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Roland Folz Pentair
Innovative Cold Block Solutions

Biography
Since February 1, 2014, Roland Folz is responsible for innovation, product design, solutions development, and the global R&D function within Pentair's Food & Beverage division. Prior to joining Pentair, he headed the VLB department Brewing & Beverage Science and Applications (BBSA), located in Berlin, Germany. With his team of experienced engineers at the VLB-Berlin, Folz has worked on sustainable developments for the brewing industry, future brewing streams and fermentation & applied microbiological concepts. Under his leadership, the BBSA department became an internationally respected provider for mission-oriented research and solutions regarding technological topics, global consultancies and international training courses.

Abstract Detail
The processing in the cold block in the brewery, from 'chiller to filler', is undergoing serious changes. In the last decade quite some changes have taken place, but it seems like even more is to come. The rationale for these changes are the drivers from the market like consistency of beer quality, the need to reduce operational expenditures in global competitive environment, ambitious sustainability goals to reduce water, energy and solid waste footprints and more flexibility in the process due to product differentiation. Pentair, which can be regarded as the cold block specialist, has introduced one of the key improvements, namely beer filtration with membranes. The benefit is a more sustainable operation against comparable and even lower costs. Other improvements were the IntelliTank Matrix, a smart alternative for the swing band panels and valve manifolds, and a next generation CO_2 recovery system, with lower energy costs and lower investment. Based on these developments, and other developments like shorter process times for fermentation and maturation, the following question is raised: how does the next level cold block process look like? What kind of technologies are required? What are the benefits for the brewing industry?

Keith Hayes SABMiller
Diesel Generator Exhaust Heat Recovery System

Biography
Keith Hayes is working as Technical Director at Southern Sudan Beverages Ltd, a wholly owned subsidiary of SABMiller. With over 30 years experience in manufacturing and brewing gained in the UK, this is his first role in Africa.

Abstract Detail
Southern Sudan Beverages is a wholly owned subsidiary of SABMiller operating its plant in Juba, south Sudan, the world's newest country. It produces a range of beers, carbonated soft drinks and blended spirits.

Its geographical location and poor infrastructure presents a range of challenges one of which is the extremely high cost of energy, the business operating anywhere between 2 and 4 1000kVa diesel fired generators to provide utilities to the production plant and domestic premises on site.

A range of initiatives have been explored and some implemented to reduce this financial burden. The proposal was to install a Thermax exhaust gas boiler and connect the 5 diesel fired generator exhaust systems to the gas boiler and then connect the steam raised to the main steam line from the diesel boiler. As a consequence of raising steam from the energy in the exhaust gases, less fuel has to be burnt in the boiler for generation of steam.

It was estimated, even with only 2 generators in use, that the annual fuel savings would be 81MJ/hl assuming a 300k hectolitre annual production volume and the capital cost of the project was budgeted at $301k, coming in eventually at a total spend of $214k. Payback was projected between 4 and 8 months.

Work began in late 2013 but was suspended for a number of months due to political unrest and civil war but recommenced in March 2014, commissioning taking place in May.

Upon review in November 1014, annual savings were estimated to be in the order of $363k realizing the payback within the anticipated period.

Very little external expertise was used to complete the project led by Gustav Liebenberg, Project Manager and supported by Kenneth Turyagyenda, Utilities Manager.

Alex Hesketh Talbot & Talbot
Biogas Utilisation – Review of Opportunities

Biography
Alex holds a Master of Science in Chemical Engineering from the University of Cape Town. He has been working for Talbot & Talbot for 3 years, where he has gained experience in wastewater treatment and biogas recovery, from lab-scale research through process design to construction of wastewater treatment and biogas utilisation plants.

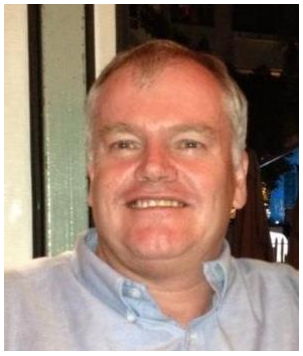
Abstract Detail
Anaerobic digestion has, over the past 20 years, become the standard technology choice for effluent treatment in the brewery and distillery industry. Biogas, which generally contains 60-70% Methane (CH_4), is a by-product of the anaerobic digestion process. Historically, this gas by-product is flared or vented to atmosphere. However, it contains significant potential as a fuel source.

