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Sugar Research
Australia™



MillingMatters

Issue 3 | 2015

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Welcome to MillingMatters



Welcome to the third edition of SRA's MillingMatters publication. This magazine continues to provide important updates on research activities in the milling sector, and in this edition there is a strong focus on the extra income that can be realised through value adding.

Research that has recently been completed at Southern Cross University has looked at the value of turning an unwanted waste – bagasse fly ash – into a potentially valuable resource that can be used in the creation of new generation concrete. This new concrete is stronger and more resistant to erosion from chemicals than other concretes, and this technology could bring real value to sugar millers.

We also have a close look at new research as part of the Australian Government's Rural R&D for Profit program. SRA is embarking on a major bio-refineries research project with QUT and other partners, and this exciting research has significant potential for the sugarcane industry.

Along that theme, this edition also has a look at what the Queensland Government's proposed policies around biofuels could mean for sugarcane millers and growers.

This edition also provides an update on new research occurring at QUT regarding bringing some efficiencies of overseas milling operations back to Australian factories, and other research that is looking at alternative shredder hammer configurations.

We also look at SRA's work on compiling the milling statistics for the 2014 season, and how this important data is used in the online tool QCANeselect™ for the benefit of the entire industry.

SRA is your industry owned company. If you have any suggestions on keeping the milling sector informed about our research, please email me at bpfeffer@sugarresearch.com.au.

Brad Pfeffer

Manager Communications, SRA

Adding value to ash

A newly completed project conducted by Southern Cross University (SCU) and Australian Bio Refining has provided information that could help sugar mills redefine some of their 'waste' products as a valuable resource. By Brad Pfeffer

The project was funded by SRA to examine the properties of bagasse fly-ash, including its potential as a material to enhance the durability and strength of concrete.

Lead by Associate Professor Malcolm Clark, the project has revealed promising results in particular for the use of the ash in concretes.

By transforming the fly ash into value-added products such as zeolites and geopolymers, SCU found that the once unwanted waste product has significant potential value for a sugar mill.

As part of the research, concrete developed from bagasse fly ash had improved strength and chemical resistance, particularly to chloride and sulphate acids.

Prof Clark estimated that the ash could cost some mills in the order of \$60-\$70/tonne to dispose of, but when used for concrete it could be worth in the range of \$30-\$40/tonne, presenting a tempting reversal in value.

It is expected that such a product would be useful for the concrete at a mill itself, where cane-juice can quickly erode concrete.

'If you walk through any mill where the concrete is more than five years old, the floor is tilted and corroded from spills of juice on the floor,' he said. 'These stronger concretes could be used at the mill, or potentially sold to a local concrete manufacturer.'

'There are areas nearby to sugar mills where there are acid-sulphate soils, which makes such a concrete product valuable for the concrete industry.'

Modelling suggests a potential return on investment of 23 percent for zeolite manufacturing and 21 percent for reusing bagasse fly ash into concretes (without considering the disposal costs).

Prof Clark said that he was grateful for SRA's investment in the project and the recognition of the value that the findings could provide for sugarcane millers.

'A waste is just a resource that we haven't found a use for yet,' he said. 'Ash is not necessarily a waste, but we need to know where to put it to use. We also need to get around the negative psychology of the word 'waste' and think: where can we use it? Who can we sell it to?'

For example, he said the industry already had the right mindset from extracting value from molasses – and although this was an easier mental shift because of its link to a food product – he said the same principles applied to other by-products such as the ash.

There are several important steps forward for the future of the work. A new grant from the Bragg Institute will allow SCU to follow up on the chemical reactivity of the concretes, while the information from the SRA-funded research will also be communicated to the milling industry and the concrete industry.

Key Focus Area

Product diversification and value addition

Project name

Development of value-added products from sugarcane boiler ash

Project number

2011/903

Project providers

Southern Cross University and Australian Bio Refining Pty Ltd

Project end date

June 2015 (complete)



Above: Mortars with 0, 5, 10, 15 and 20% SCBA content exposed to H₂SO₄ solution at 0 (top), 14 (middle) and 28 (bottom) days.

Two percent ethanol mandate on the agenda

The Queensland Government has announced a renewed push for biofuels in the State, in a move that has potential to yield benefits for sugarcane millers and growers.

The Government released a biofuels discussion paper in June 2015 and as part of the discussion paper signalled plans to revive plans of former governments to have more ethanol blended fuels in petrol bowsers across Queensland.

The discussion paper has suggested a two percent mandate for ethanol, which equates to about 59 million litres per annum, with the relatively small figure aimed at allowing a chance for production and distribution to increase. It would be effective from July 1, 2016.

