



How to build an IT infrastructure for net weight control

Introduction

This white paper explores the key Information Technology (IT) issues that engineers and quality professionals should consider when developing a net contents or weight control program. The intent of this paper is to give non-IT specialists the background they need to better communicate with their IT counterparts and other business leaders, and thus have more effective conversations.

A modern weight control program cannot operate as a stand-alone point solution. It must span geographic space, hosting data from multiple lines and even divisions. Because of the proliferation of co-packers it must sometimes also span company boundaries. It must support data entry from humans, as well as direct acquisition from a wide range of weigh scales and devices. And it must connect and interoperate with other business applications.

The ideal system is inexpensive, using 'off-the-shelf' hardware and software. No components can be proprietary, and there should be a minimum amount of software customization. At the same time, the system must be impervious to harsh environments such as high temperatures or wash down protocols and offer the flexibility needed to support such a diverse environment.

Building an infrastructure

A weight control system should be deployed using standard, 'off-the-shelf' hardware and software offerings. Avoid home-grown or proprietary databases, and make sure the system supports the company's strategic IT direction.

One valuable extension of the Microsoft platform is the use of Terminal Services / Citrix Metaframe. Terminal Services is a component of the Windows Operating System that allows a user to access program applications stored on a remote computer (server) on a network. Citrix Metaframe (developed by an independent company, Citrix) is the underlying technology for Terminal Services, and extends the functionality of Terminal Services. (For additional background on Terminal Services, visit http://www.windowsnetworking.com/articles_tutorials/Overview-Terminal-Services.html.)

Deploying a weight control program in a Terminal Services environment provides several important benefits:

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| Reduced Costs | By concentrating computing resources in centralized host server, you can use older and much less powerful computers as the clients. This can reduce your capital investment and extend the life of your existing desktop computers. |
| Increased flexibility | Terminal Services client drivers are also available for Palm and WinCE (PDA) devices, making it possible to run powerful desktop applications on portable, pocket-sized devices. More on this phenomenon later. |
| Easy deployment | Terminal Services enables you to deploy powerful solutions to remote locations with very little IT support. Many packers and co-packers are located in very small facilities, where the local IT guru is probably self-taught on his home computer. Terminal Services enables these facilities to deploy state-of-the art technology |

with no more than a PC (or Palm or Windows Mobile device) and an Internet connection.

Economies of scale

Terminal Services makes it easy to store and share data in a centralized location, offering substantial economies of scale. At the same time, Terminal Services provides robust security protocols.

One other infrastructure issue is the in-plant network infrastructure. Wherever possible, use secure, wireless network connections to provide the greatest flexibility and portability. Wireless technology makes PDA data collection a reality.

Wireless PDA devices are an ideal solution for a food packaging environment. Many food packagers must sanitize down their facility regularly. The traditional solution to delivering computing power in this environment is to deploy hardened workstations. For a fraction of the cost of a hardened workstation, one can deploy a wireless PDA. When it comes time to wash down the facility, the operator can tuck the computer safely in his pocket.



Data storage and traceability

In keeping with the theme of using standard, off-the-shelf technology, make sure that you build the system with multi-user high-end databases such as Microsoft SQL Server or Oracle. Both are ODBC (Open Database Connectivity) compliant and are good options. In addition, there are several low-cost and low maintenance databases, such as Pervasive, which are also suitable. Avoid single-user databases such as Microsoft Access because they do not share data well in a multi-user environment.

The system should support lot genealogy so that it is easy to search for a specific raw material lot number and identify all the products made with this lot of material. Ultimately you need to be able to answer these kinds of questions:

- Do different lots of raw material significantly impact process variability?
- If we have to recall all products made with a particular lot of raw material, can we identify all of the production lots that need to be recalled?
- Can we identify which customers received a production lot that is being recalled?

Following these guidelines also supports the Regulations Concerning Recordkeeping in the Bioterrorism Preparedness Act of 2002.

Finally, the database repository itself should be optimized for speed and security.

Simplifying connectivity

Think of the weight control system as a triangle, where each corner is the opportunity to connect to something. One corner connects to scales (balances) and other instruments. Another corner links to existing business systems. The third corner is the human interface. Let's take the connectivity to the scales first.

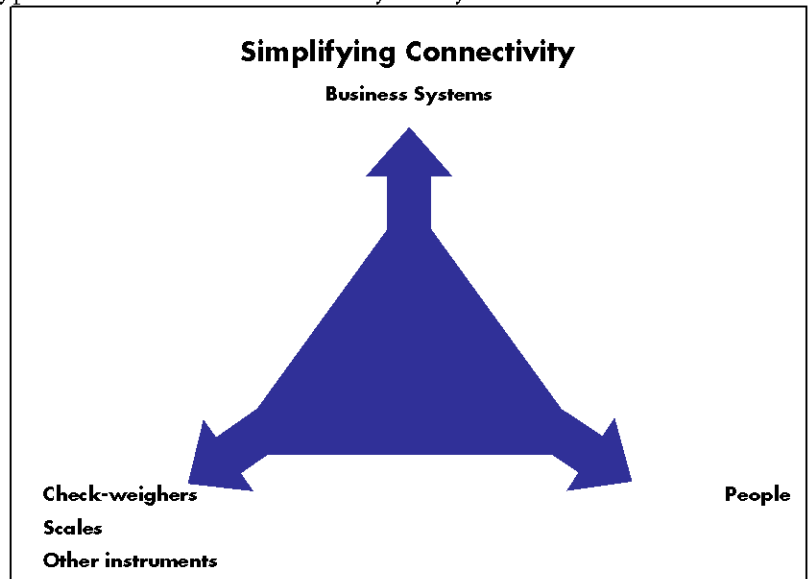
Most scales come with a serial interface, and your system will need to be able to ask for and receive data using this protocol. Some scales have a built-in capability to operate in a 'stabilize and send' mode. This is very helpful because it simplifies the operator interface. If the scale doesn't support that, it is possible to write software to imitate 'stabilize and send' functionality.

