

Demand Project Quality to Ease Maintenance and Reduce Cost of Ownership



Once a control system project is completed, its ownership transfers to the customer and their production & engineering staff. From that point on, ease of maintenance and cost of ownership kick in. This long period of responsibility for the machine control system is often not fully considered during the procurement process. Two simple measures can optimise the ownership experience for customers and suppliers alike and both actions will maximise the quality of project engineering – **allocated sufficient budget & realistic timescales.**

A project is deemed successful by both customer and supplier when each of its various component disciplines is met:

- budget
- deadline
- functionality and
- engineering quality.

Too often projects are compromised on budget and timescale, so jeopardizing the engineering quality and resulting in an undesirable ownership experience. At Optima we strive to ensure the best ownership experience and aim to work closely with our clients to this end.

The procurement process is nearly always classified as "successful" when the lowest price for whatever being bought is obtained for what appears to be the same level of goods and services provided. It's no secret that a lower cost will mean reduced deliverables, though the compromises that will be made by the chosen supplier to provide the cheapest price often reside in the engineering discipline and are not obvious. The quality of engineering and project management is not so easy to determine at the procurement stage and it is this engineering input that determines the life-long ownership experience.

Of the four important success criteria one is invariably met - functionality. Deadline comes next in the list of must-haves, then budget and finally engineering quality.



Why are they prioritised that way? In my opinion it is a natural phenomenon. Three of the four disciplines conclude when the project is handed over. Even when budgets are squeezed...

(1) **Functionality cannot suffer** – the machine must perform its primary functions – and because this is easily measureable everyone understands and agrees.

(2) **Deadlines have to be met** - because shutdowns are planned and downtime is expensive – again, measureable, understood and agreed. Then

(3) **Budgets often flex** - one party or other will generally end up overspending on their originally projected costs,

The last important discipline is engineering quality and its impact lives-on long after the handover stage. It is the least understood by procurement professionals, it is the most difficult to measure and the easiest one to unwittingly compromise. A low cost price inevitably means that less time can be afforded to a project and when time is tight corners are unwillingly cut in order to achieve a deadline. No one wants this.

Understanding the engineering and management content of a project is therefore crucial to optimise the ownership experience and discern supplier proposals.

What can customers expect from a well engineered and managed project?

I would firstly say that *both customer and supplier* have key roles to play. I strongly advocate the involvement of customer focused engineering professionals in the assessment process. Today's control systems are highly technical and complex in nature.

The procurement process begins with a visit from a supplier sales and applications engineer. This should be someone with extensive experience in the field of control and automation engineering. He must be familiar with the subject machine, its process and the control methods employed (both when the machine was built and with current best practice techniques and equipment).

The supplier company's track record of providing solutions for a specific application or ones closely comparable is a good indicator of the company's ability to deliver. Testimonials and site visits are an excellent way to satisfy these queries.

The supplier's independence from component manufacturers will ensure that whatever solution they propose will be the most appropriate equipment for one's application. This can be a particularly complex area and depth of experience will simplify the decisions enormously.

Look for a fundamental understanding of the machine process. This is probably the most difficult skill to acquire but the most important in delivering a successful project. Here I refer again to track record.

The supplier's proposed technical solution should stand up to customer scrutiny. There is usually little room for variance here if the subject machine is to be controlled in a prescribed way. So the suppliers understanding of the process will be critical as will their suggested key equipment manufacturer.

The real differentiator in solutions usually boils down to the engineering content, the project structure and management. These, as discussed above, directly influence the system ownership

Here are the key engineering activities to expect in an industrial automation project with some brief associated comments.