Future increases would be reviewed by the new Queensland Productivity Commission.

Importantly, the State Government also flagged the opportunities for overlap with work in bio-refineries. Sugar Research Australia (SRA) is already leading the charge with

biorefineries research via the *Rural R&D for Profit* program.

According to the discussion paper: 'Bio-manufacturing is seen as a major global growth opportunity and Queensland, with its tropical/sub-tropical climate, technically advanced agriculture sector, and large biomass supply is well placed to benefit.'

'It can also significantly value-add to agricultural outputs and create new revenue streams for agricultural producers,' the discussion paper stated. 'The Queensland Government is keen to take a proactive approach to help develop the bio-manufacturing industry.'

The State Government has conducted a series of public forums on the proposed policies, and has received encouraging feedback from the Australian Sugar Milling Council (ASMC), CANEGROWERS, and the RACQ.

A number of SRA-funded projects are underway relating to value-adding, particularly under Key Focus Area (KFA) six, product diversification and value addition.

This includes the aforementioned biorefineries project, and other products that look at using mill by-products for use in products such as paper or concrete.

Recent work at QUT developed three sets of equipment to measure bagasse material behaviours relevant to bagasse degradation and spontaneous combustion.

Outputs of the project will assist in the improved design and management of large stockpiles, enabling year-round reliable delivery of high quality bagasse feedstock to sugar industry power and biofuel projects.



Left: The Queensland Government's biofuels agenda has potential benefits for sugarcane millers and growers.

Biorefineries to create a profitable future for agriculture in Australia

Sugar millers and growers are expected to benefit from a new research project as part of the Rural Research and Development for Profit Programme.

Key Focus Area

Product diversification and value addition

Project name

A profitable future for Australian agriculture: biorefineries for higher-value animal feeds, chemicals and fuels

Project number

2015/902

Project providers

SRA lead with range of partners including QUT and other RDCs

Project end date

2018

SRA has been successful in securing funding for the new collaborative project that would engage leading scientists to develop technology that would convert agricultural and forestry by-products into higher value commodities.

This is an exciting and collaborative project that will see SRA as the lead agency working with Forest and Wood Products Australia Limited, the Cotton Research and Development Corporation, Australia Pork Limited, and the Queensland University of Technology.

'The project also has support from NSW Department of Primary Industries as well as industry support from Southern Oil Refining and AgriFuels Ltd,' according to SRA CEO, Neil Fisher.

'We know that in many agricultural and forestry production systems, there is significant biomass created in the production system that is of low value compared to the core commodity being produced,' Mr Fisher said. 'This project will look at how we can add value to products such as cane mulch and bagasse, cotton stalks and trash material, and forestry by-product.'

'The project will investigate using biorefinery methods to convert low value material into higher value products such as animal feed, fuels, fibre, and chemicals.'

The project will run over three years and is being funded with \$3.09 million in Federal Government grant funds and a matching commitment from the partner organisations.

For the project, QUT research will investigate how to develop a more profitable future for Australian agriculture by transforming farming by-products into valuable new products.

The project will broadly address bioproduct opportunities across various agricultural sectors with other key agricultural industries.

A recent study by Deloitte Access Economics and Corelli Consulting, prepared for QUT, found the establishment of rural and regional biorefineries could generate more than \$21.5 billion in revenue over the next 20 years in Queensland alone, creating 6,640 full-time jobs.

Associate Professor Ian O'Hara, from QUT's Centre for Tropical Crops and Biocommodities (CTCB), said the project would develop and demonstrate a range of innovative biorefinery technologies that will add value to primary products and by-products.

'The project will develop new technologies including enhanced animal feeds, chemicals from crops and advanced biofuels from

agricultural feedstocks,' Professor O'Hara said. 'Creating biorefineries which generate higher value bioproducts from waste products is one of the keys to creating a profitable future for Australian agriculture.'

Professor O'Hara said the project would create new revenue opportunities. 'At the same time it creates opportunities for those same industries to reduce input costs, for example through local production of lower cost animal feeds and fuels,' he said.

'This project will show that Australia has a multi-billion dollar opportunity to establish a new manufacturing industry based on biorefineries that will create thousands of jobs.'

Professor O'Hara said QUT is well placed to undertake the project as it has significant research and infrastructure capability including the Mackay Renewable Biocommodities Pilot Plant. Based in the sugar hub of Mackay in Queensland, the pilot plant allows new technologies to more rapidly transition from laboratory to commercial scale.

