

VEHICLE SCHEDULING COMES OF AGE AND WINS GOLD

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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, suboptimal 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: Tthis 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.

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