: +1.410.221.0544; Web: www.gkdusa.com. GKD will feature the fabricated NeverLeak filter leaf designed to outlast and outperform all other filter screens. All NeverLeaks are rescreenable multiple times to "like new" condition. These screens provide longer runs; low maintenance; quick, even cake development; and a clean release. GKD turns concepts into filtration realities.

254 **Golden Industrial Refrigeration,** 203 James Street, Wales, WI 53183; Tel: +1.262.982.6006; Fax: +1.262.982.6009; Web: Girwhq.com. Golden Industrial Refrigeration is a national engineering firm that provides consultation engineering and construction solutions nationally. GIR can be trusted with procurement of parts and equipment for industrial refrigeration plants. President of GIR, Phil Golden, and his team provide clients with the experience and professionalism that clients expect.

737 **Gusmer Enterprises, Inc.,** 1165 Globe Avenue, Mountainside, NJ 07092; Tel: +1.908.301.1811 or +1.715.281.6973; Fax: +1.908.301.1812; Web: www.esau-hueber.de. For more than 85 years, Gusmer has worked with brewers to develop extensive R&D and application support labs, offer the most advanced products, and provide a ready resource for problem solving. Go to Gusmer for premium equipment, instrumentation, filtration, yeast nutrients, finings, PVPP, silica, enzymes, oak, lab supplies, analytical services, and more.

545 **Hach Company,** 5600 Lindbergh Drive, Loveland, CO 80538; Tel: +1.970.663.1377 or +1.970.663.1377; Web: www.Hach.com/FlavorFootprint. Monitor and ensure superior quality products and manage your brewing water quality and wastewater with the complete analytical solution from Hach Orbisphere. Our accurate, industry-standard products provide consistent and reliable results for your lab and production areas while helping you control costs and increase production uptime.

950 **Hamilton Co.,** 4970 Energy Way, Reno, NV 89502; Tel: 1.800.648.5950; Fax: +1.775.856.7259; Web: www.hamiltoncompany.com/Sensors. Hamilton Company manufactures application-oriented pH, ORP, dissolved oxygen, and conductivity sensors distinguished by their high quality, long life, and competitive price. Our intelligent VisiFerm optical dissolved-oxygen probe offers technology that sets new standards in DO measurement. Stop by our booth to discover more innovations from Hamilton.

754 **Hansen-Rice Inc.,** 1717 East Chisholm Drive, Nampa, ID 83687; Tel: +1.208.465.0200; Fax: +1.208.465.0272; Web: www.hansen-rice.com. Hansen-Rice, Inc. is a national construction firm with 30 years of expertise as a design-build general contractor. Our capabilities include site design and master planning, in-house architectural design and engineering, refrigeration, structural steel buildings, roof sheeting, and insulated metal panels.

344 **Hop Research Council,** P.O. Box 298, Hubbard, OR 97032; Tel: +1.503.982.7600; Web: www.hopresearchcouncil.org. The Hop Research Council is a nonprofit organization that funds hop research to benefit the U.S. hop industry. Members include domestic and international brewers, hop merchants, and hop growers. Hop Growers of America is a nonprofit association representing the U.S. hop industry in the areas of marketing, statistics, promotion, and education.

318 **IMERYS Filtration Minerals,** 1732 North First Street, Suite 450, San Jose, CA 95112; Tel: +1.805.562.0200 or +1.805.562.0210; Web: www.celitecynergy.com. IMERYS presents Celite Cynergy, an innovation in beer stabilization and clarification. Learn about this revolutionary brewing tool that enables the brewer to improve bright beer clarity and chill haze, while simultaneously increasing filtration capacity by up to 50%, reducing costs, and helping the environment.

845 **Institute of Brewing & Distilling,** 33 Clarges Street, London, W1J 7EE, United Kingdom; Tel: +44 20 7499 8144; Fax: +44 20 7499 1156; Web: www.ibd.org.uk. A member organization and educational charity that provides globally recognized professional qualifications and certification. It also publishes *The Journal of the Institute of Brewing* and *The Brewer & Distiller International*.

