What is the true cost of Automation downtime?
Abstract.

More often than not automation equipment is reliable to a fault and will run satisfactorily for many years. However, this means that the provision for correct care and maintenance is easily overlooked. The result is that on the rare occasion when something does go wrong the results can have a serious effect on productivity.

Making appropriate provision for the visibility and pro-active care of automation equipment can therefore prove to be highly valuable and well worth exploring.

This document contains an overview of service support options, often provided under a contract by the manufacturer, for automation equipment. It reviews their benefits and looks at how a bespoke service can be developed for each plant.

Contents.

Introduction

Chapter 1. What part does the Manufacturer play in the support contract?

Chapter 2. What is a typical facility set-up?

Chapter 3. How do you approach the task for the first time?

Chapter 4. Won’t my automation equipment last forever?

Chapter 5. What automation assets do you have and where are they?

Chapter 6. Talk to me...

Chapter 7. Compare the costs

Conclusion

Appendix 1. Mitsubishi UK Service Offering

References
What is the true cost of automation downtime?

Introduction

Mechanical power transmission vendors quite rightfully make a big deal about using good quality replacement items for wear parts. That said when they go wrong, most items are easy to change and often almost identical parts are available from many vendors. Therefore, the downtime impact of mechanical failure is usually low.

However, when automation equipment fails the impact can be far more significant. Inverter drives, PLCs, machine controllers, HMIs, robots, servo motion control components and other automation equipment are normally very reliable and it is easy to overlook their proper maintenance. However, failure of automation equipment or systems can have a dramatic effect on manufacturing output.

A report from international business analysts Dunn & Bradstreet indicates that 49% of Fortune 500 companies experience at least 1.6 hours of downtime per week, which is the equivalent of two working weeks a year.

The costs associated with this vary from industry to industry, from company to company and even from stoppage to stoppage. Contributing factors include loss of production, wastage or raw material, repair/recovery costs, opportunity losses, reputational damage etc.

In some industries such as car production and petrochemical refining, downtime is often measured in tens of thousands of pounds per hour. Costs are also high in continuous production environments, such as the food and beverage industries, where plants often run 24 hours a day and deliveries to retail outlets are organised to very strict schedules.

Calculating the cost of downtime for a particular plant is a complicated matter in which many factors must be weighed. However a rough calculation can be made by dividing the annual sales revenue by the number of production hours worked per year and adjusting this with other major factors such as spoilage of raw materials, the cost of overtime to catch up production, etc. This figure will be a ‘first estimate’ and can be refined by the consideration of more factors.

\[
\begin{align*}
\text{Annual sales} & \quad \text{Production hours} \\
\text{Incident costs:} & \\
& \quad \begin{align*}
& \text{Waste material} \\
& \text{Replacement parts} \\
& \text{Labour (overtime)} \\
& \text{Clean - up} \\
& \text{Logistics disruption} \\
& \text{Penalty clauses} \\
& \text{Process re-start}
\end{align*}
\end{align*}
\]

\[\text{Real cost of downtime} = \frac{\text{Annual sales}}{\text{Production hours}} + \text{Incident costs}\]
Practicality & the real world

One aspect of reducing downtime that can be easily overlooked is that it effectively increases overall production capacity. There will be times in a company’s development or in the economic cycle when market demands will be increasing, leading to a need to increase output. This may mean building a new line, or a new factory but because of the costs involved it is usually considered a better solution if demand can be satisfied with existing assets. Thus if downtime is squeezed out of the system, corresponding extra capacity is created.

Another of the key issues with automation equipment is that most production sites, whether they are small high-technology facilities, SMEs or large-scale manufacturers, are all likely to operate with a range of equipment from different eras and different vendors. This issue is prevalent in food and beverage production plants and poses a challenge to the operational and maintenance teams as it creates a need to hold spares from many vendors and requires that personnel are familiar with different makes of hardware and able to use multiple software programs.

