

Between
the project
rock and
the knowledge
hard place

by MICHELE
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Building systems: the quest for **quality**

To say that one is stuck "between a rock and a hard place" stresses that there are two forces which are restricting one's movement. For the building and construction company, the forces are the short term goal of carrying out the assignments and the long term goal of making the most of them in terms not only of money but also of experience and capabilities. Quality management can be the lever to accomplish the two goals in the most effective way. Nonetheless, in many work environments, Quality Management is perceived as a bureaucratic burden on the shoulders of those who carry out the real work.

This is particularly true in the building, construction and in the HVAC industry. On the other hand, our experience suggests that Quality Management can be a strong element of project facilitation and the mean to transfer significant knowledge from the worksite to the company. This story starts a couple of years ago, when our company was asked to cover the role of Quality Management with the contractor responsible for building services in a very large assignment, the new exhibition centre in Milan.

Our first client in that project was the Italian branch of an international engineering and contracting company specialising in HVAC and, even though they have an established structure for managing quality, their hands-on approach collided a bit with the idea of having at the worksite someone fully devoted to the quality

function. However, they were convinced by the fact that the work to do was very big, it had to be build and delivered in 24 months and the General Contractor explicitly required a full time quality manager.

On the paper, our task was quite simple and straightforward, i.e. to implement the Project Quality Plan (POP) prepared for this assignment by the company quality consultant on the basis of the analogous document elaborated for the General Contractor. POPs have been used extensively in large projects in recent years, though their first appearance was in the nuclear and petro-chemical industries.

Structure and contents of POPs

A POP, or quality management plan, as sometimes is called, is an application of the company Quality Management System which specifies in a comprehensive fashion instructions and guidelines on how to manage important aspects of the project such as:

- Project organization

chart, job descriptions and responsibilities

- Work planning/programmes
- Reference and contract documents, standards and laws to comply with
- Implementing procedures

Interface and record requirements.

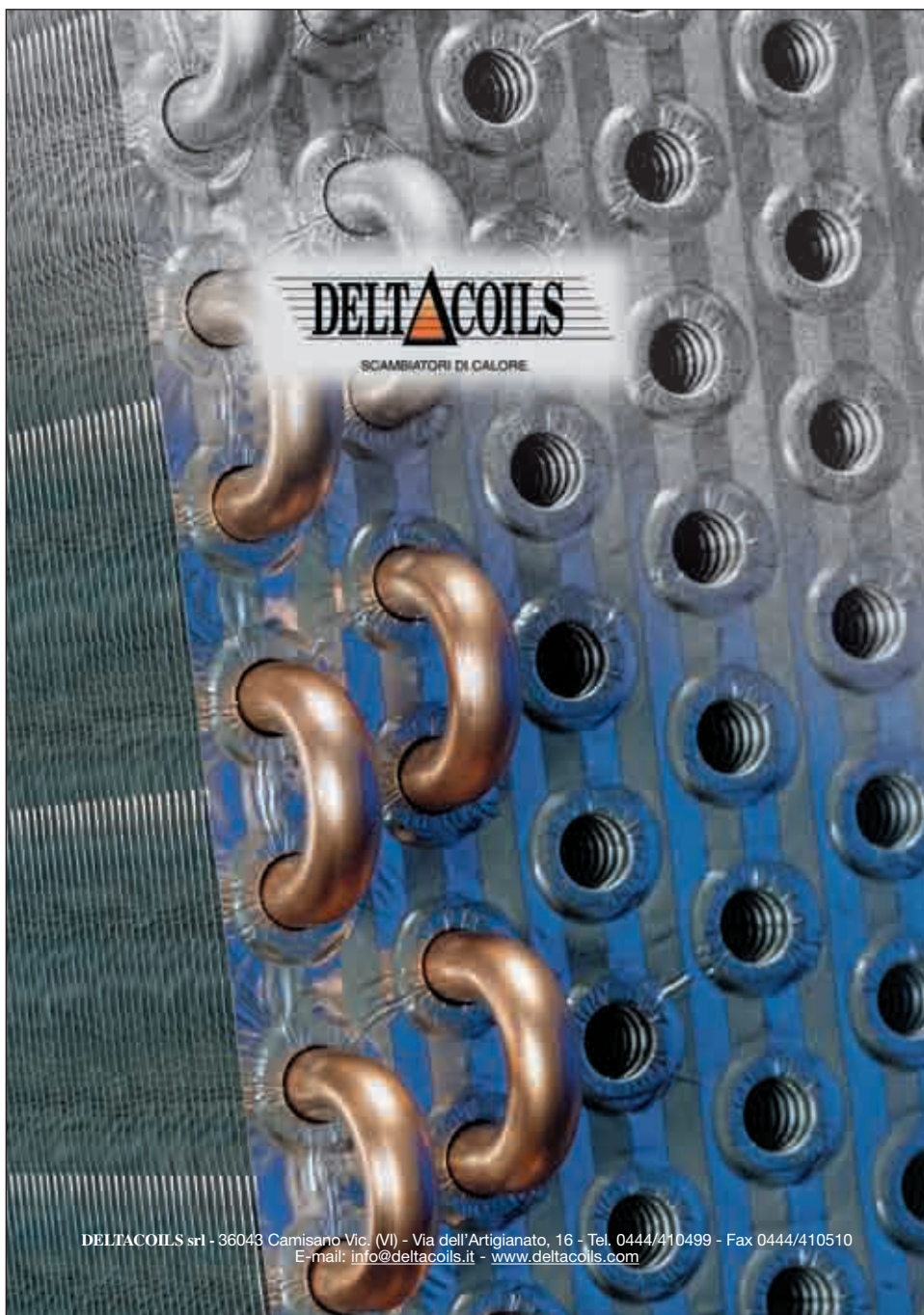
In table 1 we listed a POP typical index. Contents generally start from an introduction and brief description of the scheme drawn from clients' specifications and contract documents, identify the objectives of the project and include references to applicable law and standards. Central issues in the POP are the instructions on:

