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Welcome to our WBC issue!

The 2012 World Brewing Congress co-hosted by the MBAA and the ASBC will start on July 27th with special tours, followed by pre-congress classes the next day but this year's largest brewing technical conference begins with presentations, workshops, exhibitions and poster sessions on Sunday July 29th. The WBC is held every four years and draws brewers, exhibitors and presenters from around the world. The 2012 WBC will be held in Portland, Oregon which, with over 50 breweries in its city limits ranks as one of the hottest spots for the craft-specialty brewing movement in the USA. The full program of events and presentations is at www.worldbrewingcongress.org

Tours

Mount Hood and Brewpubs

8:00 a.m. – 5:30 p.m. • Depart/return

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.

Hops, Farms, and Fields

8:15 a.m. – 5:30 p.m. • Depart/return

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.

Oregon Wine Country

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

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, an experienced tour guide, lunch at a wine country bistro, and all tasting fees and gratuities.

Pre-WBC Courses

The MBAA and the ASBC are sponsoring six short courses on Saturday, July 28th:

Beer Canning and Double Seaming Technology

Organized by MBAA

8:00 a.m. – 5:00 p.m. 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.

Beer Steward Seminar: Understanding Beer Flavor

Organized by MBAA

8:00 a.m. – 5:00 p.m. 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.

Setting Up a Brewery Quality Assurance Program

Organized by MBAA

8:00 a.m. – 5:00 p.m. 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, microchecks, 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.

Sensory Application and Quality Control

Organized by ASBC

8:00 a.m. – 5:00 p.m. 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.

Design of Experiments/Response Surface Modeling

Organized by ASBC
1:00 – 5:00 p.m. 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.

Global Conversations

The theme for this year's WBC is "Imagine Our Brewing Future: 2020" and to highlight changes in brewing in the not too distant future the program will feature interactive conversations on a variety of topics that brewers internationally will be considering as they plan ahead.

Raw Materials of the Future

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

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.

Water & Energy in the Future

Kathy Kinton, MillerCoors retired (moderator); Tom Collins, MillerCoors; Cheri Chastain, Sierra Nevada Brewing Company; Conor Donoghue, 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.

Innovation for the Future

Mary Lachnit, M^2 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.

Workshops

Workshops are interactive presentations within the WBC program, presenters will focus on the workshop theme with time for questions and discussion with the attendees. The WBC will feature five workshops during the congress:

The Trilogy of Barrel Aging

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.

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

Hops for the Future

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

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.

Inline Instrumentation Critical Process Control Points (CPCP)

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.

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

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

Invited Symposiums from the World's Brewing Community

The World Brewing Congress invites brewing associations representing brewers from around the world to present symposiums on topics of international interest. Presentations this year cover issues that concern everyone working in our industry.

BCOJ Invited Symposium: Technology for the Future

Organized by Brewery Convention of Japan
Hiroyuki Yoshimoto, Kirin Brewery Company, Ltd.; Tomoo Ogata, Asahi Breweries, Ltd.; Takako Inui, Suntory Liquors Ltd.; Masahide Sato, Sapporo Breweries Ltd.

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.

S-1. Yeast comprehensive analysis system for evaluating fermentation performance. *Hiroyuki Yoshimoto, Kirin Brewery Company, Limited, Yokohama, Kanagawa, Japan*

S-2. Research of brewer's yeast based on genome information. *Tomoo Ogata, Asahi Breweries, Ltd., Moriya, Ibaraki, Japan*

S-3. Study on the attractive hop aroma for beer. *Takako Inui, Suntory Liquors Limited, Osaka, Japan*

S-4. The effects of insufficient nutrition on flavor compounds production, propagation, and fermentation of yeast. *Masahide Sato, Sapporo Breweries Ltd., Shizuoka, Japan*

EBC Invited Symposium: Resources for the Future

Organized by European Brewery Convention
John Brauer, European Brewery Convention; Carsten Zufall, Cerveceria Polar CA; Martin Biendl, Hopsteiner HHV GmbH
Moderator: Stefan Kreisz, Carlsberg

This symposium will give an update on EBC, the EBC Science Group, and the Brewers of Europe and the technical re-

sources 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.

S-5. Visualizing fermentation in living yeast cells. *Sebastian Meier, Carlsberg Laboratory, Copenhagen, Denmark*

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*

S-7. Four years past the merger with The Brewers of Europe: What's new at EBC. *John Brauer, EBC*

S-8. The EBC Brewing Science Group: A different concept of scientific exchange. *Carsten Zufall, Cerveceria Polar Los Cortijos, Caracas, Venezuela*

IBD Invited Symposium: Workforce of the Future

Organized by Institute of Brewing & Distilling
Charlie Bamforth, University of California, Davis; Graham Stewart, GGStewart Associates; Katherine Smart, University of Nottingham

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.

Welcome. Simon Jackson, IBD, and Charlie Bamforth, UC-Davis and IBD (moderator)

S-9. Shooting for the stars. *Michaela Miedl, IBD*

S-10. Guess what, Execs—There is no panacea solution to building organisational capability. *Iain Clarke, Competitive Capabilities International*

S-11. The MillerCoors journey. *Toby Eppard and Randal Burroughs, MillerCoors*

Q&A discussion. *Panel includes speakers and David Cook, University of Nottingham; and Graham Stewart, GGStewart Associates*

Oral and Poster Presentations

The heart of all technical brewing conferences lies within the oral and poster presentations made by our colleagues from academia and industry. This year the technical committees of both the MBAA and ASBC sifted through over 265 submitted papers to fill out the oral and poster presentation programs. In this edition of the MBAA Technical Quarterly we are presenting abstracts of the 78 oral presentations that will be given. Many thanks to all who are sharing their work with the rest of the brewing community at this year's WBC.