Clearly there is a need for service contracts to be provided by organisations that can provide comprehensive multivendor support. The ideal service contract would be blind to the origins of the automated plant it was covering - it wouldn’t matter from where or from whom the customers’ automation equipment came, the service contract would support it. The contract would cover maintenance, repairs, replacements and upgrades to equipment, plus programming, reprogramming and integration. There is a major issue with obsolescence in automation components on most established sites; hence managing legacy equipment effectively is a critical aspect of an effective service contract.

Such an open acceptance policy could be extended from just the manufacturing and processing plants to also supporting packaging facilities; distribution centres and even retail outlets where automation equipment is in use.

Food and drink is the largest manufacturing sector in the UK. Already responsible for 18% of the country’s total output by value, the industry has been tasked by government and the Food and Drink Federation with achieving 20% growth in productivity by 2020. This has increased pressure on businesses to develop

- innovation to satisfy increasingly demanding consumers
- increased productivity to produce more from less
- the preservation of natural resources whilst minimising waste
- more efficient manufacturing to reduce costs and drive competitive advantage
- engineers who are familiar with leading edge technology and the scientific aspects of food production

Sheffield Hallam University. National Centre of Excellence for Food Engineering
Food and beverage plants often run continuously and have to have a high overall productivity in order to remain viable in a highly competitive market. To this end, many plants already have service plans in place. However there is additional pressure to become even more competitive and this is set against a backdrop of an aging workforce and low availability of potential new recruits.

According to the Food & Drink Federation\textsuperscript{[3]}, there are about 400,000 people employed in the food and beverage production industries in the UK alone. To meet targets and expectations for growth, a further 170,000 people will have to be recruited and trained before 2020; many of these new people will have few if any relevant technical skills. The Federation represents nearly 6,500 businesses, 96\% of which are classified micro to medium sized.

Significantly the industry doubled exports to £12.8bn in the ten years to 2014, demonstrating a significant increase in productivity, due in part to increased automation and better utilisation of production assets.

An on-line internet survey conducted by Business Industrial Network\textsuperscript{[4]} indicated that the automotive industry which loses about 700 hours per year to unscheduled downtime has the worst problem. Food drink and tobacco producers are in a second category along with manufacturers of metal products, who suffer 400-500 hours of downtime each year. Industries that fair better include paper making, plastic products manufacturers and equipment and machinery builders.

This paper looks at some of the common questions and fills in the gaps about automation service contracts, plus it features examples of the potential risks of operating without an all-encompassing service agreement and conversely some of the more prominent rewards.

What is the true cost of Automation downtime?
Chapter 1 - What part does the manufacturer play in the support contract?

Many manufacturers, process companies and distribution operations are now passing the responsibility for maintenance to larger organisations, having realised that it is unrealistic to expect a small in-house maintenance team to cope with automation equipment as well as routine electrical and mechanical work. They are also realising that replacement stock sitting on shelves for long periods is an extremely bad use of resource if the responsibility for maintaining profiled stock can effectively be handed to a third party.

Unlike the familiar power transmission based distribution and maintenance companies that have grown up with bearings and gearboxes, automation support ideally should be principally supplied by a large scale automation vendor with the technical knowledge and product availability to support any given situation.

A service contract held with a global manufacturer differs from the alternatives in a number of significant areas, all of which have an impact on reducing downtime and hitting production targets.

When a global automation equipment manufacturer acts as the service provider it is a larger concern with more extensive resources that is taking responsibility for meeting the required customer service levels. In an ideal scenario customers should expect quality assurance, high service levels and multi-vendor support from their service provider.

Couple this to a high availability of stock and the ability to supply spares for current and discontinued lines and the benefits of working with a global manufacturer start to add-up.

Well established production plants are usually filled with equipment from multiple vendors and often face the issue of obsolescence. In the food & beverage industry for example, equipment surveys frequently reveal that these businesses are operating with an obsolescence level of up to 70% for their automation equipment. A situation that should immediately be ringing metaphorical alarm bells, if not real alarms with the site operators.

