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VEHICLE SCHEDULING COMES OF AGE AND WINS GOLD

by

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In 2005 a SASRI project funded by the Department of Transport and involving MSc(Eng) student Ryan Giles, showed that large savings could be made if vehicles transporting sugarcane to mills were carefully scheduled. Such an initiative would significantly reduce both the number of vehicles and the number of no-cane stops. A case study indicated that in excess of R 18 m could be saved each year. During 2006 Ryan joined Crickmay & Associates (PTY) LTD who then became the service providers for a scheduling system known as FREDD.

The development of FREDD began in NSW Australia in the 1990s. The software design aimed to mimic the decision-making process of a top class manual scheduler. In this application FREDD proved very effective. Its potential to increase vehicle utilisation and the mill crushing rate was clearly demonstrated. This increased the supply chain management's confidence in the new transport scheduling systems ability to deliver sugarcane reliably in a 'just in time' (JIT) fashion to the mill. In one instance, the FREDD software signals the factory process control system to vary the crush rate according to the actual real-time supply pattern.

Since then, a number of articles highlighting the progress of this initiative have appeared in the Sugar Journal. To date, FREDD has been commissioned at three mills in South Africa and one in Swaziland. An alternative scheduling system has been installed at a fifth mill and a sixth is about to install a system.

The FREDD System

The system is not purely an installation of software but rather the result of four important steps:

- Installation of hardware (including support and maintenance).

- Installation of the scheduling software.

- Selection of project personal (operational, support and maintenance staff).

- The Supply Chain Improvement Process (including analysis tools and consulting staff).

The system uses a real-time method of scheduling where the driver of an empty truck from the sugar mill is given an instruction of where to collect the next load of sugarcane. This allows the system to

accommodate the many operational changes that take place during the day as various constraints occur (for example, breakdowns).

In order to monitor the progress of vehicles while travelling or loading, vehicle management systems with GPS and GSM modem are installed on all vehicles. The FREDD system is significantly enhanced if it is directly interfaced with a local information system such as LIMS or the local factory control system. This facilitates various automation procedures enabling schedulers to spend more time on supply chain problem identification and resolution such as cane availability.

The supply chain management function that the FREDD project fulfils is an important one for all the role-players: millers, hauliers and growers. Therefore, in all cases, competent personnel are sought because these individuals determine the ultimate success or failure of the project.

The four discrete role categories are:

• Supply Chain Manager

• FREDD Schedulers

• Project change agents

• Support and maintenance

On implementation, the system quickly provides an improvement in the performance and efficiency of the supply chain by coordinating and managing the logistics as a single system, rather than the individual elements managed independently.

One cannot expect 100% success in a short period, but rather that the FREDD system enables one to manage the resources optimally within the given constraints. The ongoing challenge is to gradually reduce these constraints and allow the software to coordinate the supply chain more and more efficiently. One of the valuable features of the software is to identify and record areas of opportunity and weakness which can be addressed.

Examples of supply chain constraints are: complexity imposed on the system by vehicles that can only haul from certain growers, unbalanced loading windows, sub optimal shift-change strategies and loader availability.

This process is facilitated by using the Logistics Information Platform (LIP) which is a software tool designed and supplied by Crickmay & Associates as a component of the project. LIP provides FREDD with all of its reporting capability as well as providing for an interactive component for the Supply Chain Manager and Change Agents to interrogate the information and better understand the problems that need to be addressed.

Results

Efficiency improvement occurs over a period of time as the supply chain constraints are eliminated. At Maidstone, the mill turnaround time was reduced from 2.1h to 0.7h equating to a 67% reduction in just 2 years. The cost savings resulting from the reduced mill turn-around alone are estimated conservatively at over R12.7 Million pa.

At Maidstone there has been a 54% reduction in mill no-cane-stops from 1369 hours to 636 hours in the first year of FREDD operation. Although difficult to calculate exactly, the savings associated with the reduction in mill stops are estimated to be in excess of R14.7 million.

Qualitative remarks from role players at the mills include:

- Supply Chain Manager Darnall: We used to operate with as many as 23 trucks in the holding yard and 7 in the mill. I never thought I would be comfortable with only 3 trucks in the yard.

- 3rd Generation Darnall Grower: The mill performance in the last 2 years has been the best for as long as we have grown cane in the area (since 1920s).

- Two large private growers in the Darnall area: "We haven't left a stick of cane behind since FREDD has been introduced.

- Darnall grower and private/commercial haulier: I have increased total tonnage hauled from 36 000 t (own cane) by 31000 t (new commercial contracts) to more than 67 000 (with the same two vehicles).

- Supply Chain Manager Darnall: In 2008 we had our worst mechanical efficiency (83%) at the mill for a ten-year period. Every grower in the area that does not know the figures says it has been the best year since 1987 (1.5 m tons). This is because the FREDD controllers smooth the movements of trucks and good communication allows all to know if there is a delay, and why and how it will influence their daily delivery.