Biogas can be utilised for steam or electricity generation. In an industry using steam in processing, the generation of steam from biogas provides opportunity to reduce fuel costs by utilising biogas within the boiler house, either in an existing heavy fuel oil (HFO) boiler modified to accept biogas, or in a dedicated biogas boiler.

A case study on a typical 1 million hl/a brewery is presented, indicating steam generation and fuel saving potential. The case study highlights payback periods for different fuel sources employed by breweries, with focus on HFO. The paper also discusses critical success factors to maximise biogas utilisation potential, covering installation, control and operations from Talbot & Talbot's experience in the field.

Derek McKernan SABMiller

3. **Renewable vs Non-Renewable Energy**
4. **Robotics in Packaging**



Biography

I have over 20 years of packaging experience at plant management and within packaging corporate functions. I have been head of packaging for both SAB (South Africa) and SABMiller PLC and in these roles I have been involved in a range of activities from new product development to packaging materials and technology innovation. I have qualification's in engineering, production and business management. My passion is ensuring packaging plays a prominent role in adding value to the broader business and to the consumer. I am a keen cyclist, both off and on road and spend most of my free time on a bicycle.

Abstract 1

SABMiller has set the demanding target of reducing the on-site energy usage by 50% per hectolitre of beer by 2020 and reducing water usage per hectolitre of beer by 25% by 2015.

Container warmers are employed to heat cold filled containers (glass bottles, cans and PET containers) from approximately 3 deg. C to ambient to avoid the formation of condensation. Ambient may differ from country to country; ranging from 15 deg. C 40 deg. C. Container warmers consume large quantities of energy and water. The current method of generating energy for container warmers is steam which is generated by coal fired or electric boilers and in some countries; gas fired boilers.

A study was conducted to investigate energy efficient measures to reheat beverage cans and bottles after the flash pasteurisation and filling process in order to prevent the formation of condensation. Condensation, among other things can cause label damage and packaging damage.

One of the main benefits of using flash pasteurisation outside of the quality improvement of the product is that there should be a noticeable energy saving. Flash pasteurization is a 90-95% energy efficient process as the heating energy is recycled to cool the beer after pasteurization has taken place. A concern here is that by including a container warmer, the savings that are garnered using flash pasteurization are eroded by using a wasteful container warmer process.

SABMiller is looking to migrate a large proportion of their breweries from tunnel to flash pasteurisers, and in doing so is looking to commission potentially a large amount of container warmers. The study considered two main parts in the process of heating containers, namely the generation of thermal energy and the efficient transfer of this available energy to the containers.

The aim of the study was to improve the efficiency of the container warmer in order to reduce the overall energy footprint of the system

Newlands Brewery site was selected as a case study. Three main efficient heat generation concepts were considered in the study

- Heat Pump
- Solar Thermal
- Solar Photovoltaic powering a heat pump

Renewable energy is vitally important for the environment, but is it cost effective? The result will be rather surprising!!

The poster shall reflect the following:

- The feasibility study of sustainable energy options

The full cost analysis indicating the considerations required to evaluate renewable technologies for an in brewery application

Abstract 2

The SABMiller Technical Strategy is presented in the form of four "Strategic Themes"

- Building pride in the technical fundamentals of our brands
- Enhancing our reputation for operational excellence
- Enhancing the sustainability of our supply chain
- Developing a reputation for product and packaging innovation

SABMiller Group Technical has identified four key challenges which support the four Strategic Themes:

- Embrace flash pasteurisation (vs Tunnel) by 2020
- Deliver 12 month perfect product stability (ESR, Kieselguhr, etc.) by 2015
- Reduce water consumption (<3.5hl/hl) by 2015
- Reduce energy usage and fossil fuel emissions (50% reduction) by 2020

The Strategic Themes and their supporting challenges combined with SABMiller's strategic priorities form an important backdrop for considerations for the development of the Pack Line of the Future. SABMiller's strategic priorities are:

- Creating a balanced and attractive global spread of businesses;
- Developing strong, relevant brand portfolios in its local markets;
- Constantly raising the performance of local businesses;
- Leveraging its global scale.

Typical packaging lines have an operational life of approximately 15 years, so decisions made on equipment and infrastructure today affect the cost base, product mix, flexibility, quality and reliability of operations well into the future.