This highlights a vital consideration that should be explored when choosing new automation equipment and automation service operators, what is the manufacturer’s policy on legacy support and migration? Best practice for the manufacturer, in order to bring most benefit to the customer and not the most profit to the manufacturer, is for a clear migration path to be maintained across generations of both hardware and software products. This provides the option and ability to carry out a staged migration from the old to the new, with minimal disruption, cost and risk to the business.
Scalability is also a key aspect.

In a service contract no job should be too large; no job should be too small. The automation manufacturer for example is likely to be providing all the automation equipment to some of the world’s largest food plants in addition to oil refineries, high volume car factories, electronics companies etc., so there is nothing that should faze them in terms of the scope and size of a contract.

Equally, automation is just as important to small and medium enterprises as it is to global corporations. A vendor should be comfortable dealing with non-mainstream companies, such as artisan bakers, ice-cream companies, vending equipment and specialist production equipment.

An ideal automation equipment service provider will maintain a wide stock profile including discontinued lines and have the facility to hold bonded stock for particular customers. It is important that there is a positive policy of supporting ‘backwards compatibility’ and maintaining stocks of products no longer in production, only major vendors have the critical mass in terms of the scale of the organisation to do this effectively.

The contract provider must also have the resources to carry out the testing and repairs of critical spares in order to be able to make a balanced ‘repair or replace’ decision on behalf of the customer, rather than just a blind decision based on the preference of the service contract holder and it’s own cost base.

What is the true cost of Automation downtime?
Chapter 2 - What is a typical facility set-up?

While all production sites are unique sites, many of them use similar machines for food and beverage manufacturing, processing and packaging. Distribution centres are also likely to have similar equipment. While sites are all unique, and by degrees similar, each one is subject to different and constantly changing demands.

Experience is the key here, which when combined with flexibility gives service providers the ability to come to a site and quickly understand the restrictions and requirements in play. This is particularly important on a food production site where fast and effective service is vital.

- Experience comes in many forms, but some of the characteristics include:
- Knowing what is likely to work and what isn’t.
- Spotting if something can be improved.
- The ability to identify and alleviate the knock-on effects of a problem.
- Recognising potential future problems.
- The knack of addressing potential issues before they become real problems.

Lean Levers: Key Savings Areas

Lean-program experts and champions master the details of several interrelated levers critical to savings in the food and beverage industry. These levers include optimizing manpower levels on lines, reducing bottlenecks, and optimizing fixed costs. They are also immersed in finding savings by, for example, raising OEE, improving material yield, and reducing inventory. (See Exhibit 4.) Furthermore, these levers focus on reducing the company’s carbon footprint.

Exhibit 4. Six Important Levers Within the BCG Framework Address the Cost Base and Increase Savings

<table>
<thead>
<tr>
<th>Lever</th>
<th>Typical improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimising manpower levels on lines</td>
<td>from 15 percent to 40 percent</td>
</tr>
<tr>
<td>Reducing bottlenecks</td>
<td>from 10 percent to 30 percent</td>
</tr>
<tr>
<td>Raising OEE(^1)</td>
<td>from 10 percent to 30 percent</td>
</tr>
<tr>
<td>Improving material yield</td>
<td>from 20 percent to 40 percent</td>
</tr>
<tr>
<td>Optimising fixed costs</td>
<td>from 15 percent to 25 percent</td>
</tr>
<tr>
<td>Reduced inventory</td>
<td>from 20 percent to 30 percent</td>
</tr>
</tbody>
</table>

Source: BCG analysis

\(^1\)OEE = overall equipment effectiveness

What is the true cost of Automation downtime?
Chapter 3 - How do you approach the task for the first time?

A well devised service and support programme will provide cost savings, improved machine availability and system uptime and also minimise implementation risk.

The first step in formulating such a programme is a site survey, in which all automation equipment and systems are logged and described. This step can be integrated with or closely followed by servicing all the equipment, so that the whole site is in its best working order.