- Inbound Logistics Manager Malelane: We use to think we knew where our problems were, but now we really know. I never knew how bad it (the supply chain) was.

- Darnall/Gledhow grower / haulier: What I do with two trucks into Darnall (with scheduling) takes me three to do at Gledhow without scheduling.

- Darnall Miller: Traditionally, prior to FREDD, if there were less than 7 vehicles at the mill, the mill operators would start preparing for boil-off and a no-cane stop, currently we have got a maximum of 5 and minimum of 3 vehicles at the mill at any given time. Mill operations and best practices had to be changed to accommodate this, and the mindset change of all employees had to take place as they constantly wanted to boil off or "bank" the boilers due to the perceived shortage of trucks.

- Darnall Supply Chain Manager: We have not only reduced our mill turnaround by over 50% but at the same time have been able to increase our average crush rate.

- Darnall grower/haulier: This year I have transported over 53 000 t with one vehicle. This just would not have been possible without FREDD at our mill.

- Darnall Efficiency Committee Member; management of the cane yard has never been easier.

- Maidstone Efficiency Committee Member: the Transport Joint Venture project would have been impossible without FREDD.

- Darnall grower: having advanced notice of cane flowing to the yard enabled us to take effective action.

- Malelane Efficiency Committee Member: We have been able to move 200,000 t more with no extra vehicles in the fleet.

- Malelane commercial haulier: We have been able to sell six of our older (and all different) vehicles and buy four new identical ones to do the same job.

While the implementation of scheduling at some mills in Southern Africa has been an unqualified success, there is still a long way to go and none of the installations is operating at full potential. However, many lessons have been learnt, large savings have been made and we believe this is a springboard for the industry to make even greater savings in the future. If stakeholders cooperate, they can make a difference. In many instances it will require a mindset change. In 2009 the success of the FREDD project was recognised for its contributions to the efficiency of the supply chain and was awarded the prestigious gold award by the South African Logistics industry.

Acknowledgements

This project would not have been possible without the enthusiastic and committed support of many people from the following organisations: SASRI, Department of Transport, Crickmay & Associates, SAGCA, Agtrix (Australia), Sunshine Sugar (Australia, New South Wales), BEEH, UKZN, THS (Darnall & Maidstone), TSB (Malelane) and Illovo Sugar (Sezela).

Participants in the FREDD Project receiving the Gold Award from South African Logistics Industry.

From left to right :   Ryan Giles - Supply Chain Consultant, Crickmay Supply Chain Evolution

Peter Lyne - Principal Engineer, SA Sugarcane Research Institute

Kathy Hurley - Director, Regional Services, SA Canegrowers Association

Jan van Niekerk - Manager, In bound Supply Chain, TSB Sugar

Grant Corson - Supply Chain Manager, Maidstone, Tongaat Hulett Sugar

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AGRO-PROCESSING DATABASE

by

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Background of the Database:

The original Agrelek Food-Processing Database was operated as a joint project between the Agricultural Research Council – Institute for Agricultural Engineering and Eskom's Agrelek division, and began in the late 1990's. The project was defined as a comprehensive and detailed reference guide for the processing of agricultural products and included information on, among other, the processing of dairy products, deciduous fruits and meat. Eskom dissolved its Agrelek branch in 2004. The Institute for Agriculture Engineering took ownership of the database with the closing of Agrelek, and the project was renamed to the Agro-Processing Database, in order to encompass the vision which the project team had for the database, which was to include not only food processing information, but also crop and cultivar information, and other agricultural processing methods.

Main Objectives:

For South African farmers searching for new ways and opportunities of adding value to crops, it is important that sufficient information and knowledge be made available on the opportunities that are available. Options need to be selected carefully based on sound information of these processing opportunities presenting themselves on a regular basis seen in the light of the strengths and weaknesses of individual farms.

The main aim of the Agro-Processing Database is to provide the client with some detailed but not–too–technical information on agricultural processing, be it food processing or other processing methods, in order to realise the extent of the operations involved in the production of foodstuffs and to provide interested parties with insight into food production and processing in general. The database is aimed at accumulating as much information as possible regarding the processing of food stuffs from raw product to final product, into a detailed, easily accessible, reference work. In the past decade the Agro-Processing Database has expanded to the point where in now covers more then 20 food groups, which jointly contain more than 67 product categories. Furthermore, the database also attempts to provide both large-scale and small-scale processing methods. In addition to food-processing information, there is also a section on crop / cultivar information currently available.

The information contained in the Agro-Processing Database is of use to agricultural role-players and the suppliers of food processing equipment, farmers, students, training institutions, extension officers, entrepreneurs, and to anyone who is interested in food processing and agricultural products. The information may also be used to compile training courses on minimal and small scale processing of food products on farms and in communities to add value to crops and enable communities and rural farmers to be self-sustaining and profitable.

