

## Seamless transition to new ProFoss NIR system at Isis



*ProFoss near infra-red (NIR) systems have been installed at several Australian sugar mills in 2017 with the help of milling researchers at Sugar Research Australia (SRA).*

At these mills, the new system is a replacement for the Direct Light NIR instrument, which is no longer being supported by its suppliers, thus creating risks such as a difficulty sourcing spare parts.

SRA Leader for Milling Efficiency and Technology, Steve Staunton, leads the NIR team at SRA and said his team had been working with mills to make the transition as smooth as possible for the installation of the instruments, which are crucial for measuring parameters for cane payment such as CCS and fibre.

One mill that has had the ProFoss NIR in operation for the final weeks of the 2017 crush is Isis. They made the switch in September after running both instruments in parallel from the start of the season.

Production Superintendent with Isis Central Sugar Mill, David Pike, said the mill identified that the hardware support for the Direct Light units was at risk, as Foss service contracts for these type of instruments expire at the end of the 2017 season. Isis had been running the Direct Light NIR system since 2007.

“The transition to the ProFoss was quite smooth, but not without some challenges,” Mr Pike said.

“Our internal IT team had to realign the ProFoss data string with our cane receivals system and we also had some timeout and windows OPC server problems.

“These were resolved quickly by the SRA team and without their ongoing maintenance support of the software and calibration platforms, the new ProFoss

NIR system would not function to the level of confidence required for cane payment.”

He said the support from SRA was paramount to the installation and operation. Mr Staunton said: “In running the systems in parallel, and based on that data, we saw that the new system was outperforming the old, and Isis were able to make the switch seamlessly. “We had a turnkey solution available, which is a bolt-on with no moving parts.”

The ProFoss systems are calibrated to the laboratory methods for Australian sugar mills for cane parameters such as brix in juice, pol in juice, cane fibre and cane CCS. A continuous series of check samples are analysed by the mill laboratory using the traditional wet chemistry methods and compared to the ProFoss results to ensure the system is both accurate and precise.

The statistical parameters that demonstrate acceptable performance of the system are:

1. The standard error of prediction (SEP); this metric shows the standard difference between traditional laboratory analysis and the online ProFoss analysis. Acceptable SEPs for each parameter are defined in the calibration process and are monitored using the laboratory results plotted as control charts to ensure the system is within acceptance limits.
2. Prediction bias; this metric describes the average difference between the laboratory and ProFoss results for the laboratory check series.



3. Linear regression between the laboratory and the ProFoss results for check samples. Linear regression parameters such as slope of the regression line and the co-efficient of determination ( $R^2$ ) describe how similar the two sets of results are to each other from the highest to the lowest values. Linear regression slope should be between 0.90 – 1.10 and the co-efficient of determination should be as close to one as possible (one being a perfect match).

**Opposite:** Production Superintendent David Pike.

**Above:** Tanyia Rainbow and Kim Swan with Isis Central Sugar Mill validating the ProFoss NIR instrument with traditional cane payment methods.

**Below:** An example of a linear regression line, with SEP and Bias, for ProFoss CCS in Cane at ISIS mill is shown in the figure. The results for the ProFoss shown in the figure meet all the requirements for cane payment.

Isis Mill, 2017: Profoss Cane Analysis System Laboratory Validation Plot CCS % Cane