From here a schedule of on-going maintenance and service is formulated and agreed between service provider and plant operator.

This may include:

- Routine servicing
- Renewal or upgrade commitments
- Software management and version control
- On-site bonded stock of spares
- Maintenance of a technical handbook library
- Multi-vendor cover
- Remote monitoring & multi platform alarms
- Telephone hotlines
- 24x7 callout provision
- Onsite training

Significantly service and support needs to be flexible, so contracts should include options to review and adapt arrangements over time.

Probably the best way to develop a bespoke service contract is to define the needs of the plant in terms of basic and additional requirements, then compare this to a list of services options.

An entry level service, for instance, would be based on telephone support from the service provider’s national headquarters. This could then be expanded to include both current and past product lines, plus support from regional centres. Further developments could include site surveys, rolling upgrades and development plans, 24x7 coverage, bonded stockholding, software back-ups etc.

Most food and beverage plants will recognise the value of 24x7 telephone technical support 365 days a year, plus, emergency callout engineering services. They will also see the benefits of regular training for their own engineers, which could be rolled into a service contract.

What is the true cost of Automation downtime?
The ultimate service contract, required by plants where down-time is critical, and response is paramount is a fully bespoke service covering

- Multi-vendor product inventory and status
- Dedicated 24x7 technical support telephone
- 24x7 on-site engineer call-out availability
- Guaranteed response times for technical support
- Regular maintenance visits
- Program code back-up
- Multi-year extended warranty on all parts
- Bonded spares (usually on-site or nearby)
- Development of libraries for software and technical manuals
- Multi-vendor product support

What is the true cost of Automation downtime?
Chapter 4 - Won’t my automation equipment last forever?

Like today’s cars, industrial automation equipment from mainstream vendors by its very nature is extremely reliable. A lot of it uses ultra-robust solid-state electronics, while servo motors, robots and other components with moving parts are designed for long service lives. It will all have been extensively tested by the manufacturer and come with a warranty.

However, working environments, operating procedures and other factors can be demanding. This should not be a problem if they were identified in the original specification but it is often the case that environments and procedures change over time, and this may put extra strain on automation equipment.

Environmental considerations such as:

• High humidity
• Oil mist
• Water vapour
• Washdown and cleaning chemicals
• Dust
• Vibration
• Physical impacts
• Extremes of temperature
• Breakdowns of other related equipment
• Power fluctuations

All of these considerations can take their toll on industrialised electronic devices over time and adversely affect the working life of technical equipment.

Similarly, poorly conceived or executed modifications, servicing or repairs can also cause issues.

**Wear components**

In servo systems, motors and linear movement components contain moving and contacting parts, such as seals and bearings that are subject to wear and will eventually need replacing.

In food safe environments, wash downs that ensure hygiene can adversely affect automation systems. Typically, they may use corrosive or caustic cleaning chemicals, hot water and steam, all of which can lead to malfunctions and reduced operating life if equipment is not checked and serviced regularly.

In this sort of situation plant engineers should be doubly certain that they know exactly what equipment is in use in their production machinery and have a regular schedule by which each part is checked, maintained, serviced and if necessary, replaced. It may even be advisable to replace vulnerable parts at predetermined time intervals or at the first sign of a problem.

What is the true cost of Automation downtime?
Chapter 5 - What automation assets do you have and where are they?

When initially setting up a service contract, the first thing to do is to identify each automation asset and record its location within the site. This will identify all the automation assets that are to be covered by the contract. It will also enable rapid responses when attending breakdowns.

Traditionally assets have been recorded using a paper or multipurpose electronic document records; however, a superior method is to identify each asset and its location via a robust labelling system containing a unique bar code reference.

The ability to accurately refer to individual items and their location through the use of a unique reference at the time of a routine maintenance or breakdown event provides the service engineer with immediate information regarding the hardware and software support tools required to prepare for the event and commence work effectively with minimal preparation time.

