

NIR - the power of centralisation

CHRISTIAN TOLLEBÄCK* discusses the advantages of networking which allows multiple NIR instruments to be connected, enabling feed producers to manage instruments from a single location, which not only saves time, but can significantly reduce costs.



Near Infra-Red Spectroscopy (NIR) is an excellent tool to measure the nutritional composition of feed ingredients as well as compound feed. The technology has been used for analysing feed stuffs since the 1980's. The advantage is obvious, in less than two minutes you can analyse a wide range of nutritional parameters. The spread and expansion of the technology, however, was limited in that it is an indirect method and it needs to be maintained and supported continuously in order to produce reliable results. This is especially true for the feed industry with the diversity of raw materials and by-products being used and constant changes. NIR is an indirect method; the calibrations will only measure samples that are similar to the samples the calibration was build with. The results can be trusted if

the methods are validated properly and with ISO 12099, we have tools to ensure that the technology is trustworthy and can be used as equivalent to the reference method (ISO-5725-6).

Success factors for implementing NIR

Many larger companies have already successfully implemented NIR. One of the proven success factors when implementing NIR has been to have a centralised NIR organisation within the company. Typically a NIR organisation would include three levels;

- Central NIR Team - which for some companies is only one person, but for larger companies is a group of people. The advantage is to have a dedicated team to become experts, so that experience and knowledge



can be accumulated in one central team, instead of having specialists in each production site with less knowledge and experience. The NIR team is responsible for the company's NIR strategy, management of calibrations, configuration of instruments, internal standard operating procedures (SOP's), training and supporting the NIR installations throughout the organisation.

- **Site Key User** - typically at each site, a person that has other primary functions and has some, but limited NIR knowledge, acts as a link between the Central NIR team and the site.
- **Operators** – who are usually trained by the site key user.

Using NIR is simple, and since there are no consumables per sample, the costs are fixed regardless of how many analyses are done. This opens up for the possibility to have multiple operators analysing samples, with minimum training.

Now it's all working nicely, you have the instruments, you have the organisation but how can you rely on the performance of your NIR's over time when they are not installed next to your desk and there are several of them to handle?

In answer to this everyday question, many have begun to use freely available software to gain remote access to their instruments. This approach is still a one-to-one

situation where the NIR itself is blocked during the remote control, and secondly you have to repeat it for every installation. You might have saved yourself a walk through the production floor, or a flight ticket and travel, but the work you have done is still essentially local to that particular NIR, and it is a reactive approach.

Remote NIR networked database

The solution is a networked database approach. Today we are used to having access to email and other cloud services from multiple devices, from our smart phone, tablet, from our work or private PC. All information is stored in a central server and when you check your email or calendar, the software synchronises with your server to search for new mails and updates. The Mosaic networking software from Foss works according to the same principle. All instrument data is stored in a central database for all instruments in the network, at the same time all local data from each instrument are stored locally, upon synchronisation, when Mosaic check for changes, data is both uploaded to the server as well as downloaded to the instrument.

When an NIR instrument synchronises, sample data, check samples and instrument performance reports are typically uploaded to the server. Calibrations, Slope and Bias adjustments, configurations and even software updates are downloaded.

Encrypted for data protection

The Central NIR team can also add some safety features when managing NIR through a network solution. First of all the Mosaic networking software can encrypt the calibration, making it possible to control the usage and make it impossible to copy the data to be used elsewhere. Many companies spend big resources on calibrations. With Mosaic you can actually control access and "turn on and off" the possibility to use the calibration like to you turn on and off the light switch. Some of our customers are using Mosaic to provide calibrations to their customers. If a commercial relationship ends, the Mosaic manager can simply turn off the

possibility to use the calibration at any given time. It is also safe in that perspective, that if a computer is broken and needs to be replaced, all data is backed up in a central server and when the new computer arrives, operations can continue as from the last synchronisation.

Harmonisation

One of the bigger advantages of having a centralised NIR organisation together with networking software is harmonisation. One of the advantages of NIR is that it is highly repeatable. If set up correctly, the standard deviation between a group of NIR instruments is less than the standard deviation between different laboratories using the reference method. We all strive after consistency, but if the individual NIR's are not controlled, calibrated and configured equally and in a standardised way, you will lose the benefit of having harmonised results. With all instrument data stored in one location, you have a better overview of how the different instruments are used, but more importantly, you can also make sure all operators are using the instrument with the correct calibrations and settings. You can also protect the calibrations from being locally manipulated by adding a wrong bias and you can for instance make sure that you have the right calibration for the right product, as a NIR manager you are in control and you can lock the possibility for local adjustments if needed.

So what if you have only one instrument is networking still an option? You still have the advantage of backing up all data and you still have the advantage of not interrupting daily operations when updating and configuring your instrument. You have also the possibility to let an external expert assist you or help out with troubleshooting that could be for instance an expert from your NIR supplier who can better help you remotely. You can also outsource tasks such as calibration development and monitoring.

FossAssure

Securing the instrument as well as the calibration performance are two cornerstones when creating a



NIR strategy, regardless if you have a one or several instruments in your organisation. Networking can be a tool that can assist you in implementing this strategy. Many tasks, however, depend on your NIR organisations skills, time and ability to detect where improvement and corrective action is needed. For this reason, an additional service has just been launched from Foss, called FossAssure. With the Mosaic networking software, you store all important instrument information in one central server. FossAssure is

created to make use of this data in a smarter way. FossAssure creates automatically reports about the status of your instrument. The report is read and interpreted by a NIR application expert where we look at certain performance parameters. If the instrument is performing as expected, no action is needed and it gets a green value. If there is a potential problem that needs to be addressed, an email is sent out with instruction with suggested corrective actions. If there is a critical problem, which we would mark red, an application expert would contact the customer immediately to discuss corrective action. It is a service that can be used in a more active proactive way, where we can provide support first if there should be any hardware related issue, and in the second phase it will also include calibration support based on the calibration performance.

What can networking do for you?

More and more NIR users are finding the advantages with

networking software. It can provide you control over those obstacles that has before limited the usage. Companies that have introduced networking software have been able to not only increase the reliability and performance of their instrument(s), but also lowered their operating costs by up to 33%, mainly by spending less time on support and training, and less money on reference analysis for validation and updating of their calibrations. **AF**

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