337 **JVNW Inc.,** 390 South Redwood Street, Canby, OR 97013; Tel: +1.503.263.2858; Fax: +1.503.263.2868; Web: jvnw.com. JVNW, Inc. is an original partner in the pioneering efforts to revive craft brewing in the United States. Established in 1981 to supply tanks and equipment to all beverage producers, JVNW manufactured the first brewing equipment for early craft breweries in Oregon, Washington, and California. We have operating brewing systems worldwide.

937 **Kagetec Industrial Flooring,** 24631 St. Benedict Road, Jordan, MN 55352; Tel: +1.612.435.7640; Fax: +1.612.435.7641; Web: www.kagetecusa.com. Kagetec provides chemical-resistant, hygienic, industrial flooring systems consisting of slip-resistant ceramic tile and integrated stainless-steel drains. We have more than 25 years of experience in the food and beverage industries. Let Kagetec help you with one of the most critical areas of your facility.

431 **Kalsec Inc.,** P.O. Box 50511, Kalamazoo, MI 49005; Tel: 1.800.323.9320 or +1.269.349.9711; Web: www.kalsec.com. Kalsec specializes in providing the brewing industry with advanced hop extracts for bitterness addition, light stability, foam enhancement, and improved economics. Our HopRival natural hop extracts deliver outstanding hop flavor and aroma, rivaling traditional hopping. Kalsec's hop-derived products are also ideal for nonalcoholic malt beverages and many nonbrewing applications.

759 **Keofitt,** P.O. Box 820, Germantown, WI 53022; Tel: +1.262.251.8209; Fax: +1.262.251.8376; Web: www.keofitt.dk. Keofitt is a world-leading company supplying sterile liquid sampling valves and accessories, including disposable aseptic sampling bags, containers, and other sampling-related products.

854 **KHS Inc.,** 880 Bahcall Court, Waukesha, WI 53186; Tel: +1.262.797.7200; Web: www.khs.com. KHS is an international manufacturer of filling and packaging systems for the beverage, food, and nonfood industries. KHS equipment includes fillers, kegging equipment, rinsers, cappers, labelers, process systems, pasteurizers, inspection equipment, conveyors, secondary packaging equipment such as tray/case packers and multipackers, palletizers, pouchers, cartoners, and PET packaging and coating.

755 **Kieselmann,** P.O. Box 820, Germantown, WI 53022; Tel: +1.262.251.8209; Fax: +1.262.251.8376; Web: www.kieselmann.com. Kieselmann supplies sanitary butterfly valves, mix-proof valves, single-seat valves, pressurized tank-top units, sanitary tubing, and related components to fabricate a brewery from the ground up.

522 **Kosme,** 9600 South 58th Street, P.O. Box 321801, Franklin, WI 53132; Tel: +1.414.409.4000; Web: www.kronesusa.com. Kosme, a subsidiary of Krones, manufacturers a full range of bottling and packaging equipment designed for the beer and beverage industries. The company serves the North American market from its Franklin, WI, facility. Kosme offers a complete product portfolio, including filling, labeling, packing, and palletizing, as well as conveyors.

526 **Krones Inc.,** 9600 South 58th Street, P.O. Box 321801, Franklin, WI 53132-6241; Tel: +1.414.409.4000; Fax: +1.414.409.4100; Web: www.kronesusa.com. Krones brewhouse process technology covers all aspects of brewing from malt intake to filtered beer, including brewhouse and filter plants, fermentation, and storage cellars. Krones also provides integrated packaging lines, IT, and warehouse management solutions. Kosme, a subsidiary of Krones, specializes in packaging equipment for small to mid-sized breweries.

941 **Lallemand Brewing,** 6120 West Douglas Avenue, Milwaukee, WI 53218; Tel: +1.702.481.8735; Web: www.lallemandbrewing.com.

