

Top 7 tips to get the most from your process - by digitally recording the data

Food and Beverage Knowledge Series
Written by: Amber Watkin

Executive Summary

The recording and reporting of data is essential to meet critical process parameters in many food and beverage processes, but can also provide additional benefits in terms of efficiency. This report covers our Top 7 tips on the potential savings that can be achieved in terms of time and energy, plus what features to look for in a modern digital data recording solution.

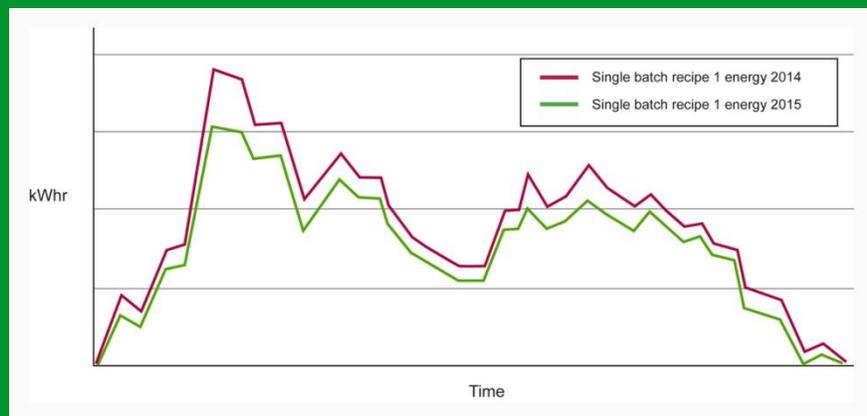
1. Recorded data empowers you to save energy



We often hear people say “I don’t know how much energy is being used by my process” and new legislation like the Energy Saving Opportunity Scheme (ESOS) is driving larger plants to review and report their energy usage. Under the ESOS scheme, large companies that are not covered by ISO 50001 energy audits will need to review all substantial areas of energy use in order to report their performance and identify potential efficiency savings. These energy assessments must be carried out on 12 months’ worth of data and repeated every four years to demonstrate improvements. In older factories where production lines are still reliant on utility electricity meters it is often impossible to tell how much energy is used on individual lines and processes in the plant, and even if modern energy meters and sensors have been fitted at optimum points of measurement, you still need a way of collecting, recording and calculating the data in a meaningful way for analysis and reporting purposes.

Most modern energy meters have communications built in, allowing data to be sent to a logger or recorder for analysis and reporting. Data from probes and sensors can also be recorded by feeding the output signals into data loggers’ inputs. Full featured digital recorder models have advanced mathematical functions to carry out calculations on the data. The resulting signals can also be recorded, providing valuable information to engineers responsible for meeting energy saving targets and for reporting to management.

- **Comparing this year’s energy usage against last year’s in specific areas can prove that your implemented energy saving improvements are working**
- **The recorded data can also be used for reporting in audits such as ESOS**



Difficult to prove without recording the data!

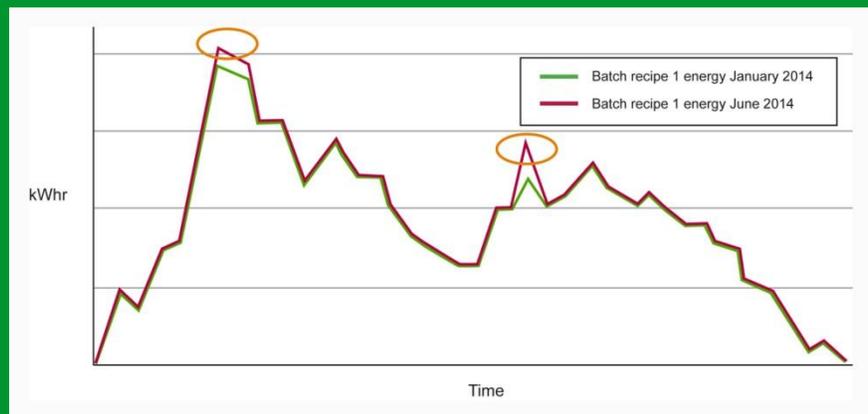
2. Benchmarking the process for better predictive maintenance



The equipment used in the manufacturing of food and beverage can have a hard life, particularly in continuous processes. Equipment like thermocouples, motors and compressors can become degraded over time and may not be operating at their full potential. It is difficult to know when components are wearing out and likely to cause problems in the process. Also, Overall Equipment Effectiveness (OEE) and Total Effective Equipment Performance (TEEP) are increasingly important Key Performance Indicators (KPIs) in modern business. OEE quantifies the performance of a piece of equipment or production line relative to its optimum capacity during its planned run time. The result is then measured against the maximum possible running time to calculate the TEEP. The calculations involve metrics based on loading, availability, performance and quality and the resulting information shows up efficiency problems like down-time due to unplanned maintenance and product quality issues.