Above: Associate Professor Ian O'Hara says Australia has a 'multi-billion dollar opportunity' to establish a new manufacturing industry based on biorefineries. *Picture: Erika Fish, QUT Media.*

Building a bio-based industry upon the foundation of the cane industry

Second generation biofuels using lignocellulosic biomass such as bagasse as the renewable feedstock have the potential to produce fuels on a large enough scale to meet a significant fraction of national demand while avoiding the use of feedstocks which compete with food production. By Kameron Dunn, QUT

Depending on the conversion technology, production of second generation biofuels is expected to generate significant amounts of lignin or black liquor.

Lignin is an amorphous branched polymer and the second most abundant of the three naturally occurring polymers (cellulose, hemicellulose and lignin) contained in lignocellulosic material.

Lignin is also the only constituent based on aromatic units, an important structural characteristic of high value phenolic compounds currently derived from the petrochemical industry.

Such phenolic compounds are used in applications for pharmaceuticals, food flavourings, resins, plastics, carbon fibre and carbon fibre composites.

We know from previous extensive studies reported in the literature that lignin hydrolysis reactions, used to depolymerise lignin into monomeric or phenolic products, suffer from:

- the generation of a wide spectrum of chemical products, making product recovery and refining difficult;
- low yields of derived phenolic oils (< 25 wt% on dry lignin) or total monophenols (typically less than 10% on dry lignin) and;
- the occurrence of competing repolymerisation mechanisms, thus making the lignin structure less amenable to monomer production.

I recently completed a PhD study aimed at understanding the mechanisms associated with lignin hydrolysis through hydrothermal liquefaction, as a means of deriving high value phenolic compounds from bagasse. This PhD was supported by SRA and sought to:

- identify the structural characteristics of technical sugarcane lignin and report on how such characteristics change for different pulping techniques;
- determine the chemical and structural constituents of both the phenolic oil product and the solid residue obtained as a result of different hydrolysis treatments on lignin; and identify lignin depolymerisation pathways.

This study identified the structural attributes of sugarcane lignin, the products resulting from the depolymerisation of sugarcane lignin during hydrothermal liquefaction and the influence on the product distribution resulting from the initial lignin feedstock structure and catalyst used. Specifically the study identified:

- a depolymerisation pathway for some lignin structures to promote higher phenolic oil yields and lower molecular weight residue lignin. Knowledge and manipulation of this pathway subsequently resulted in demonstrated monomeric phenolic yields of 35 wt% from lignin, where previously maximum yields of only 22.5 wt% had been reported in literature i.e. a 60% improvement in yield.

Key Focus Area

Capability development, attraction and retention

Project name

Conversion of sugarcane lignin into aromatic products and fractionation of products for industrial use

Project number

2010/067

Project leader

Dr Kameron Dunn, Queensland University of Technology

Project supervisors

Dr Phil Hobson, Prof William Doherty and Associate Prof John Bartley

Project end date

2014 (complete)

Sugarcane lignin represents a significant renewable resource for the production of high value phenolic compounds.

- that hydrolysis conditions could be tailored to substantially reduce the number of phenolic compounds produced, some of which having considerable commercial value.

QUT is also developing further improvement to the depolymerisation approach, and in the method of recovering and purifying the various lignin derivatives using specialised solvent extraction techniques.



RECORDED

Kameron's webinar, titled 'Awakening the sleeping giant', can be viewed on our website by clicking on the 'Growing Cane' menu item and then selecting 'Milling'.

Key Focus Area

Milling efficiency and technology

Project name

Increasing capacity to undertake cane preparation research through modelling and experimentation

Project number

2015/018

Project leader

Geoff Kent, Queensland University of Technology

Project end date

1 May 2017

Benefits of better preparation

Most Australian factories are not achieving the cane preparation benchmark of 90% pol in open cells. While preparation is strongly linked to power consumption, in many cases the problem is not that there is insufficient power available but that insufficient power is being consumed.
By Geoff Kent, QUT

An opportunity to try new shredder hammer configurations to improve preparation.



This project looks at alternative shredder hammer configurations with the intent of installing more hammers in the shredder to increase power consumption and achieve better preparation. It also involves a preliminary look at alternative grid designs.

The SRA-funded project is a collaboration between Queensland University of Technology and Rocky Point Mill.

The project aims to experimentally determine the effect of different hammer configurations on maintenance requirements, vibration, noise, windage and performance.

It will be supported by a CFD modelling investigation into the windage issue.

In addition, a preliminary CFD modelling investigation into grid design will be undertaken, in preparation for grid design experiments to be undertaken in a subsequent project.

The focus this year will be on the hammer configuration work. Floren Plaza at QUT will be undertaking the CFD modelling of the windage process in order to determine the effect that different hammer configurations have on windage.