Work Methodology:

With the closing of Agrelek, the information contained within the database at that time was fully transferred and placed at the disposal of the Institute for Agricultural Engineering to use as they saw fit. After taking over the database, a number of enquiries regarding the information and format of the database at that stage were made. Shortcomings were identified and addressed, and the information received from Agrelek was evaluated.

Foremost among the problems that were encountered, was the PDF-format in which the files were provide to the ARC, which limited the ability of project members to send information to clients via e-mail. In order to solve this problem, during 2005/2006 the food processing reports was transferred to more accessible Microsoft Word documents. This transfer included process flow diagrams, complete process-step descriptions, legislation where available and literature sources, all of which was completed by January 2006. With this first step completed, more processing options were identified by the IAE and research began to further extend the number of product processes covered by the database. Discussions also began into ways to make the database more accessible and easier to use, which finally resulted in the decision to compile a number of publications, and also to write the Agro-Processing Database into a Microsoft Access database format, which would be able to link records within the Access database to the relevant Word documents, and also make the database fully searchable. These additions to research and changes within the project then also required the name change from Agrelek Food-Processing Database to the ARC-IAE Agro-Processing Database, as the project had now evolved into a uniquely agricultural research information system.

In its most basic form, the information on food processing contained in the current Argo-Processing Database is made up of reports which consist of two parts:

- The first part gives a little background in the product being discussed and also provides a flow diagram of the steps to be followed during processing;

- The second part gives detailed descriptions of each processing step. It also gives a list of the sources from which information was obtained.

The information contained in the database entries is researched from a wide spectrum of sources including encyclopaedias, reference works, magazines, Government publications and Internet resources, as well as from enquiries made to industry leaders. In order to keep the database relevant, it is regularly updated and the publications are revised to contain the latest information available.

Current Status and Future Vision for the ARC-IAE Agro-Processing Database:

Currently the database is available as hardcopy publications and through the Microsoft Access database on the network of the Institute for Agricultural Engineering, which enables all users on the network to gain access to the search functions of the database, the Word documents and other information such as crop/cultivar information and scanned documents. Technical revision of the current publications is also an ongoing activity to ensure that the information contained in them is complete, relevant, and most importantly, up to date.

Future planning for the database includes the expansion of the information to contain more household and rural processing of crops, more crop and cultivar information, a supplier and role player database, product processing facility engineering, and the packaging of the information into other relevant formats such as making the complete database available via the ARC Intranet and internationally via the Internet. Information should also be added to enable training modules to be complied with information on the prevention of soil erosion, water harvesting and small scale irrigation to assist in environmental conservation in rural areas.

VERSOEK AAN ALLE LEDE:

(i) Om die databasis van die lede korrek en op datum te hou, word lede versoek om asb hulle naam, kontak foon-nommer (beide kantoor en selnommer) en korrekte email-adres te e-pos na Luther Siebert by mls@iafrica .com Bogenoemde inligting sal verseker dat die versprei- ding van inligting korrek plaasvind en die lede bereik. (Enige bykomende inligting bv ID- nommer, pos adres, huidige werkgewer, ens sal waardeer word.)

Lede wat reeds bogenoemde inligting deur gestuur het word bedank vir hulle samewerking.

(ii) Alle lede word vriendelik versoek om enige nuusgebeure, gebeurtenisse mbt die landbou en ander inligting deur te stuur na bogenoemde e-pos adres vir verdere verspreiding.

(iii) Om instaat te wees om 'n nuusbrief saam te stel wat die aktiviteite van SAILI se lede weer gee, word n vriendelike versoek aan alle lede gerig om artikels in te stuur waarin die lid se huidige werks aktiviteite of belangstellings velde uitgebeeld word. Stuur asb sodanige artikels na bogenoemde e-pos adres.

REQUEST TO ALL MEMBERS:

(i) To be able to keep the member database up to date and correct – which will aid in the dis semination of information to members – each member is requested to please email their name, contact telephone number (office and cell) and correct e-mail address to Luther Siebert at mls@iafrica.com. (Any other information, e.g., ID number, postal address, present em ployer, etc will appreciated.)

To those who have already submitted the above a word of thanks.

(ii) All members are invited to send news items, agricultural activities in their regions and other relevant information to the e-mail address above.

(iii) To be able to produce a newsletter of interest to the members, a request is made to all mem bers to please submit articles about their present field of work or interest of between 1000 – 1500 words for publication. Please send such articles to the above e-mail address.

We would also like to remind members of the following SAIAE Branch meetings:

KZN Branch - 2nd March 2010

Western Cape Branch - during the week of 15 - 19 March 2010

Graag herhinner ons lede daaraan dat die volgende SAILI Tak vergaderings sal plaasvind :

KZN Tak - 2de Maart 2010

Wes Kaapse Tak - Gedurende die week van 15 - 19 Maart 2010.