- Key meetings and interfacing bodies
- Contract review procedures, design and documentation management (including drawings and their releases, correspondence and forms)
- Bid and Procurement management, from requests for information to the actual order, including supplier qualifications procedures,

Typical project quality plan index

table 1

1. Introduction, objectives and policy statement
2. Scopes, aims and limits of supply (description of the works)
3. Organization, job descriptions and responsibilities
4. Project information, procedures, work packages and detail quality plans
5. Records, document and data control processes and project files
6. Contracted services
7. Financial control and reporting
8. Safety
9. Audit Programme



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vendor lists, subcontracting rules and material acceptance routines

- Control of the construction phases: work packages and list of detailed quality plans (DQPs). DQPs, also called quality control plans, are subordinate documents to describe discrete but significant pieces of work or set of activities for which very close controls are required (see table 2).
- Measurement and test equipment
- Criteria for managing non-conformances (to the quality requirements) and non-compliances (to laws and regulations)
- Criteria for inbound logistics and warehouse management
- Records, document and data control processes and project files (information and document management systems) with particular reference to the documents that must be delivered to the client.

It is quite clear that there are many diverse activities to be managed according to the strict guidelines contained in a POP, but following the right procedures is just the first level that quality management entails, one that is necessary but not sufficient to guarantee a successful accomplishment of the works.

Indeed, there are two other levels which may be even more strategic, one is about the competences of the quality manager and her contribution to the smooth ongoing of the assigned activities and the other is the potential of the POP to create a robust and effective organizational infrastructure for the project.



The Quality Manager role

Often, the POP provides only the structure of the work to be done and the part related to the DQPs at the outset is just a list of the subsystems where these documents are required. Therefore, the Quality Manager will have to discuss later on with her colleagues from their client and suppliers organizations in order to agree which tests should be carried out and what documentation should be collected for each and every DQP. Another important task is to practically shape the internal and inter-company information flows.

This negotiation activity entails skills that are not only "bureaucratic" but also organizational and behavioural. Procedural competences are of course important to Quality Manager (QM) at the worksite, as the application of rules and procedures represent the bulk of her ordinary activity: they ensure that all the assigned tasks are properly completed.

Procedures should be learned (and followed) by everybody involved in the work, but generally they

are applied in an uneven way, with more "zealous" people leading the front.

QMs usually have this kind of temper. Therefore, we know that quality

management is not rocket science, but at the same time not everybody is suited to the role.

Our belief is that QMs that stick only on procedure application are not fully useful to the project where they operate.

As already said, an important component of the POP are the DQPs, with their detailed list of activities to be performed and subjects which shall be present in order to contractually deliver to the Client the relevant portion of the project. This is an interface document that also indicates norms and standards to be followed during the tests and list other complemen-

tary documents to be included. DQPs are very important in two ways: first, they represent a necessary documentation for issuing invoices; second, they are an essential part of the final dossier of completed works, and together with schemes and technical sheets of installed equipment, they will be very useful for maintenance purposes during the operational life of the plants.

As DQP are usually only listed in the POP, the contractor QM has the delicate task of designing them so that they guarantee contractual obligations but are the same time entail simple, quick

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the consultant

The Quality services provider

Cogent is a management consultancy specialising in integrated approaches to project and knowledge management.

They have provided quality management experts to the HVAC contractors in the New Milan Fair's complex.

Mail info@cogent.it for further info on reference and methodology.

The new Exhibition Centre in Milan

The Fiera Milano (Milan Fair) new complex is an imposing structure, with a gross floorspace of 530,000 square meters on a 2 million square meters site that has been designed to host several exhibitions at the same time. It is composed of 8 pavilions, a Congress and services centre and several facility buildings. The complex, which has required an investment of more than 550 million €, has been built by a general contractor (a temporary association of enterprises led by Astaldi) and several specialist contractors. Mechanical plant power for heat production amount to 42,5 MW plus 22 MW coming from district heating, whereas refrigeration power amounts to 67 MW. In the pavilions, there are 36 km of air ducts connected to 156 units for 8.400.000 cubic metres of air treated each hour.

and economic tests. This implies that the QM has both contractual and technical skills, a practical mind and the interpersonal communication capabilities needed to relate with all the colleagues at the worksite.