Two alternative hammer configurations will be trialled at Rocky Point this year, under the supervision of Terry Drury, Maintenance Supervisor at Rocky Point.

The configurations are expected to be spiral type designs, but final decisions have yet to be made.

Above: The Rocky Point shredder.

Learning from the overseas experience

SRA has approved funding for this project to commence in the latter half of 2015, which will look to bring some of the efficiencies of overseas milling operations to benefit Australian factories.

Key Focus Area

Milling efficiency and technology

Project name

Develop a blueprint for the introduction of new processing technologies for Australian factories

Project number

2015/043

Project leaders

Ross Broadfoot, Darryn Rackemann

Project end date

September 2017

Currently several technologies are being used in overseas cane factories that are not being applied in Australian factories.

These technologies have mostly been implemented overseas in order to reduce the process steam consumption.

QUT believes that these technologies may be suitable for Australian factories, with benefits in terms of cost effective increases in crushing rate and increased sugar recovery.

For some Australian factories (for example, those currently cogenerating export electricity to the national grid), the benefits of reduced process steam consumption will also be financially attractive.

The project will investigate falling film tube and Kestner evaporators, the implementation of molasses conditioning to assist the performance of batch and continuous pans, vapour recovery from condensates and other energy saving measures.

The technologies will be assessed based on capital and operating costs and impacts on sucrose degradation, energy consumption and water and effluent management.

The project will determine a blueprint that defines the technologies that are most suited to adoption into Australian mills now, for our current operational objectives, and are well suited to providing major reductions in process steam consumption in the future.

The main phases of the work program involve:

- Determination of the extent of sucrose degradation in Robert evaporators in two Australian factories and estimation of losses in alternative evaporator technologies; and
- Inspections of the technologies in several overseas factories.

The project involves the investigation of changes to the mass and energy flows, including the water balance of the factory, through adoption of the technologies into Australian factories.

The modelling will be undertaken using the 'whole of factory' Sugar SysCAD model. QUT recently completed the development of the Sugar SysCAD model under another SRA-funded project.

Ross Broadfoot and Darryn Rackemann plan to visit factories in Mauritius, Reunion and South Africa later this year to inspect the equipment, and familiarise themselves with the operation and performance of the technologies.

The sucrose loss studies are also planned to be undertaken during the 2015 season.

Some of the technologies being used in energy efficient overseas factories can be introduced into Australian factories to provide capacity and operational benefits.



Getting the value from milling statistics

Sugar Research Australia has published a guide to milling statistics for the 2014 season, providing a document that gives a comprehensive run-down on last year's crush. By Brad Pfeffer

The guide, *Mill Area Statistics 2014 Season*, provides an analysis of the harvest according to each of the industry's sugar mills, and it is complemented by a second document called *Varietal Composition and Distribution*, which provides in-depth data on cane varieties and performance across the industry.

The Mill Area Statistics provides a range of information for mills, including tonnes milled, hectares harvested, average cane yield, average CCS, and the proportions of the crop that were harvested green or burnt, and the areas of plant, ratoon and standover cane. It also plots trends over the last 10 years.

SRA principal researcher, Jo Stringer, said the publication was useful across the industry and also provided value to sugar millers by compiling a range of data into a single location.

Dr Stringer said the information was also valuable to both growers and millers because it was accessible via the online tool QCANESelect™, via the SRA website at <http://tools.sugarresearch.com.au/QCANESelect/Default.aspx>

'QCANESelect™ is an extremely valuable decision support tool for growers in helping them choose their varieties,' she said. 'When we as an industry are able to provide tools that have the potential to increase productivity then this delivers both positive outcomes for both growers and for millers.'

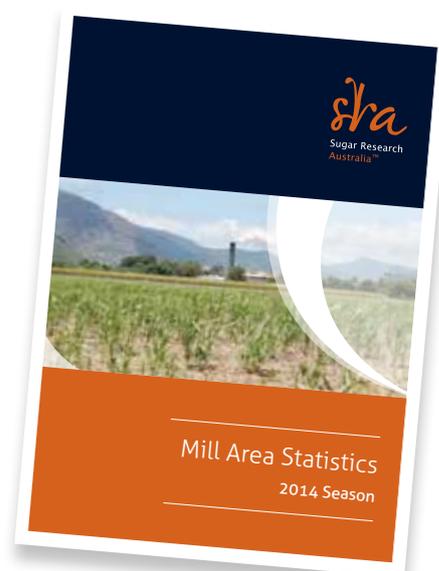
'We encourage millers to make themselves familiar with QCANESelect™ so they are aware of the potential of this important resource.'