Furthermore the ability to link the software program contained within the automation asset, for example the valuable PLC program or HMI screens, to the unique asset and location offers additional benefits not only to the service engineer but to the customer through reduced downtime and greater confidence in meeting planned maintenance targets.

Having a backup of the software program for each automation asset ensures speedy restoration of production where replacement of hardware is required and can prove invaluable in a breakdown situation.

This is a critical service feature: replacing hardware upon failure can be straightforward – re-engineering the PLC program or re-creating the HMI screens however could take 10s if not 100s of hours of engineering time if a back up is not available or version control is poorly managed.

The provision of a complete back up library of software programs linked to an accurate identification system provides valuable security and version control, further reducing downtime risk and duration.

Interestingly, plant operators are often surprised by the quantity and diversity of their automation assets. Therefore, the creation of a detailed list of assets related to a back up of software programs provides immediate value to site operations whilst allowing the service provider to highlight any obsolete or aging components that may prove troublesome in the future.
During the process of identification a simple health-check can be completed on each component and subsystem. Further, consumables such as dry cell batteries can be replaced as a proactive measure to prevent future downtime.

With this first ‘housekeeping’ stage completed, owner and provider can then formulate procedures for regular checks and service, plus a strategy for dealing with breakdowns.

Working in partnership with the plant owner, service providers can substantially reduce risk through the management of vulnerable components by providing a managed migration program to new componentry. An alternative that may be preferred could also be the establishment of a bonded critical spares provision.
Chapter 6 - Talk to me

Most modern automation devices are smart – that is to say they have on-board computing power – and can also be addressed via a communication bus or Ethernet based network system, or accessed remotely, if this can be achieved in a secure and safe manner.

It is relatively easy to set devices up so that they send messages about their performance and status to other machines, supervisory software systems or to particular people wherever they are. Typically, they send production updates but can also send warning messages if problems are arising. They can even switch themselves off or shut down plant safely when there is a significant issue.

For this to be effective in the real world however there is a big question to answer: Is someone listening to the messages and acting on them? And there is an even worse scenario: somebody could be receiving the messages and not interpreting them correctly (if at all); instead, they unthinkingly reset the system after a fault without looking for the root cause of the problem.

The downside of these scenarios is easy to imagine: their rectification however is actually easy to deal with. The answer is to send the signals to a software management layer that can determine the best response and also send them to a support service provider who is incentivised to react quickly and thoughtfully.

The service provider will see the signals as a core responsibility of their job, rather than an inconvenience caused by poorly performing and badly understood machinery and will want to be seen to be professional and dedicated in the execution of their duty.

Often, the response will be simple and take no more than a few minutes to complete but the service provider will understand its importance to ongoing success. Occasionally, the message will require an involved and time-consuming response but the service provider will know that they are averting a potentially more serious problem.

In every case, prevention is better than cure.

Downtime analysis

The detailed monitoring of downtime within a food production environment can reveal a huge amount about the real costs and causes of downtime. Many downtime calculations are based purely on full plant downtime incidents which are usually big numbers for a modern production plant with figures ranging from a few thousand £ GBP per hour to tens of thousands; however OEE (Overall Equipment Effectiveness) and downtime software can be used to identify many small bottlenecks and issues within a plant that can reduce overall efficiency. This has a knock-on effect reducing overall productivity and ultimately profitability.

Looking after automation equipment correctly, including software monitoring and hardware servicing is essential in order to maximise production efficiency, a small intermittent fault, or a software glitch often won’t stop an entire production line but it may slow it down, or result in the end product falling outside key quality threshold points. Over time, these issues can make a huge difference to a manufacturing plant’s profitability.

What is the true cost of Automation downtime?
Having identified and then traced non-critical problems, retrospective action can be taken to address the many small issues that cumulatively can have a huge effect on the efficiency of production, particularly in large batch or continuous production environments. Hence, there is a huge benefit to be gained from taking a much closer look at plant automation and its ongoing care and maintenance.