You may also wish to consider using a TCP/IP converter to convert the serial interface to a network address that you can connect to via wireless handheld devices.

On the second corner, connectivity to other business systems, you can add significant value by linking to scheduling or workflow data systems. For example, to take advantage of the lot genealogy information described earlier, you need to be able to capture lot information as well as machine, filler and shift information. If you force the operator to type this information into the system you increase the opportunities for errors or omissions.

Whenever possible, link to other business systems so that you avoid the problems associated with hand-keying information. In other words, avoid duplicate data entry.

Another important point of connectivity is feeding information back to other business systems. If you build your weight control system properly you will have important information that your accounting or scheduling system can use. For example, if your accounting system has the material cost for a given product, and your weight control system calculates the amount of over pack, it can use these numbers to calculate a cost of over pack. If you accumulate this information over time you can identify the products, suppliers, fill lines and even filler heads that have the highest levels of waste. More importantly you can report the waste in a unit that everyone can identify with: dollars and cents.



The last corner, the human interface, is maybe the most important. Of course any weight control system should allow you to collect data manually, using keyboard or touch pad. This interface should be simple and uncluttered. Ideally it should guide the user through the process, instead of presenting a spreadsheet or grid and hope the user gets the right data in the right place.

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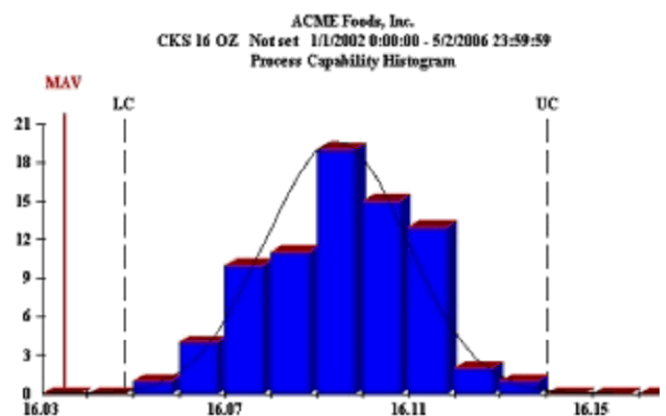
Output

A weight control system needs to turn data into knowledge so that you and other business leaders, can make better decisions. Ultimately you should expect three types of output from a weight control system. If you accept less than this you have suboptimized your efforts.

The first task of any weight control program is to meet the requirements of NIST Handbook 133 and other governmental regulations for compliance to net content declarations on packaged goods. However, the NIST 133 standard doesn't specify limits for overfilling – that's **your** problem!

This puts you between a rock and a hard place. On one hand, **individual** fill weights must be above the Maximum Allowable Variance (MAV). At the same time the **average** fill should be as close as possible to the label declaration. The classic method of meeting the regulation is to shift the curve up, so that the average is at or above label, and the lower tail is just above MAV. But this means giving away product.

This brings us to the second task of a weight

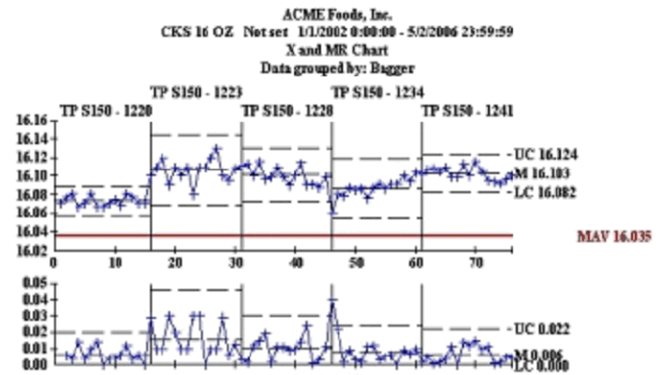


control program: reduce the variation (tighten the curve), so that there are no MAVs and less over pack. To put it another way, know your process well enough that you can reduce or eliminate over pack and still sleep at night knowing there are no violations.

As each new measurement is entered into the system, your system should apply real-time statistical tests to this data and alert you immediately if a process change is detected.

But your system should go beyond reacting to real-time alerts and allow you to shift to a more proactive strategy. Use statistical tools to pinpoint sources of variation in your fill processes. These tools, along with database technology, make it possible to discover which fill heads, material suppliers, operators, product lines, and other variables have the greatest impact on process variation – individually or in combination.

Armed with this information, you can make good decisions on process improvements that reduce process variation and shift average fill weights closer to the declared label weights. Then, as mentioned above, link weight (overpack) data to cost information to help stakeholders understand give away data in dollars rather than in pounds or percentages.



Conclusion

A properly designed weight control system can take advantage of modern IT standards for database, computing and networking platforms. In doing so, weight data can give you the knowledge you need to confidently reduce costs and improve profitability.

About Hertzler Systems

Hertzler Systems provides seamless, accurate data acquisition solutions for your business enterprise. We have been in this business for over 20 years. We have a large and diverse customer base in service, transactional and manufacturing environments, including Consolidated Biscuit Company, McCormick & Company, Hormel Foods and many others.

Our customers buy software and services from us because it is a good investment. With our assistance they can easily acquire data from any process, analyze that data in real time, and instantly notify process owners of process variation. These capabilities help them reduce costs, cycle time, errors, and defects, and increase profitability and customer satisfaction.

These are our core competencies. We turn data into knowledge.

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