1. Planning	A project plan detailing key design stages and review milestones
	indicates good engineering discipline.
2. Survey	The degree of detail required for a useful machine survey cannot
	be overstated.
3. Specification	This document is arguably the most critical document of a
	project. Laying down the full scope of supply, the control
	philosophy and functionality.
4. Electrical Design	Electrical design has always been very important for longevity of
(Hardware)	any control system. Electrical design engineers must have not
	only a comprehensive command of high level electrical
	engineering methods but also in-depth knowledge to design
	legally compliant safety systems, cabling techniques and
E Coffigura design	Component specification.
5. Software design	the most important elements in the enward system maintenance
(SCADA, FLC, Drivos sonsors)	and support activities. Expediency when diagnosing and
Drives, sensors)	resolving downtime causes can save significant amounts of loss
	of production time and accordingly money
6. Procurement	It is important to understand that there is a high skill level
	required in the procurement of specialist control equipment.
	Supply chain relationships that exist between the system
	integrator and their suppliers can mean longer warranty periods,
	improved prices and elevated support levels from product
	specialists.
7. Panel Build	The development of electronic components means better, faster
	performance characteristics, which in turn means higher
	dynamic electromagnetic interference. EMC regulations require
	high resistance is a pre-requisite for both emissions and
	tolerance.
8. lest	The testing phase (prior to shipment) of a control system makes a
	significant impact on the system commissioning time.
	more sub-standard, components, and verify the quality of the
	control papel construction. More extensive testing should
	include the energising of higher power controllers and the
	calibration of motors transducers and sensors. Communications
	networks can be set up and tested so that once on-site, the
	fundamental system elements are pre-gualified operationally.
9. Shipping	Shipping, carriage and packing is an activity that is too often
	taken for granted. Today's control systems comprise many
	components that include sensitive, micro-electronic control
	equipment that uses integrated circuit technology. Rough
	handling and transport of control panels can significantly reduce
	the longevity of a control system due to shock loads being
	experienced by miniature elements embedded in the main

	system components. We advocate careful handling and transport
	methods are employed at each stage of the shipping activity.
10. Installation	Installation is rightly seen as a major part of a control system
(Optional)	project. An efficient installation activity reduces the downtime
	burden, potentially reducing loss of production significantly.
	Planning, management and good documentation are key
	has a significant bearing on the ease with which future
	maintenance and support services are provided and the speed at
	which failures are found and resolved.
11. Commissioning	Commissioning very often feels like a frustrating delay getting
	into production rather than the task that is - guaranteeing
	production reliability. Pressure is always imposed to hasten
	machine often meaning that full process and material trials are
	left incomplete and deferred to a later date. In the event this
	works out being an inefficient approach. A comprehensive
	commissioning plan, agreed prior to the commissioning exercise
	commencing will set out the actions and parameters determined
	with the project specification requirements
12. Documentation	Maintenance and support of any new machine or control system
	relies heavily on the depth and quality of the system
	documentation. It is rare to find many simple components in a
	modern control system. Manufacturers are constantly striving to
	develop their components with the aim to maintain a market
	of control components are relatively short lived Self-sufficiency
	is therefore highly desirable in the machine maintenance
	discipline, for both efficiency and cost reasons. No engineer can
	effectively support and fault find on a control system without up-
	to-date and comprehensive documentation. These activities rely
	leading design tools (CAD etc.) and custom software that is
	generated according to recognised industrial standards and with
	a good documentation regime.
13. Sign-off	Obtaining the customer sign-off is a critical and sensitive stage
	for both parties. A commissioning plan helps this process greatly.
	Having a pre-determined schedule that is developed up-front is
14. Training	Training is a vital ingredient in the machine ownership period.
0	Without controlled, educational exposure to the sometimes-wide
	range of components with resident software, the ready uptake of
	ownership by the maintenance team is difficult to achieve. A
	contident engineer works much more effectively than one with
	Training is essential

These are the key management activities to expect:

15. Regular engineering	Engineering complex control systems is a highly skilled
stage reviews	capability. An engineer must be multi-faceted, with an
	expert command of electrical engineering, software
	development, machine safety, personnel safety, explosive
	area design methods to name a few. Most with serious
	legal compliance obligations on behalf of the customer.
	Given the range and degree of expertise required regular
	reviews of the various elements is an essential part of the
	design process. Attainment to plan is also of significant
	commercial importance because deadlines need to be
	mot
	met.
16. Progress	Projects inevitably produce variations as they progress.
correspondence and/or	No matter how deep an initial machine survey is
progress meetings with	something new always comes to light. Some part of a
clients	process has not been identified or some product that has
	not been processed in living memory will need trialling. It
	is with these on-going developments in mind that regular
	dialogue between project manager and client becomes
	necessary. Projects such as these rely heavily on a strong
	customer-supplier relationship. For this reason close
	dialogue and regular development and progress updates
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	prove essential.

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