'It is important to remember that the more layers of data that SRA are able to receive from the mills, then the better the quality of the information that feeds into QCANESelect™. Better data can assist growers in choosing varieties according to soil type or productivity zones for example.'

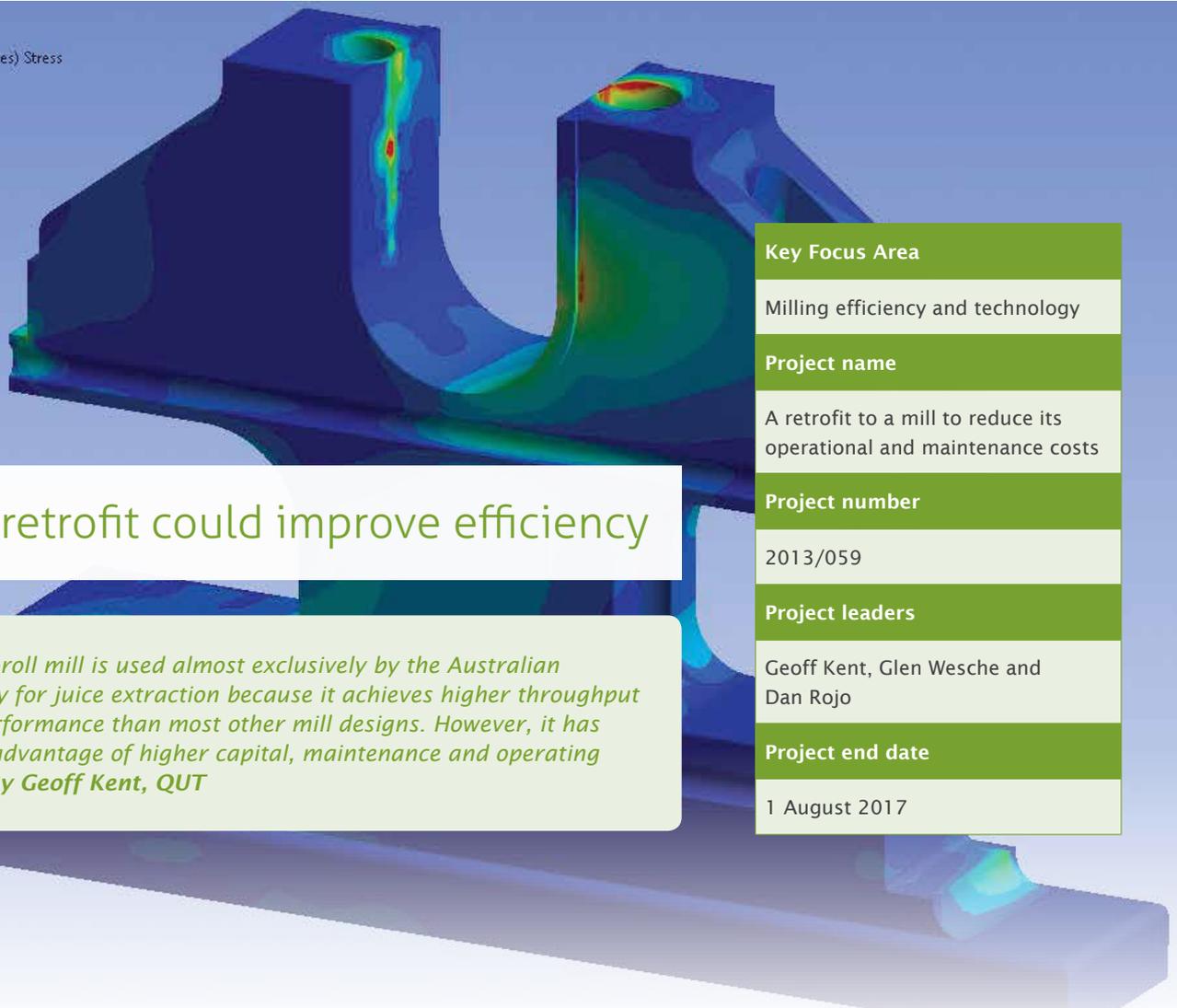
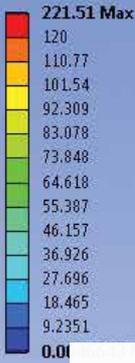
'The milling statistics that feed into QCANESelect™ are an important part of informing and improving the overall productivity of the industry.'

'SRA thanks all those who collaborated in once again helping to compile this important publication.'

The booklet has been distributed to milling businesses across the industry. If you would like to receive a copy, please email Jo Stringer jstringer@sugarresearch.com.au.