The goal of high productivity is not just a question of more efficient and intelligently controlled production processes; it should also encompass smart, effective monitoring and maintenance.

The reliability of systems plays a key role, because breakdowns of individual machines can lead to critical bottlenecks for production as a whole. The resulting lost production can cause significant economic losses for the company concerned, not to mention dissatisfied customers, who suffer due to extended delivery times.

Maintenance concepts, however, can’t be limited solely to resolving errors and faults as quickly as possible. They also have to ensure that breakdowns are prevented from the start, where possible.

**Practical considerations**

Having established that detailed monitoring of downtime within a food production environment can reveal a huge amount about the real costs and causes of downtime, a combination of software and hardware products can be utilised to provide low cost system solutions for tracking and reporting shop floor production in the form of OEE.

PLCs and associated equipment usually contain a vast amount of data with regard to the way the system is operating; the key to improving operational efficiency is harnessing this data and acting on the results of its analysis.

The trend in modern data collection is to use a push approach rather than a pull or polling method to access the data. There are several methods of collecting the data from a control system, the most fundamental one is to poll the data from a PC or HMI device - this is the traditional approach which although it works well enough, can lead to large communication demands on the network.

Recently there has been a trend towards logging the data locally, due mainly to the increased intelligence in the PLC; in modern PLC systems it is now possible to log data at very high speeds, the advantage being that the system can identify the conditions leading up to a fault in high definition, this can be an invaluable method of fault-finding and identifying potential maintenance issues before they become serious ones.

Another approach is to push the data to a database of some nature such as an SQL server, this method means that the data is polled locally at the PLC level but only sent to the database when instructed to do so. Triggers can be set in the logging systems that are actions to send the data when a fault or warning condition occurs.

What is the true cost of Automation downtime?
Using the data

Utilising the data produced by the above methods can be as simple as using a spreadsheet to produce statistical reports, to drive a SCADA (Supervisory Control And Data Acquisition) screen for live plant visualisation or feed in to more specialist software which can be used for further analytical purposes.

It can be used as the basis of information for a lean manufacturing system to identify and solve problem areas causing defects or downtime to produce Key Performance Indicators (KPIs), with concise and easy to use real-time and historical reports, for all personnel from the shop floor to the boardroom. The KPIs can be displayed on a number of device types most commonly in some form of browser on a PC or tablet.

The concept of virtual downtime is often implemented where small short term stoppages are identified that can lead to significant downtime when accumulated over a shift or week, these stoppages can be harder to find as they can often be masked by operational staff compensating for the issue in their normal working patterns.

Lean process integration

OEE software forms a core part of any Lean Manufacturing implementation. Being able to schedule work to the shop floor and monitor production in real-time allows maintenance and operational staff to react to the continuously changing production environment, added functionality for product tracking, product genealogy, online work instructions and extended HR tracking can be achieved with most software systems.

Features to look for are:

- Fully configurable security
- Manual data entry
- Automated real-time data collection
- PLC interface
- Real-time graphics
- Full configuration tools
- Time event viewer
- Graphics builder

What is the true cost of Automation downtime?
Chapter 7 - Compare the costs

A service contract is designed to provide overall cost savings, improved machine availability and higher system uptime, while minimising implementation risks. As with all insurances, usually the savings are hidden because regular servicing and proper care prevent catastrophic failures but without them, then the worst can happen. Here is how the costs stack-up.

Service Example

A West Midlands dairy has a calculated downtime cost of £3000 per hour.[6] Part of this cost relates to the rapid perishability of its raw ingredients which results in both pre- and post production losses.

The dairy also knows that it has to frequently upgrade processes and machinery, including modifications to PLC programs. To help maintain production and ensure trouble free upgrades it has agreed a bespoke service and support arrangement.

On one occasion the dairy’s valves on the blending plant began to generate alarms. The control system didn’t reveal anything obviously wrong but the site engineers knew they had to get the problem resolved quickly and put in a call to the service provider’s technical support hotline.