SABMiller Group Technical developed and defined conceptual views for the future of the brewing business. Technical, organisational and commercial options that have the potential to meet the requirements were conceptualised and concepts for a pack line of the future were developed

One of the key themes for 'The Pack Line of the Future concept' is flexibility. Flexible lines are most suited to product variants that are foreseen at the time of their design. True flexibility is the ability to respond to unforeseen requirements and is better utilised at the pack hall level. The 'Flexible Packaging Hall of the Future' concept has been developed to cater for this need and can be described to include the following, but not limited, requirements:

- The packaging hall operates as a unit, rather than as a collection of discrete lines
- It has the capability to rapidly redirect product from the fillers to feed different labellers, packers or secondary packaging units. In this design, the greatest investment in flexibility is after the filler
- The packaging hall has space for expansion
- The 'Flexible Packaging Hall of the Future' is achieved by including some or all of the following technology:
    - Flexible cross-line conveyoring

- High speed robotics
- The combination of high speed precision overhead-mount robots and accumulation conveyors for multi brands. Individual container tracking facilitates the accurate detection, picking and placing of containers in any required combination of clusters for subsequent processing.

The combination of high speed precision overhead-mount robots and accumulation conveyors is a unique concept in the high-speed beverage industry. The concept developed for the 'Flexible Packaging Hall of the Future' is a 'world's first'.

The poster will illustrate the unique SABMiller pack line of the future initiative and showcase the move into the ultimate flexible line, which uses a decoupled line designs as well as robotics to link the labeller and the packaging area.

Areas such as size, brand/pack requirement, floor size, agility, will be touched on.

Daniel Njuguna Diageo
Diversity in Packaging

Biography

I am a proactive individual with an eye for fine details. By profession, I am trained Chemical and Process Engineer as a well a brewer. Currently, I am working as manufacturing excellence professional in the Packaging Operations for beer and spirits at East African Breweries Limited. I have experience from shop floor packaging operations as a shift a manager and a line manager. Prior to that, I worked as a Supply Planning Analyst in charge of packaging materials for beer and spirits operations. I have also had some experience in procurement, handling capex projects and a stint in field sales.

Abstract detail

In the fast changing beer consumer market and businesses seeking growth in market share, convenience, style and quality of packaging is fast becoming a key factor in consumer preferences. The African market largely operates in the context of returnable packaging. With time glass packs become scuffed and unattractive to consumers who mind about the quality of package used for their favourite brand. Supplying from a centralized operation also comes with increased logistics cost. That is the position Tusker Brewery found itself in as it sought expansion in the regional markets and in a bid to satisfy customer requirements.

The situation was compounded by soil accumulated during storage and transportation to the packaging plant. To attain the required level of cleaning which guarantees food safety, the cost of cleaning glass went up since more detergent and additives had to be used and line OEE was taking a 3.3% hit when packaging in this glass. Empty glass outage had become a norm when turn-around-time and accumulation of returnable glass from the regional markets was low, impacting on packaging plans and efficiency of delivering customer orders.

Too keep consumers satisfied while sustaining the anticipated growth, the business had to think fast, very fast. The easiest solution would have been to pursue non returnable packaging in the form of glass and would have required capital expenditure on at least two of the business's bottling lines, considering the distribution of the SKUs. With a can line whose utilization was not at the expected level, quick decisions were made to change part of the regional market supply into cans starting with the flagship brand, Tusker Lager, and the outcome was a ripple effect of success.

The Business's subsidiary serving the region grew by a massive 50% in the period when this decision was made, largely supported by this shift. The increased volume for canned beer to the regional markets has positively impacted performance by allowing room to absorb overheads, created flexibility in the packaging operations as more capacity is released for the bottling lines and allowed the can line to produce at improved OEE. This flexibility has allowed packaging operations run for 4 out of 7 days in a week impacting positively on total cost of goods, contributed by improved operating efficiencies, right mix in the cost of cleaning returnable packs and a high non material motivated morale for shop floor teams.

Tony Paterson Wits

The management of hygienic welding of thin wall pipes

Biography

Education BSc(Civ) Eng Wits 1969, BSc (Hons) Eng UP 1976, MSc Eng UP 1980,, PhD UMIST 1983
Employment: Murray and Roberts 1970 - 1980, After return from UK in 1983 joined aluminium industry. Exec Dir Aluminium Federation of RSA from 1985 until retirement. Retained as Technical consultant; Joined Wits as SAIW Chair of Welding Science and Fabrication in 2012 with interest in hygienic fabrication and in interfaces between wrought and cast material.