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 Equivalent Stress 2
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Mill retrofit could improve efficiency

The six-roll mill is used almost exclusively by the Australian industry for juice extraction because it achieves higher throughput and performance than most other mill designs. However, it has the disadvantage of higher capital, maintenance and operating costs. By Geoff Kent, QUT

Key Focus Area

Milling efficiency and technology

Project name

A retrofit to a mill to reduce its operational and maintenance costs

Project number

2013/059

Project leaders

Geoff Kent, Glen Wesche and Dan Rojo

Project end date

1 August 2017

This project seeks to investigate a low cost modification to the six-roll mill to reduce its maintenance and operating costs by removing the delivery roll and trash plate while maintaining or improving performance at the same rate by implementing Bundaberg Walkers two-roll mill (BHEM) technology.

The BHEM design has achieved very good performance at low throughput and has maintained good performance at higher throughput with feeder rolls. This project utilises an existing pressure feeder as feeder rolls and the existing top and feed rolls as the two BHEM rolls.

The SRA-funded project is a collaboration between Queensland University of Technology, Bundaberg Walkers Engineering Ltd and Sunshine Sugar Pty Ltd. The design concept will be trialled at Sunshine Sugar's Harwood Mill.

While existing milling theories are sufficient to be confident that the modified mill design will achieve lower maintenance and operating costs and will maintain

capacity, there are no reliable theories to predict the resulting mill performance. This project will measure the performance of the prototype mill at Harwood.

Another significant issue is the transfer of bagasse after the mill. Without the delivery roll, the bagasse exits the mill at a lower location and in a downwards instead of upwards direction. A low cost methodology is required to ensure the bagasse is transferred to the next intermediate carrier.

To date, the project has focussed on addressing the risks of the prototype mill to Harwood's crushing operations.

A finite element analysis was undertaken to ensure that the stress in the roll shell in the new configuration was not excessive.

A second finite element analysis of the mill cheeks was undertaken to ensure the modified loading was capable of being supported by the existing cheeks.

Aim: a low capital cost method of reducing ongoing maintenance and operating costs.

A laboratory experiment was undertaken to examine chute design parameters for conveying the bagasse to the next intermediate carrier.

The results of the investigations to date have been utilised in preparing a capital budget and funding request to Sunshine Sugar to provide the necessary funding to modify the Harwood mill to the proposed design.

The modifications to the Harwood mill will be made, pending final funding approval, so that the design can be tested in 2016 crushing season.

Above: Stresses calculated in finite element analysis of mill cheeks.

Updated traits to maximise profitability along the value chain

An extensive consultation process involving an industry reference group has helped determine a new approach for selecting sugarcane varieties as part of the Sugar Research Australia (SRA) plant breeding program.

Over the last two years, SRA has been working with industry to review and modify the way different traits are weighted in the industry's sugarcane breeding program.

This involved working with a group of 12 people who were appointed by the Australian Sugar Industry Alliance (ASA) to work with SRA technologists and managers on a review of the weighting given to each trait.

SRA Executive Manager for Development, Dr Peter Allsopp, said that changing the weighting of traits in the breeding program was not a decision treated lightly.

'When we breed a new variety, we give each characteristic an economic weighting, such as for disease resistance, sugar content, or tonnes of cane per hectare. These weightings are then added together to help choose potential varieties,' Dr Allsopp said.

'The breeding objective is to maximise profitability from cane production for the entire industry. Varieties deliver that increase through different levels of different traits.'

New varieties undergo a rigorous selection procedure and SRA has been working with industry to ensure that breeding outputs reflect the main components of the production system through the economic weightings that are used in variety selection.

These weightings, based on grower and miller costs, have been updated and approved by the industry reference group.

Dr Allsopp said SRA had been through a collaborative and consultative process in reviewing the weightings of traits and the aim was to deliver optimum outcomes across the grower-miller value chain.

'Growers and millers have come together through this ASA group to consider the weightings of traits for the breeding program, and this group has now told SRA what they want implemented as part of these changes,' Dr Peter Allsopp, said.

'This group has told us that the breeding program must maximise profitability for the entire industry and, with this as their focus, they have endorsed specific changes to the weightings of traits.'

The review considered a range of changes that have occurred in the sugarcane production system since the last review almost 10 years ago, and also ensures that SRA plant breeders understand the specific needs of the local industry.

Variations of the new weightings are being adopted for the existing plant breeding regions (Northern, Herbert, Burdekin, Central, and Southern Queensland, with northern NSW yet to be finalised).