The benefit of recording your process is that you can use the data to benchmark aspects of the output for comparison over time. For example, the energy used in a batch can be recorded and compared at monthly intervals. If more energy is being used, something could be going wrong in the process which can then be investigated early before a complete failure occurs. Also, given the benefit of visual data, maintenance personnel are often able to recognise when components are starting to fail. For example, a failing compressor will show a recognisable wave signal. The recording product can be configured to trigger an alarm based on aspects of this kind of signal pattern using maths functionality, informing the maintenance team and preventing unplanned down time. The ability to make comparisons between recorded benchmarked process data and current process data is becoming a valuable advantage to efficiency during manufacturing, improving profitability through better OEE and TEEP.

- When more energy is used to make the same product over time it can mean a component in the process is starting to fail
- The time it occurs in the process can be a clue to which component or piece of equipment is becoming worn



Impossible to see without recording the data!

3. What do we mean by *Secure Data*?



Some food safety standards and guidelines dictate that the recording system must be able to determine if recorded data has been altered or made invalid. Many data recording systems such as those within SCADA, PLCs and basic data loggers save data in .csv file format. This format, while very useful for easy import into spreadsheets, is in no way safe from tampering, or able to indicate that it has been tampered with, and therefore cannot be used for processes that require high level data integrity like 3rd party audits and government standards. Another problem can arise from the way data is collected, some SCADA software packages record data not from within the recording product but over communication lines. If communication is lost, so is the data, making this kind of system unsuitable for certain applications.

When choosing a method of recording, the first feature to look for is a secure file format that is not editable. Data recorders and some precision PLCs are available that save data in binary check summed files which are resistant to tampering and only viewable using specific software. This is a much better solution than using .csv files which are easily editable and therefore not secure. An added benefit is that the files can be compressed so more data can be stored on the product itself before transferring to other media. Another important feature to look for is that the data is recorded at the point of measurement i.e. in the recording product, which solves the problem if communications are temporarily lost during transfer of data. Look for products with self-healing store-and-forward strategies that automatically backfill any missing data caused by breaks in communication as this will save time compared to transferring missing data manually.

Full featured recording products have security management options that provide a tamper resistant audit trail for recording User Names, Passwords and Access Permissions. All operator activity is logged and recorded in a secure database. The permission to change something can be by electronic signatures designed to assist with regulations like FDA 21 CFR Part 11 and 21 CFR Part 113. For example, an operator could be given permission to change configuration by digital signature or they may need to get a second level of authorisation from a quality engineer. The important thing is that the changes will be logged for quality personnel and auditors to review should they need to. Features like these that bring traceability of 'who did what' in a process are useful in many applications to help maintain Good Manufacturing Practises (GMP) and Hazard Analysis and Critical Control Points (HACCP) guidelines.

4. Compliance to standards



Measurement and the recording of temperatures are important for the storage of perishable goods like dairy and meat products within GMP and HACCP guidelines. For companies who also export product to the US and need to comply to standards such as 21 CFR Part 11 and 21 CFR Part 113, it is vital to prove that the product in question has remained within its critical temperature limits throughout its storage, processing and manufacturing. Basic data loggers/recorders do not have the required high levels of measurement accuracy or secure data storage and transfer strategies to comply with these kinds of standards

Forward thinking European food manufacturers are moving to recording products that aid compliance to 21 CFR Part 11 and 113, in order to future proof their processing and manufacturing flexibility. This can be a key differentiator in winning contracts over the competition. For example, a European manufacturer of canned meats was recently chosen to supply food for astronauts on the International Space Station (ISS) based on their compliance to FDA and USDA standards. The company had invested in modern digital control and recording equipment with high accuracy I/O and rejection to noise in industrial environments, allowing for precise measurement of the recorded signals. Secure tamper resistant data is captured in the form of binary check summed files which can easily be reviewed by quality engineers and auditors, and the activity of operators and engineering personnel is logged with password authorization in an audit trail in accordance with FDA standards. Features like these make this type of product an ideal solution to prove that critical parameters have been met for the correct amount of time, ensuring the safe processing of meat and dairy products within GMP and HACCP guidelines.

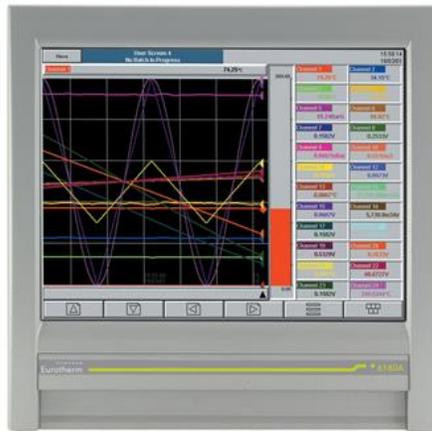


5. Moving from paper to digital recorders

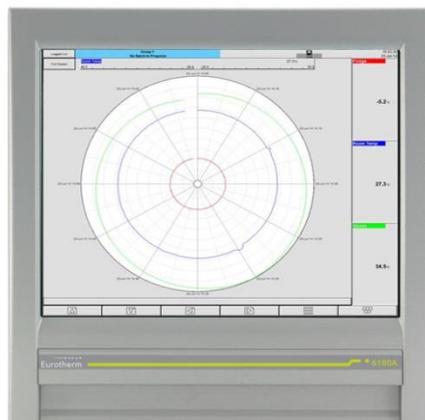
- **No need for paper and pens**
- **All data securely digitally stored**