Abstract Detail

Process plants are typically made up of tanks, heat exchangers, distillation columns and interconnecting thin wall pipes. Food and beverage process plants which need to comply with increasingly onerous health legislation. This limits acceptable bacteria and spore counts in the final product. Bacteria are directly associated with the build-up of bio films on the contact surfaces of operating plant equipment. Whilst tanks, distillation columns and heat exchangers are factory built, many pipe inter-connections are made on site. Inadequate welded joints can compromise product quality in an otherwise hygienically designed plant. Site welding is more difficult to control. Poor joints and/or welding can trap biofilm, the source of bacteria. They may also lead to Microbial Induced Corrosion. Several factors lead to inadequate welded joints. Amongst these are the matching and alignment of pipes. This may be due to manufacturer inputs related to rolling, slitting and pipe forming tolerances or may be or fabricator centroid misalignment. Pipes are manufactured to diameter, wall thickness and ovality tolerances. Pipes and bends from a current brewery fabrication site were measured. A mathematical algorithm was developed to assess interconnecting pipes against the criteria of a minimum of an 80% area overlap around the pipe circumference. 316L stainless steel 50 mm ID, 1.5mm wall thickness pipes allowing for a random 6% of wall thickness (0.1 mm) centroid misalignment were tested. Future possibilities of using duplex stainless steels with half the current wall thickness without changing manufacturing tolerances were also assessed. It was found that a well performing weld was difficult to achieve with random orientation of pipes, particularly when the manufacturing tolerances are wider. This leads to health legislation implications. Far better results were achieved by aligning major axes. Whilst the welder is unable to control manufacturer tolerances, he is able to manage orientation and alignment.

Fredy Piepmeyer Imerys

Celite Cynergy® Increases Production Efficiency

Biography

A seasoned brewer with a back ground in production management, quality control, technological support and product development who now looks after the African market for Imerys Filtration and Additives as Technical Service Manager.

Abstract Detail

Long-term (9 month) trials were carried out at the XXX brewery using Celite Cynergy as a replacement for standard silica gel stabilizer. Results showed a 43 % increase in filter run length, with a 15 % reduction in total powder additions (filter aids and stabiliser). In addition to the cost savings associated with reduced powder dosing, the increase in filter run length and thus reduction in filter cycles required per annum, will lead to significant additional savings - water consumption, beer losses, filter cleaning costs and spent cake removal. The use of silica gels for stabilising beer is well practiced and relatively effective. Filter aids such as kieselguhr are essential to ensure the efficiency of the filtration process as most silica gels are relatively low in permeability and therefore lead to higher filter inlet pressure increase. This reduces filtration cycle length as the silica gels reduce filtration performance. In addition, the physical nature of silica gel as a filter aid works against it: whereas filter aids need to be irregular and rigid in order to function, silica gels tend to be spherical, relatively “smooth” and compressible. Silica gel manufacturers have been attempting to address these issues, but generally it can be said that the current products fall well below the efficiency of a kieselguhr filter aid in terms of mechanical filtration performance. In contrast, up until now, kieselguhr products have been essentially inert and devoid of any stabilisation functionality, other than that gained indirectly by the removal of the suspended solids from the beer. For this reason, both kieselguhrs and silica gels are normally used together, with the silica gel often being added either at the lagering stage or before in filter inlet buffer tank to increase contact time and thus improve stabilisation efficacy. Celite Cynergy is the beer protein stabiliser that has been developed to have both fully-functional protein absorption capability plus all the usual functionality of a kieselguhr filter aid. This should allow a beer to be fully stabilised by the removal of haze-sensitive proteins without the need for silica gel additions that reduce filtration efficiency. This paper compares and discusses these findings and those of other trials currently under way.

Emmanuel Rurema Pentair
Non-Invasive CO_2 Measurement

Biography
Emmanuel RUREMA was born in Rwanda. He graduated from the Technical University of Munich (Weihenstephan) Germany, where he obtained his Engineering Degree in Food Technology. He started his career at Pentair Haffmans (formerly Norit Haffmans) in 2000 as a management trainee and moved into the R&D department as Market Development Manager. He joined the Sales Department in 2001, where he was responsible for Africa, the Middle East, French speaking Europe, and South East Asia. Most recently, Rurema served as Commercial Director at Pentair Haffmans and Director Business Development for Africa. Since 2014, Rurema heads Pentair's regional office in Nairobi, Kenya.