The capacity of deciding the most adequate course of action during the thousands controversial situations that arise during a project and the ability to shape the right wording while writing official correspondence are also very useful to the QM and his team.

If the QM attitude allows it, she will become the reference point for all construction managers, which can rely on her on contract interpretation, to define what to write to a faulting subcontractor or how to reply to client letters. Another important task for the QM is to create a cooperative atmosphere with her counterpart in the client's organization. This will ease a lot their working relations providing a positive impact on the way client perceives the work of the contractor.

Project managers are usually burdened with many tasks and one of the most common mistakes for them is micro-management of every small issue. A good QM can provide a very important back up to them and let them concentrate in the managing of people and money rather than the managing activities and technical details. PMs should rely on Quality Management not only to keep track of non conformances, but also to coordinate information and work flows and to overview document approval and test advancement status.

This role of support is even more important when in a worksite most of the people have been

hired for that contract and they work together for the first time. Often, they will not work for the company in future projects, therefore, it is very important to use at the best their capabilities and to capitalize the experience that they are doing. This is the essence of knowledge management (i.e. the processes through which organizations generate value from their intellectual and knowledge-based assets) and in a worksite of a certain importance it is necessary to have a professional able to work with this approach in order to let the company capability grow.

An integrated approach to Quality and Project Management

In our experience, the QM can provide added value to the project not only when taking care of mandatory procedural issues but above all when she does it in a knowledgeable, diplomatic and collaborative way so to become a reliable reference point for colleagues, client and suppliers. This role can be defined as "project facilitation". Facilitation, which someone defines as the art of leadership in group communication, help the others work better and their

activities to be more focused.

Few years ago, Bill Gates said that Information and Communication Technologies (ICT) could

tests and trials, and creating a central repository and gateway for information and documentation management it is the system to exploit the full potential of quality management in a construction worksite. Moreover, this paves the way to effectively re-use and improve upon the work done and the expertise accumulated, a central issue in knowledge management. This would be greatly enhanced by the adoption of an IT platform to manage documents and workflows. However, electronic business activity (e-business is any process

European construction sector includes 2.3 million enterprises of which 96% are small companies with fewer than 20 employees), many companies prefer to be re-active rather than pro-active in their use of ICT.

Even large enterprises in the industry and new sector entrants which have adopted ICT for their internal or marketing processes, when it comes to worksites are usually very slow in providing their people with proper applications, maybe because they are often temporary staff and their employers think that the investment

them are here outlined:

- First, is that quality is not a cost, indeed it can be an investment, especially when is fully integrated in the project management functions since the outset: then it is possible to write an effective PQP and to make investment in technological infrastructure that can be easily repaid by the savings in time and resources.
- Second, is that people matter even more than functions and role: a good QM is the best support to the Project Manager and the everyone would need such a

Example of DQP

table 2

No	ACTIVITY DESCRIPTION	DEMANDING/CONTROLLING DOCUMENT	VERIFICATION (DATE AND SIGNATURE)				IDENTIFIED RECORD/ VERIFYING DOCUMENTS	NOTES	
			SUB-CONTRACTOR	CONTRACTOR	GEN-CONTRACTOR	CONSTRUCTION SUPERV.			
1.0	Material acceptance at the arrival on site	Control procedures as specified in PQP section 3.2		H		W	D	Inspection report No.	
2.0	...								
2.1	...								
2.2									
11.0	Final check and documentation control	N.A.	H		H		W	E	Final verification report and approval signatures

INTERVENTION CODES	APPLICABLE DOCUMENTS	ISSUED DOCUMENTS	Date:
H mandatory	TS technical specifications	ST standards	Issued:
W to be informed	DR drawings	A factory inspection report	
R to check	PF supplier standard procedures	B test report	Approved:
	SP contractual specifications	C supplier test report	
		D site inspection report	
		E final verification report	
		F	
		G	
		L	

become the "digital nervous system" of the company. In the same fashion, we could say that Quality Management can be considered as the "nervous system" of the project: integrating design, safety, planning,

that a business organization conducts over a computer-mediated network) in construction and building services is generally very limited compared to other sectors included manufacturing. Maybe because of their size (the

it is not worth. This has led to a fragmentation in ICT use and e-business activity, characterised by a lack of commonly accepted standards, technical specifications and labels and the result is that not many firms are committing resources to implement at the worksite this kind of applications. There is a huge opportunity if we consider that the construction sector is the biggest industrial employer in the European Union, with a GDP contribution of 9,8% and an overall employment rate of 7,1% of the European workforce. Our approach to quality management was successful enough that we got other clients in the same worksite. However, we learnt several lessons in this project, some of

co-worker, especially towards the end of the project, when deadlines approach, the relations with the counterparts become more tense and the information flow becomes hectic.

- Third, that if proper IT solutions were made available at an affordable price and above all in reasonable time (we have heard of solutions that take longer to be implemented than the project they are supposed to serve to be complemented), an integrated quality management platform could greatly improve construction efficiency and make effective maintenance and knowledge accumulation easier. //

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