For those who are still using paper recorders, there are ongoing problems involving cost and maintenance of replacing charts and pens, plus secure storage of the data in paper chart form. There is also the possibility of pens or paper running out during a batch. Missing data can result in wasted time for quality engineers while assessing the non-conforming process and can result in the possible scrapping of the product.

There are several benefits of moving to secure digital recorders. Firstly, there is a cost saving as you no longer need to buy, store and conscientiously dispose of paper and pen consumables. Secondly, you will save on maintenance time as there is no need to replace paper and pens on a regular basis and the product is more reliable due to less mechanical parts. Last but not least, the data is stored in digital format which is much more convenient to view on a PC, Tablet or Smartphone. Full featured secure digital recorders store data in a secure tamper resistant file format within the product which can be securely transferred to removable media (USB etc.) or servers over a network. The data can then easily be retrieved for quality checking, reporting and auditing, unlike paper charts which can easily be mis-filed, lost, or run out during the process.



For companies that traditionally use circular paper chart recorders, moving to digital is not a problem as some digital recorder models are available with circular chart options. The added benefit of this kind of digital recorder is that you can easily display the chart in a number of different ways including horizontal, vertical, bar chart, numeric or circular format, just by scrolling through the different views.

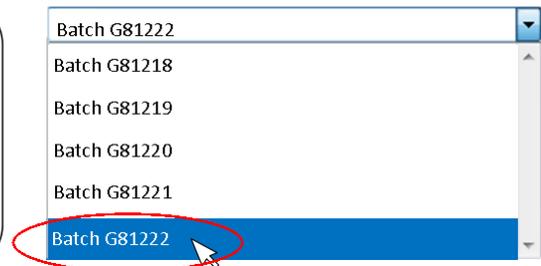


6. The benefit of recording by Batch

- **Data recorded by batch for easier quality sign off**
- **Quality signature digitally saved with the batch data.**

Being able to record what happened during a batch process is very powerful, especially if something goes out of limits. A quality engineer will need to assess the data before signing off the Batch, a time consuming task, especially in older plants where paper procedures are still being used.

Full featured digital recorder products have batch functionality which enables the operator to record individual batches with a start and stop button on the screen, or by external input via a bar code scanner for example. The data from the batch is then easily retrievable by the quality engineer for assessment purposes via a PC. Software for reviewing the secure files can be used to zoom into areas where problems occurred and the historical data also shows all messages whether triggered by an alarm or entered manually by the operator. The reviewing software also allows digital signatures to be added to the batch for sign off. The main advantage of digital batch recording and signing is it saves time for the quality personnel and gives them all the data they need for easy reporting and compliance to standards.



7. Easy Reporting



We all need to supply reports nowadays, to prove compliance to process parameters, account for energy usage and present our KPIs. It is still common to see personnel manually creating report documents and often that input data needs to come from various sources. This can mean scanning or photocopying data and images like paper charts into digital format, manually manipulating and calculating data, and cutting and pasting information into documents by hand. For some people it can waste several days per month. There is a better way to produce these reports!

Most reports are required on a regular basis and the solution here is a software reporting package designed for industrial automation applications. These contain configurable report templates along with drivers for pulling data from a variety of common devices and file sources. The real time saver is that the data can be pulled in automatically over a network, creating your report the way you want it, saving it as a secure PDF and sending it to the right person. Collecting your data digitally at the source, enables you to save time in the everyday reporting process even if creating them by hand, but the most efficient way of reporting the data in the long term is to take advantage of a dedicated software reporting package, so you can get on with your daily tasks without the bother of time consuming manual reporting.

Make the most of your energy and assets

Eurotherm have designed 50 years of knowledge into our recording products which gives us the leading edge in secure digital recording. Our specialised features such as Batch, Maths and Auditor, simplify the collection, calculation and recording of data, to give you the information you need to save energy, predict maintenance and create your reports. Our intelligent recording method, unique secure file format and secure data transfer strategies for archiving, aid compliance to standards like FDA 21 CFR Part 11 and 21 CFR Part 113, enabling food manufactures to export their products globally. From discrete products to full automation solutions and industrial reporting packages we can help you save costs and improve your efficiency.

Get the most from your food and beverage process

To find out more visit www.eurotherm.co.uk/en-gb/industries/food/