Abstract Detail
The carbon dioxide (CO_2) content is a determining factor in the quality and taste of beer and carbonated beverages. Both breweries and soft drink manufacturers strive to closely control the CO_2 content not only during production but also in the filled package. A novel measurement technology enables the use of new features resulting in valuable advantages and benefits for breweries and soft drink manufacturers. The features that come forward from the optical measurement technology are the non-invasive measurement as well as the selective measurement. Non-invasive measurement means that the sample is not destroyed. Selective measurement means that there is no influence from other gases like nitrogen, oxygen and water vapor on the measurement result. The benefits from samples that are not destroyed reaches out from quality benefits like repeated measuring of the same sample, environmental benefits like less waste of material and manufacturing benefits like cost savings of material and less required storage space. Selective measurement results in a clear quality benefit in the area of accurate measurement results. From here we can even gain more insight in possible future developments among oxygen content measurement in packages.

Wouter Steyn SABMiller

Application of rare earth magnets in the brewing industry

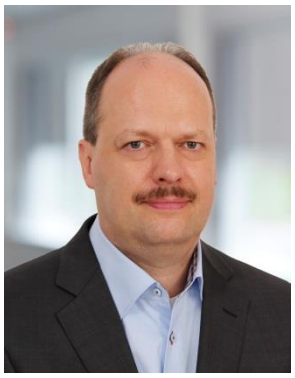
Biography

Currently working as a process Engineer in the Brewing department at Rosslyn Brewery, South Africa (SAB Ltd), focussing on hygiene and flavour stability optimization projects. Completed a traineeship through SABMiller Group Technical where various optimization and commissioning projects were undertaken in Tanzania, Mozambique and Zimbabwe, as part of the trainee program. Completed B.Eng (Chemical) at the University of Pretoria in 2011, the IBD Brewing Diploma in 2013 (Dave Fraser award Winner) and currently completing an MSc in Brewing and Distilling Sciences through Heriot Watt University.

Abstract Detail

Application of rare earth magnets in the brewing industry: Heavy metal ion removal in wort streams and possible increases in mashing/lautering efficiencies The modern brewing industry has become a textbook example of industry consolidation. One of the many drives, or advantages, behind industry consolidation is the opportunity to export a premium brand to new, unexplored markets and thus increasing the brand's value and profit. This however came with the technical challenge of increasing the product's flavour stability, as one had to ensure to present a "fresh" beer to the export market along with the continuous journey of decreasing production costs through increased efficiencies. One specific parameter which has been identified as a flavour stability negative is heavy metals ending up in the beer. The occurrence of the heavy metals varies between breweries due to factors such as the mode of malt transport, materials of construction and the design of the brewery itself. Thus depending on the specific brewery's situation; a cost effective treatment option would result in a significant contribution to an increased shelf life. To the author's knowledge; the technology has not yet been tested on liquid streams in the brewing industry and therefore the application will firstly be tested on water streams. A volume of water will be induced with specified amounts of heavy metals, processed through magnetic treatment and the concentration of the ingoing and outgoing streams monitored after a settling period has been allowed. The tests will then be extended to a microbrewery where the effects will be monitored on hot and cooled wort streams as well as Kieselguhr stream sent to a plate and frame filter. The analysis will not only look at heavy metal concentrations in the various streams; but will also analyse lag times (analytic method for determining product shelf life) of the treated streams versus a control brew to ensure that the results reflect the desired end state. In terms of the process efficiency optimization experiments; the magnets will be applied to the water streams feeding the mashing and lautering processes. The claimed effects of the treatments (by suppliers) include an increase in water absorption by seedlings and therefore one would expect improved extract recoveries and decreased process times.

Peter Toftegaard Union
The CO_2 technology heart is true innovation



Biography
Peter Toftegaard Hansen joined Union Engineering in 2011 as General Manager for the regional sales and service activities covering Middle East & Africa – based at the regional office in Dubai, UAE.

Peter holds a degree in Elec. Engineering from University of Southern Denmark and has 24 years international business experience from the field of industrial automation, energy efficiency/utility management and CO_2 mainly obtained working with food & beverage industry however also other industries. His merits include experience with B2B sales/marketing plus project management of performance contracting- and turnkey projects.

Abstract Detail
Back in 2009 Union Engineering developed and patented a technology – the heart of a CO_2 process plant – and called it CO_2 -Scrub. Explained in simplicity, the technology has the ability to remove impurities in the process of purifying CO_2 without using water and with significant fewer chemicals. The technology was integrated into our CO_2 plants for ethanol production in the first place, and it has been a huge success.

