

Empowering Improvement in the Supply Chain

BY LARRY MARTOF

Defining the parameters of your supply chain and identifying and correcting weak links will help ensure a smooth delivery process and, ultimately, satisfied customers.

ALL BUSINESSES HAVE AT LEAST TWO THINGS IN COMMON: THEY NEED CUSTOMERS AND THEY NEED SUPPLIERS. Simply put, suppliers provide services or commodities, and customers are the recipients of these services and commodities.

Suppliers come in many forms, from retail stores to law firms to steel detailers and mills. Their products and services flow down what is called the supply chain, where each link supplies the next, until the end product is delivered to the final customer.

While the quality of the supply chain of, say, a retail store certainly impacts the customer experience, it is even more crucial in the steel industry. That's because in today's world of high demand for rapid delivery of projects, late receipt or the fabrication or delivery of improper materials can have a tremendous impact on a project and its financials. To better understand this series of interactions, let's reach into our economics toolbox and grab the simple but effective SIPOC tool. SIPOC is a Lean Six Sigma diagram tool that describes the end-to-end delivery of a product as: Supplier-Input-Process-Output-Customer. When we apply this tool to a bridge or building project, we get something like Table 1. In this table the customer of one supplier becomes the supplier to the next. In Table 2, we further expand this scenario and reveal even more supplier-customer relationships.

Table 2 illustrates the supply chain, and any problem in this chain becomes the "weak" link. When the chain becomes stressed it will always break at the weakest link. In this particular chain, we see that the fabricator can influence and control several of these links. The importance of this control is a requirement of the *Steel Building Standard*, *Simple and Major Bridge* checklists and the *Sophisticated Paint Endorsement Standard*. These requirements are found throughout the documents in the Detailing, Purchasing, Bolting, and Painting sections, among others. We also see supplier requirements in the Purchasing clause of the *International Quality Standard ISO9001* and in the Analysis of Data clause, which is the birthplace of continual improvement within this standard.

To apply the requirements of the above standards, we need to understand two very distinct and separate concepts: qualification (sometimes called "selection") and evaluation.

Supplier Qualification

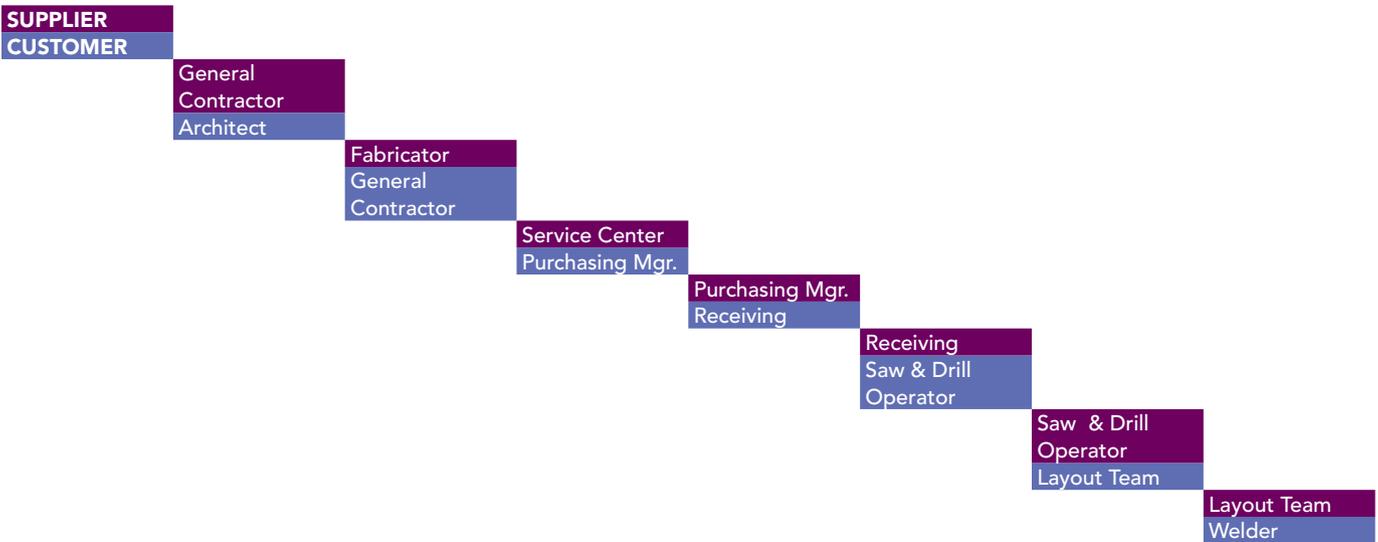
Qualification/selection is basically a one-time process that the fabricator uses to determine whether a potential steel supplier is suitable for further evaluation. The qualification process is typically only repeated when a supplier has undergone a significant change in ownership, location, machinery, or products, or when

Table 1. SIPOC

SUPPLIERS	INPUTS	PROCESS	OUTPUTS	CUSTOMERS
Architect	Design Standard	Approved Drawings	As-Built Drawings	Building Owner
Engineer	Codes & Regs			
Specifier	Design Principles		Product Certs	State DOT
		↓		
Steel Mill	Iron Ore	Specified Materials	NDT Reports	Federal Government
Service Center	Steel Stock			
Bolt Supplier	Rolling Stock		Material Certs	Occupants
Paint Supplier	Chemicals	↓		
		Fabricated Components	Inspection Reports	Vehicle Owners
Fabricator	Welding			
NDT Inspector	Detailing		Completed Assembly	
Calibration	Painting	↓		
		Final Assembly	Final Acceptance	
Erector	Welding Assembly			
Transportation	Blocking		↓	

Quality Corner is a monthly feature that covers topics ranging from how to specify a certified company to how long it takes to become a certified company. If you are interested in browsing our electronic archive, please visit www.aisc.org/QualityCorner.