555 **Loeffler Chemical Corporation,** 200 Great Southwest Parkway, Atlanta, GA 30336; Tel: +1.404.629.0999; Fax: +1.404.629.0690; Web: www.loefflerchemical.com. The Loeffler Chemical Corporation offers a full range of cleaning products, sanitizers, line lubricants, and specialty products for any size brewery. We also offer a wide range of customized automation solutions, ranging from simple allocation systems to fully automated dosing and monitoring systems, as well as fully automated cleaning and calibration systems.

218 **Logix,** 10518 Northeast 68th Street, Suite 103, Kirkland, WA 98033; Tel: +1.425.828.4149 or +1.425.736.6355; Fax: +1.425.828.9682; Web: www.logix-controls.com. Logix manufactures refrigeration energy management control systems for breweries that provide flexible fermentation tools, while lowering energy use and improving product quality. Our award-winning energy-saving control systems deliver plant-wide equipment control, data logging/reporting, and remote monitoring and alarm notification. Logix system owners enjoy a superior competitive position over their peers.

659 **M² Professional Solutions,** 1486 Via DiSalerno, Pleasanton, CA 94566; Tel: +1.559.250.5427; Web: www.m2prosol.com. M² Professional Solutions offers unique support for the food, beverage and consumer goods industries. Our unique innovation process guides product development to deliver perceivable product benefits that satisfy unmet consumer needs. Our team's combined experience utilizes development, manufacturing, and commercialization strategies that minimize costs while delivering successful marketplace products.

418 & 422 **Malteurop North America Inc.,** 3830 West Grant Street, Milwaukee, WI 53226; Tel: +1.414.671.1166. Producer of barley and wheat malt from our malt houses in North America.

455 **Master Brewers Association of the Americas,** 3340 Pilot Knob Road, St. Paul, MN 55121; Tel: +1.651.454.7250; Fax: +1.651.454.0766; Web: www.mbaa.com.

245 **McNichols Co.,** 2502 North Rocky Point Drive, Suite 750, Tampa, FL 33607; Tel: 1.866.754.5144; Web: www.mcnichols.com. McNichols provides a large selection of decorative and structural perforated and expanded metals, wire mesh, grating, and walkways in both metal and fiberglass, landscape plant screens and walls, and safety walkway matting. We have 17 stocking locations coast to coast and offer custom fabrication to meet your specific requirements.

354 **Mettler Toledo Ingold,** 36 Middlesex Turnpike, Bedford, MA 01730; Tel: +1.781.301.8800; Fax: +1.781.301.8701; Web: MT.com. Mettler-Toledo Ingold is the leading producer of in-line process analytics worldwide. We offer solutions in pH, dissolved oxygen, gaseous oxygen, conductivity, and turbidity measurements.

755 **Meura,** P.O. Box 820, Germantown, WI 53022; Tel: +1.262.251.8209; Fax: +1.262.251.8376; Web: www.meura.com. Meura designs and builds mash filters, complete brewhouses, yeast management systems, and technology-driven components to improve customers' existing brewing systems.

340 **Microbiologics Inc.,** 217 Osseo Avenue North, St. Cloud, MN 56303; Tel: +1.320.253.1640 or +1.320.253.1640; Web: www.microbiologics.com. Microbiologics offers the widest variety of ready-to-use positive and negative control cultures in many convenient formats. From QC of microbial identification systems, daily process controls, QC of enumeration methods, QC of culture media, and water testing—we've got you covered! Need help with environment isolate testing? Ask us about Microbiologics custom solutions!

527 **Micro-Matic USA Inc.,** 19791 Bahama Street, Northridge, CA 91324; Tel: +1.817.403.1502. We all know that bacterial contamination is the enemy of good beer. In many cases, minimum cleaning requirements are not met for draft beer lines. Come and see Flexi-Draught by Micro-Matic to see how to eliminate line cleaning.