Therefore it was considered whether the technology could be transferred to other industries and the breakthrough came in 2011 when Union made a contract with Carlsberg about the first CO_2 plant for breweries that could purify CO_2 100% water free, reduce 20% in power consumption and with an increased yield (higher recovery rate at low raw gas purity) generating more CO_2, which can be used for soft drinks or other applications.

Today Carlsberg has three plants based on this technology – called ECO_2 Brew – at 3 sites; Denmark, Finland and Serbia and for the CO_2 production based on ethanol over 15 plants are in operation and thereby prove the technology as being the state-of-the art producing CO_2 with focus on sustainability.

Mika Unting Stabifix

Prediction of beer filterability on crossflow membrane by modified Raible-test

Biography

After a two year business administration education at Diessel, today GEA-Diessel, Mika Unting studied brewing technology at Technical University Berlin / VLB, including a research semester at Napier University Edinburgh, finishing with an industry diploma thesis on ultrasonic inline-measurement of beer. Mika´s main carrier steps took place within ISP, later Ashland, where he developed over a period of 14 years from a technical support role through several management positions with increasing geopgraphical, functional and team leading responsibilities, finally becoming Global Business Unit Director of Ashland´s Polyclar PVPP business. In 2012 Stabifix Brauerei-Technik KG, Munich, appointed Mika as managing director.

Abstract Detail

Filterability of beer is influenced by raw material qualities, brewing processes and aids. Significant effects can derive from brewing water, barley beta-glucan levels or other high molecular weight components, adjunct types and addition rates, starch or protein degradation, shear force impact, yeast stress factors, maturation times and temperatures, quality of sedimentation-, clarification-, filtration- and stabilisation-aids and many other. Such filterability factors can appear in combination and therefore are so numerous, that it appears unreal to find a prediction formular based on one or few reference parameter. An additional challenge in beer filtration and it´s prediction is that beer haze particle size distribution peaks in more than one particle size area, usually at least around 8-10 micron (yeast) and also in the submicron area (proteinacous haze particles). No stand-alone filration-aid but Kieselgur has yet succeeded to constantly solve the task of removing haze components at both particle size peaks. Crossflow membrane filtration is the other applied technique that can deal with such challenges. These two technologies are today dominating in beer filtration but react differently on the inconsistent particle load of beer. Under described circumstances the use of laboratory test filters have been proven to be the most valueable sensors for filterability prediction. Stabifix´s Filtercheck laboratory filter has been developed several decades ago and a MEBAK filterability test method is named after its inventor Dr. Raible. The presentation describes how the Filtercheck test unit and the Raible-Test method have been modified to allow filterability prediction, now also for crossflow membrane filtration.

Jason Vardy Talbot & Talbot

Digestion of Waste Yeast – Increasing an existing's Anaerobic Digester's (AD) biogas yield

Biography

Jason obtained a BSc in Chemical Engineering from the University of Cape Town and a Master of Engineering in Process Synthesis through the University of the Witwatersrand. In 2010 Jason joined Talbot & Talbot and the wastewater industry. He has spent this time gaining valuable experience in the subject of wastewater treatment focusing mainly on industrial effluent treatment plant design. He has developed the knowledge required to understand industry specific requirements and develop the necessary treatment solution in a cost effective manner through the application of the appropriate technology.

Abstract Detail

As the standard technology in brewery wastewater treatment, a large majority of breweries in Africa have anaerobic digesters installed. These existing anaerobic digesters are often operated below their design capacity either due to low beer production rates or overdesign.

Utilisation of biogas is an ideal method of reducing operating costs and recovering capital spend. By not operating an anaerobic digester at its design capacity there is a lost opportunity to realise the full energy potential and savings that are achievable. Of all the organic by-products produced by breweries waste yeast is most suited as a potential substrate for digestion in an Up-flow Anaerobic Sludge Blanket (UASB) digester.

The co-digestion of waste yeast with general brewery effluent can increase the biogas yield of an existing anaerobic digester by 15 – 20%. Waste yeast cannot be fed directly into a UASB without pre-treatment and conditioning. This presentation will cover the pre-treatment methods, will evaluate the business case for installing the equipment and detail other benefits derived by including waste yeast as an additional feedstock to a brewery's anaerobic digester.