The review group met in June to discuss the outcomes of the review of the economic weightings of traits, with this information being communicated locally to the regions throughout August 2015.

Notable changes to the weightings are the inclusion of a ratoonability index and more emphasis on cane yield.

'This reflects the different production environment to the early 2000s, where now many mills have excess capacity and it makes economic sense to utilise that capacity,' Dr Allsopp said. 'The overall focus is on maximising profit to the industry.'

The SRA plant breeding program continues to be a core component of SRA's R&D investment and has the aim of delivering optimum outcomes for sugarcane growers and millers.

Plant breeding is expected to contribute to two of the industry's main goals: 36 million tonnes of cane per year, and cost reductions and profit increases.

The breeding program also seeks to find the balance between the needs and wants of both millers and growers in selecting for various traits being selected within new sugarcane varieties – it does that based on the economic value that a variety can deliver.



SRA Performance Report sets a benchmark in accountability

Sugar Research Australia (SRA) has developed and released its first Performance Report, for the period ending 30 June 2015, which details the achievements and progress of the Australian sugarcane industry's owned corporation for research, development and extension.

SRA CEO Neil Fisher said that the SRA Performance Report had been developed in consultation with industry representative bodies and SRA investors and it came as a response to their requests for a document that tracked SRA performance against a range of transparent and repeatable measures.

'This is a comprehensive report that has been developed to address the needs of sugarcane growers, millers and the industry as investors and stakeholders in SRA,' Mr Fisher said.

'It provides a clear and accountable way of measuring our performance for our investors, and follows a traffic light principle of reporting our progress against key measures. SRA's performance is measured in green for work that is on track; yellow for activities that are facing some hurdles; and red for research and activity that needs more attention.

'We believe this is a tangible demonstration of our commitment to being accountable to our investors.

'It is the nature of scientific research that the results do not always turn out as expected or may take longer to achieve than first anticipated. SRA's investors have asked for this document to help them understand the investment we continue to make on their behalf.'

The first Performance Report has been informed by a range of sources, including independent reports and surveys.

It will be further refined in consultation with our industry representative bodies each year so that SRA investors can continue to track SRA's progress. It will be enhanced by documents such as SRA's independent annual grower survey and the forthcoming ABARES survey of sugarcane growers.



SRA Performance Report
2014-15

The Executive Summary of the Performance Report for 2014/2015 has been emailed to all SRA investors. The Executive Summary and the full report can be located on the SRA website www.sugarresearch.com.au

New precision agriculture manual helps put even more information at growers' fingertips

Sugar Research Australia (SRA) has released a new manual that is aiming to hasten the uptake of precision agriculture technology in the Australian sugarcane industry.

The manual, *Precision agriculture for the sugarcane industry*, looks at all aspects of this modern farming technology and practice and provides useful advice for growers who are looking to invest as well as for those who are already using precision agriculture.

SRA Manager Mr James Ogden-Brown, said that precision agriculture was an example of a modern farming technology where there was significant potential for gain for the industry, with greater adoption able to benefit both growers and millers.

'This manual provides growers with important information that can help inform investments in precision

agriculture, which in turn can mean more sustainable growers and more cane across the rollers for sugarcane millers,' Mr Ogden-Brown said.

'With production costs increasing, this is another way for the Australian industry to improve its productivity and competitiveness.

'This guide sets out steps to adoption, outlines the benefits, and provides case studies on growers who are already putting the technology to good use.

'I encourage growers, millers, and advisors to grab a copy of the guide.'

Proserpine cane grower Tony Large is part of a local farming group that has spread and shared the investment in precision agriculture across this group, allowing the group to make investments that would have been difficult for them as individuals.

'For us, precision agriculture is about efficiency and making us more sustainable, for example by reducing soil compaction,' Mr Large said.

Although his group has already made the investment, he said that the manual would be useful for those who were looking to invest.

'I found it (the manual) especially useful where it ran through the range of GPS units that are available to help you choose which one suits you,' he said. 'I'd advise anyone looking to make the investment to consider those recommendations in the manual.'

For a copy of the manual email Andrea Evers on aevers@sugarresearch.com.au or call (07) 3331 3333.

SRA unveils new and comprehensive library of industry research

Sugar Research Australia (SRA) has unveiled a new resource for the Australian sugarcane industry bringing together a comprehensive library of industry research into one publicly accessible location.

The elibrary is available via the SRA website www.sugarresearch.com.au and provides full-text access to many research reports and electronic publications authored by SRA researchers and staff or sponsored by SRA.

SRA CEO Neil Fisher said the library had come in direct response to our industry representative bodies' and members' requests to have readily available access to industry research data, reports, and other communications.