Table 2. Supplier-customer relationships



the evaluation process renders a supplier unsuitable, requiring re-qualification. The requirements of the various standards narrow the list of suppliers down to the ones that can directly affect product quality; this in turn narrows the scope of the qualification and evaluation process. Also, the fabricator must look at its business and determine which suppliers influence product quality. This list will include some obvious suppliers like steel mills, steel warehouses/service centers, detailers, and engineering firms, but should also include bolt and hardware suppliers, welding consumable suppliers, calibration and testing groups, paint providers, painting services, hauling and transportation companies, blast media suppliers, welding gas suppliers, and NDT test providers—and can even include erectors if they are part of the fabrication package.

The typical qualification process begins with a survey completed by the supplier. (Refer to the Qualification sidebar for some examples and best practices.) You may decide that an on-site visit is needed, and you may even require your own supplier audit as part of the qualification process. Your qualification process may also include an inspection regimen to ensure the quality and timeliness of initial shipments. The important thing is that the output of the qualification process is documented, because this will become the foundation for the evaluation process.

Supplier Evaluation

Supplier evaluation is the ongoing process of monitoring supplier performance and taking action based on the results. The *Building Standard* requires a periodic evaluation of suppliers. This can be interpreted as conducting an annual review/evaluation of those suppliers that affect product quality. As with

all requirements there is a “high road” and a “low road.” Producing and maintaining a list of approved suppliers/vendors—based on their quality and timeliness—that is reviewed by the management review team and approved for use in the coming year meets the minimum or “low road” requirement. This is actually a good method for suppliers that are less critical to the supply chain or that have less of an impact on your product quality. For the more influential or greater impact suppliers, you may want to consider the “high road.” (See Evaluation sidebar.) This involves a formal evaluation and rating of “key” suppliers performed on a quarterly or semi-annual basis, and allows for trending of data that can be used to identify a negative trend and take proactive measures to correct it before it impacts delivery or quality. The corrective action system is a great tool for initiating actions to improve a supplier. When it is explained to and understood by the supplier as an opportunity for improvement, it becomes an invaluable tool for forming long-term supply chain partnerships.

Fixing the Weak Link

By effectively defining and implementing your supplier qualification and evaluation processes, you can identify and react to a potential weak link in the supply chain and prevent it from having a negative impact on your customers. MSC

Larry Martof is president of Process Improvement Solutions and is an ASQ Certified Quality Manager; a RAB/QSA Lead Auditor—ISO9001, TS16949, and AS9100; and a Certified Lean Six Sigma Master Black Belt.

Qualification

The supplier qualification process fulfills three important needs:

1. First, it gathers general information about the supplier: name, address, contact information, references, and product offerings. This information gathering can also include a general survey or assessment of the supplier's quality system, copies of any quality certificates, capacity and capabilities, résumés of key personnel, and even financial information and payment terms.
2. Second, it begins the relationship with, and establishes your requirements and expectations of, the supplier and outlines the actions to be taken when performance is unsatisfactory. This includes your supplier rating and evaluation process and your corrective action process as it would apply to the supplier. You should also describe the qualification process in terms of number and frequency of inspections.
3. Finally, the qualification process will establish your evaluation process and ongoing performance monitoring.

Evaluation

The supplier evaluation process begins with a performance-based supplier rating system based on defined criteria. Typical ratings are:

- **PREFERRED** – These are suppliers who have a consistent history of quality and delivery. They are sometimes called “dock-to-stock” suppliers, whose products require no incoming inspections and only random sampling.
- **QUALIFIED** – Suppliers who have passed the qualification process and are similar to preferred, but who are not as critical to the operation.
- **EVALUATION** – A new supplier that has not been fully qualified or a supplier that is rarely used and needs a higher degree of incoming inspection.
- **WATCH** – Suppliers that have had problems, requiring them to be closely monitored.
- **DISQUALIFIED** – The “do-not-use” list. Any supplier with this rating would require requalification.

Supplier scoring systems can be another effective tool for monitoring and improving the supply chain. They are typically based on a few key areas such as on-time delivery, quality, service, and order accuracy, and use a grading or scoring model. A numeric scoring system is recommended, as it provides for very easy trending, whereas the other methods (“Poor to Excellent” or lettered scoring) would need to be converted to a numeric equivalent before trending and analysis can be done.

The *International Quality Standard ISO 9001* requires that data on suppliers is analyzed to drive improvement opportunities. Some companies will use their supply chain rating and scoring system to award their top suppliers and forge strong relationships with the key ones.