The service provider evaluated the problem and decided the best option was to send a service engineer to the site as quickly as possible.

Finding nothing wrong with the PLC itself as expected, the service engineer started a code trace of the valve control logic. It was found that there was a request to open the valve but no output to the open solenoid. The logic was checked against a backup taken three months earlier during a routine health check as part of the customer’s service contract and significant differences were found.

The site laptop was checked and found to have two versions of the program saved. One was fully commented, looking very much like the original post-commissioning work and a second, later version.

It emerged that modifications had been made by one of the dairy’s staff a few days earlier trying to improve productivity. The modification included an error, which was resolved by re-loading. The engineer stayed on site for a further 30 minutes whilst the process was re-started, to ensure all valves operated and the process sequence was stable. Finally, he saved the program as the latest version and retained a copy to the archive system run on behalf of the dairy.
Snowballing costs

The cumulative cost of downtime is often underappreciated. There are many contributors to the overall cost that go beyond parts, labour and the product sales value of lost production, these include:

- Knock-on effect on other systems
- Penalty clauses
- Increased liability insurance
- Insurance claims
- Stress
- Cost of investigation and review
- Health & Safety investigation
- Additional shift work to catch-up
- Reputational damage

The cost of repairs is also heavily influenced by the integration skills of the repairer, labour is often a significant component cost and so comparing the cost of regular checks with an emergency repair should be startling.
Conclusion

Today’s automation equipment is so reliable that in a perfect world it will run and run with little or no maintenance. In the real world however there are many other influencing factors that mean a structured approach to monitoring, servicing and maintaining automation equipment can prove to be extremely beneficial to operating efficiency, measured simply by up-time figures, by more sophisticated OEE analysis and software products, or, straightforward profitability.

A strategy that does not involve actively addressing ageing automation equipment would most likely prove to be a false economy, because if something small does go wrong, it is likely to reduce profitability over time, which cumulatively can have a huge impact on efficiency. If a major breakdown occurs it can be very disruptive to production and require specialists to remedy, both of which are costly factors.

Losses can quickly mount up in either scenario and can easily overtake the cost of adding a service contract for your automation equipment to your maintenance budget. Quality and delivery issues affecting contracts with penalty clauses, plus, the business impact of re-calls or loss of reputation in the marketplace if product is not delivered on time and/or not to agreed quality standards are more serious considerations - that add weight to the argument.

A service support contract however, tailored to the needs of the particular plant can help avoid these issues and ensure that production schedules and profitability is maintained. Further, it can also be used as a method for continually assessing new options, managing upgrades to production and keeping up with the latest technical developments.
Appendix 1 - Mitsubishi UK Service Offering

Mitsubishi Electric offers a tailored range of service contracts for single and multi-site companies, on an annual or project basis. This is called our Diamond Service.

1 Diamond contract
• 24/7, 365 days a year UK telephone technical support

2 Diamond contract
• 24/7, 365 days a year UK telephone technical support
• Emergency engineer call out availability
• Three free of charge training days

3 Diamond contract
Where down-time is critical and response is paramount a fully bespoke service covering all the 2-Diamond service plus any/all of the following are available:
• 5 year extended Warranty
• 24/7 on-site engineer call out
• Product inventory and status
• Dedicated technical support number
• Multi vendor spares testing & repair service
• Multi vendor product support
• Annual maintenance visit
• Programme backup and battery check
• Bonded on-site spares
• Technical manual library
• Fixed support response time

What is the true cost of Automation downtime?
References


2. About Us. Sheffield Hallam University. National Centre of Excellence for Food Engineering
   http://www.shu.ac.uk/research/food-engineering/about

3. Who we are. Food and Drink Federation [delivering sustainable growth] Food & Drink Federation,
   http://www.fdf.org.uk/statsataglance.aspx

   https://bin95.com/True_Down_time_Cost_2sample.pdf

   https://www.bcgperspectives.com/content/articles/lean_manufacturing_lean_food_and_beverage_manufacturing/?chapter=5