250 **NETZSCH Pumps North America, LLC,** 119 Pickering Way, Exton, PA 19341; Tel: +1.610.363.8010. For more than five decades, NETZSCH has served markets worldwide with progressive cavity pumps, rotary lobe pumps, and accessories, providing customized, sophisticated solutions for a variety of applications. As the world's market leader in progressive cavity pumps, our innovative, premium-quality products are known and valued all over the world.

323 **Newlands Systems,** 602-30731 Simpson Road, Abbotsford, BC V2T6Y7, Canada; Tel: 1.877.855.4890. Manufacturer of the finest brewing systems and equipment. Offering a complete range of services, including design, engineering, fabrication, installation, and commissioning anywhere in the world.

444 **Nexcelom Bioscience,** 360 Merrimack Street, Building 9, 2nd Floor, Lawrence, MA 01843; Tel: +1.978.327.5340 or +1.978.327.5340; Fax: +1.978.327.5341; Web: www.nexcelom.com. Nexcelom, a leading manufacturer of automated cell counting and analytical instruments, serves the brewing, biofuels, and biomedical industries. Their Cellometer instruments provide fast, accurate, and consistent determination of yeast concentration and viability. Cellometer software automates sample tracking and data capture, easily integrating into existing work flows and increasing throughput and fermentation consistency.

440 **NovaBiotec Dr. Fechter GmbH,** Goerzallee 305a, Berlin, 14167 Germany; Tel: +49 30 84718 410; Fax: +49 30 84718 450; Web: www.novabiotec.de. The NovaBiotec Dr. Fechter GmbH, located in Berlin, Germany, has developed a test kit for a quick and easy determination of beta-glucan in mash and wort. The spectrophotometric test was adopted by the EBC and MEBAK as an official method in 2005 and is sold to breweries and malt houses all over the world.

240 **NovaTech,** 11500 Cronridge Drive, Suite 110, Owings Mills, MD 21117; Tel: +1.410.753.8300 or 1.800.253.3842; Fax: +1.410.753.8395; Web: www.novatechweb.com. For decades, NovaTech's D/3 DCS has provided process control of production operations within the brewing industry. NovaTech provides comprehensive and customizable solutions for brewhouse, cold service, fermentation, and utility operations. Our solutions drive profitability through superior operational performance, maximum product flexibility, intuitive application engineering, and low total cost of ownership.

336 **optek-Danulat Inc.,** N118W18748 Bunsen Drive, Germantown, WI 53022; Tel: +1.262.437.3600 or 1.888.837.4288; Web: www.optek.com. Precise control of color, haze, and yeast and solids concentrations. optek's in-line photometers and insertion probes control fermentation, filtration, separation, yeast pitching, wort color and clarity, DE and PVPP dosing, and more. Achieve uninterrupted processing of your best possible product with reduced product loss, improved profitability, and greater efficiency.

855 **Pall Corporation,** 25 Harbor Park Drive, Port Washington, NY 11050; Tel: 1.866.905.7255; Fax: +1.516.801.9548; Web: www.pall.com/foodandbev. Pall Corporation develops filtration and advanced filtration systems meeting market needs for reliability and cost effectiveness. Easy to install and simple to use, the space-saving systems satisfy a wide variety of filtration requirements. Pall filters remove particulate contamination, ensure the absence of spoilage microorganisms, and provide high-quality air and gases.

1058 **Parallel Products,** 401 Industry Road #100, Louisville, KY 40208; Tel: +1.502.471.2444; Fax: +1.502.471.2445; Web: www.parallelproducts.com. Parallel Products is America's leader in unsalable beverage recycling and destruction. For over 30 years our recycling programs have provided environmentally responsible solutions across the country. Other services include recovery assistance of federal excise taxes and duty drawbacks procurement. Our facilities are bonded as distilled spirits plants and wine cellars.