'The work gathered here is freely available and the library will be a growing collection of data from the research activities across the cane industry,' Mr Fisher said.

'The site has a powerful search function that allows users to pinpoint across a range of topics and find exactly what they are looking for. Information is grouped according to SRA's eight key focus areas of research. I encourage our industry investors and other stakeholders to make the most of this important resource.

'If you are a grower or miller you can enter a key word or words and get a one page summary of our research. If you want further information, another click will give you a complete report.

'If you are a researcher, you can access the full scientific report and other reports on the same or similar topic or research theme.'





Sugar Research Australia Webinars

The SRA Milling Webinar series provides milling staff with the opportunity to learn more about milling research topics, as well as discuss the information being presented, and provide input and feedback.

Every webinar is recorded and hosted on the SRA website to allow those who weren't able to participate on the day to watch the webinar later or, for those who did participate, to view it again. Each month we will present a new webinar.

If you would like to receive email invitations for our webinar series, simply click 'Subscribe to Updates' on the home page of our website www.sugarresearch.com.au and select the 'Milling Webinars' option.



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RECORDED WEBINARS YOU CAN VIEW ON OUR WEBSITE

Customised software for the rapid life cycle assessment of sugar and associated energy products

Presented by: Phil Hobson

Awakening the sleeping giant

Presented by: Kameron Dunn

Real time scheduling system

Presented by: Arthur Pitney

Improved design of Robert Evaporator through experimental investigations and CFD modelling

Presented by: Omkar Thaval

Increasing harvest and transport efficiency through the use of locomotive GPS

Presented by: Alex Kono

SASTA and ISSCT workshop highlights

Presented by: Geoff Kent and Ross Broadfoot

A new approach to traffic officer training

Presented by: Geoff Kent and Meredith Godat

Improved modelling of wet scrubbers

Presented by: Anthony Mann and Hassan Ali

Competency based training of supervisors and operators (SOTrain)

Presented by: Ross Broadfoot

Total Research Investment for the Milling Sector

Project Title	Project Number	Principal R&D Provider	Chief Investigator	End Date
Key Focus Area 5 (Milling efficiency and technology)				
Determine the optimum tube dimensions for Robert evaporators through experimental investigations and CFD modelling	2012/054	QUT	Ross Broadfoot	01/09/2016
Improved modelling of wet scrubbers	2012/055	QUT	Anthony Mann	01/05/2017
Determination of factory processing procedures to better manage sugar quality issues	2012/057	QUT	Ross Broadfoot	01/09/2015
A retrofit to a mill to reduce its operational and maintenance costs	2013/059	QUT	Geoff Kent	01/09/2016
Reducing the maintenance costs of mill rolls	2013/060	QUT	Geoff Kent	01/08/2018
Real time harvest and transport system (under contract)	2014/037	QUT	Geoff Kent	01/09/2017
Improving mill efficiency through rapid analysis methodologies	2014/051	SRA	Eloise Keeffe	01/08/2017
Managing aspects of raw sugar quality in the Australian sugar industry	2014/052	SRA	Eloise Keeffe	01/08/2017
Investigation into modifying pan boiling techniques to improve sugar quality	2015/013	QUT	David Moller	01/06/2017
Increasing capacity to undertake cane preparation research through modelling and experimentation	2015/018	QUT	Geoff Kent	01/05/2019
Develop a blueprint for the introduction of new processing technologies for Australian factories	2015/043	QUT	Bill Doherty	01/09/2017
Key Focus Area 6 (Product diversification and value addition)				
Process for making bagasse paper pulp	2012/053	QUT	Thomas Rainey	01/05/2016
A profitable future for Australian agriculture: biorefineries for higher-value animal feeds, chemicals and fuels	2015/902	QUT	Ian O'Hara	30/06/2018
Key Focus Area 8 (Capability development, attraction and retention)				
Modification of lignin biosynthesis in sugarcane for the production of cellulosic ethanol	2010/068	QUT	Patrick Bewg Heather Coleman	01/05/2016
Biodegradable polymer nanocomposites derived from natural fibre and starch	2011/071	QUT	William Gilfillan William Doherty	01/07/2015
Enhancing sugarcane for decreased water content and increased sugar content at harvest	2011/072	QUT	Anthony Brinnin Mark Kinkema	01/05/2016
Production of furanics and chemicals from bagasse and molasses	2012/074	QUT	Joshua Howard William Doherty	01/04/2016
Investigating the utility of mill mud for soil health conditioning and nutrient use efficiency on sodic soils within the Burdekin	2013/077	USQ	John Bennett	01/09/2016



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