437 **Pentair Haffmans,** 1330 Anvil Drive, Rockford, IL 61115; Tel: +1.815.639.0322; Fax: +1.815.639.1135; Web: www.haffmans.nl. Pentair Haffmans specializes in quality control instruments and total CO_2 management. As part of Pentair, Inc., we provide a competitive range of components, systems, and solutions to breweries, including Pentair Südmo's high-quality stainless-steel valves and Pentair X-Flow's beer membrane filtration and solutions for water and wastewater treatment.

840 **PerkinElmer,** 940 Winter Street, Waltham, MA 02451; Tel: 1.800.762.4000 or +1.203.925.4602; Fax: +1.203.944.4904; Web: www.perkinelmer.com. PerkinElmer's laboratory solutions include advanced measurements and analysis solutions that enable you to monitor foods and beverages for metals, residues, and other impurities in addition to providing laboratory instrument services, informatics, and consumables. PerkinElmer is a critical partner you need to help ensure the safety of every sip.

237 **PermaCold Engineering Inc.,** 2945 NE Argyle Portland, OR 97211; Tel: 1.800.455.8585. PermaCold Engineering, Inc., a nationally recognized leader in the engineering and construction of ammonia and Freon refrigeration systems. With corporate headquarters in Portland, OR, services include new construction, remodel, freezer storage, coolers, processing rooms, IQF and spiral freezers, chillers, compressor overhauls, service, parts, mechanical integrity inspections, and other regulatory consulting.

850 **Petainer UK Holdings Ltd.,** 63 Park Road, Peterborough, PE1 2TN, United Kingdom; Tel: +44 7432 741855; Web: www.petainer.com. Petainer is leading the industry with our approach to sustainability, focusing on sustain-

able technologies and material efficiency to deliver environmentally friendly packaging. We have a passion for innovation and new ideas, including our new Petainer keg, a light-weight, low-cost, recyclable, "one-trip" beer keg.

645 **Plastic Kegs America,** 40116 Industrial Park Circle, Georgetown, TX 78626; Tel: +1.310.310.2603; Web: www.PlasticKegsAmerica.com. The world pioneer of reusable plastic kegs for beer, wine, cider, and soda that meet all the requirements of standard metal kegs. Plastic kegs have more than 50% less cost, plus 40% less weight and noise, no flavor change, and 30% additional population life cycle. Customized kegs from 1/12 to 1/2 bbl.

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331 **PureMalt Products Ltd.,** Victoria Bridge, Haddington, EH41 4BD, Scotland; Tel: +44 (0) 162 082 4696; Fax: +44 (0) 162 082 2018; Web: www.puremalt.com. PureMalt Products Limited serves brewers worldwide with refined malt syrups. PureMalt's comprehensive product range offers malt color and flavor options for blending in beers and for the preparation of alcohol-free beverages. New products increase the drinkability of reduced-alcohol or reduced-calorie beers. Tastings will be available at the PureMalt exhibit.

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531 **Siebel Institute & World Brewing Academy,** 1777 North Clybourn Avenue, Chicago, IL, 60614; Tel: +1.312.255.0705; Fax: +1.312.255.1312; Web: www.siebelinstitute.com. The Siebel Institute of Technology & World Brewing Academy is proud to offer more brewing-related courses than any other school. Our campus- and web-based programs cover the full range of brewing-related subjects, offering world-class training programs designed and presented by the most talented instructors in brewing education.

630 **Siemens Industry, Inc.,** 11601 Lilburn Park Road, St. Louis, MO 63146; Tel: 1.800.241.4453 or +1.423.747.5850; Fax: +1.678.297.8102; Web: www.usa.siemens.com. Siemens provides products, systems, and services for each step of the beer production process, from the dedicated process control system to field devices, measuring instruments, and drives. All our products can be seamlessly integrated into existing infrastructure, are based on proven quality standards, and ensure sustainable, energy efficient, safe production.

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