HOW TO ENGINEER A SUCCESSFUL TURNKEY INSTALLATION

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Article Takeaways:

1. Due diligence is required by the foundry & supplier in defining the project's goal
2. The proposal must define objectives & timing
3. The successful installation incorporates everyone's input and engagement in the project's solutions

Every foundry approaches solving production issues or plant improvements in a similar, yet unique way. Some foundries call in suppliers with a detailed RFQ that has been previously pre-engineered, and others call the known equipment suppliers or engineering experts, and solicit solutions to find the best solution that may or may not be implemented. The latter approach is what this article will explore.

Any equipment manufacturer would love to have their phone ring, listen to the customer shower them with accolades about how great he thinks your company is, and then finish the conversation by inviting you to their plant to pick up a multi-million dollar order for a large project. Just like that, salesman of the year! Well, truth be told, these orders can come through, but not without quite a bit of planning, several iterations and commitment from both the supplier and customer to implement the perfect installation solution that can meet a matrix of requirements and restraints.

The real challenge for most equipment suppliers is that developing a solution for a customer is typically never straight forward or easy to do. Let's face it, if it was an easy solution to implement, the foundry would have already completed that project themselves.

Maybe one of the most important steps in any forthcoming project is to establish the budget estimate and ROI. As engineers, we are taught during our education an array of problem solving techniques, as well as the many disciplines and formulas necessary to work our way through and solve a defined problem.

A professor once lectured that one of the most important problem solving tasks an engineer will face is to put the proper economical solution to the problem. A problem can be approached and solved in any manner of ways, but the engineer must be cognizant of the order of magnitude of the dollars that are appropriate for any given problem. This needs to be established up front to optimize the decision making process.

Project Details

In the beginning of any potential project, the equipment supplier or engineering company must review in detail with the customer the particular project that foundry is interested in undertaking. This almost always is best accomplished by meeting the project leader and his team at the site where the project will be implemented.

Just like in engineering classes, you must listen clearly to the customer's requirements, gather all the pertinent operating data, clearly understand all the ancillary inputs of existing systems, and confirm the projects actual measureable objectives and timing.

Being a very good listener at this first stage is a key element to really understanding the concerns of the project engineer and foundry management. A very important secondary data collection step is to speak with the operators, maintenance personnel and shift supervisors if possible. The problems you are solving may have originated with these groups, and you want to make sure nothing got lost in translation.

Many times you may find that by vetting out all available personnel at the foundry will save you a considerable amount of up front time and proposal changes to get to the solution that the whole foundry team actually envisions.

Our customers must reinvest in their foundry facilities consistently over time, or they run the risk of obsolescence. As an equipment supplier, they are relying on us to supply the best possible solution, which will meet or exceed the projects objectives in a timely

fashion, and come in on budget. We try to approach these types of projects as if we were implementing them for ourselves. Being a 100% ownership ESOP company, all our employees understand running our company as effectively as if it were our own business, because it is.

With our recent Fall River molding system project, we were very fortunate to work with a well-organized foundry that had a long term strategic plan laid out for continuous improvement that would make them a best in class foundry and machine shop that can meet their customers' value added requirements well into the future.

Fall River wanted to add to their green sand molding capabilities to improve throughput and provide best in class castings for their customer. A foundry should understand, as Fall River knew, that the successful implementation of the proper solution takes time to develop and vet.

The start of the Fall River project didn't begin with a purchase order for the match plate molding machine and handling system. This project had been underway at least 12-18 months previously as far as our involvement, and I would assume even longer in management discussions at Fall River.

Fortunately for foundries today, there are many good suppliers for equipment to meet their needs. This is an important step for the foundry to determine what company's products and services can best meet their upcoming equipment needs today, tomorrow, as well as into the future. In a global economy, there are equipment manufacturers competing for North American business from all over the world.

Now, it will be safe to assume that any equipment manufacture that is queried about why their company should be selected for a project is going to tell them they are the best suited for this particular project. You have the history of the company, their products, and their general reputation which is typically common knowledge to some extent in foundry industry. Well, at least when it comes to unsuccessful endeavors.

The equipment manufacture will tout their perceived advantages over the competition. This may include such comparisons of European engineering versus American ingenuity; our product can outperform theirs, safety, price and value, the company's proximity

for support, time zone advantages, spare parts, clear manuals and other sales tactics and points of view.

Equipment Demonstrations

These are all nice sales approaches, but it really should come down to the foundries due diligence and visiting some customers who have similar equipment and can give their input as to how it was to work with that particular supplier. Not only was this performed by Fall River, but we were able to demonstrate the exact molding machine on our floor that we had built for a customer. In this case it truly was invaluable for Fall River to see the exact machine functioning in our plant.

Now of course, when these trips are set up, they are obviously going to be at the customers who will allow visitors, as well as the projects that were in all likelihood the more successful projects. Fall River was given several customer references, and some visits were accompanied by our company, and others were not. Both types of visits are important for learning about a supplier.

A business contract vetting process should be included, as both sides need to be financially sound in order to meet their contractual obligations throughout the project. Inquiring about such information is both expected and responsible. Typically on larger magnitude dollar orders, some type of payment structure during the project that is tied specifically to deliverables is general practice.

Another important vetting process is the value from spending time, working on the first sales proposals, and determining the skill sets as well as the compatibility of the upcoming foundry-equipment supplier team. You are going to be working very closely on a larger project for times that can exceed over a year. It's important that everyone is on board, compatible to a point, and fits well into the team structure.

For this project, Fall River's personnel was laser focused on implementing the best-in-class solution. This was evident from the group that worked on the proposal layout and costing, purchase order, and throughout the project. Participating from the top to bottom was a team that included the President, CFO, maintenance supervisor and mold and pouring operators in all the meetings! Conversely, our side also included a full team from our President, VP of Eng & Mfg, sales department, and engineering disciplines. Again, we approached this as if we were procuring this line for our own foundry.

In order to finalize the purchase order, it is important the quotation is as specific and detailed to the project at hand. This should include all the deliverables spelled out, the schedule or delivery date, warranty, payment terms, shipping, acceptance criteria, component specifications, and any cancellation clauses. This is the contract and should be carefully scrutinized as such. This should be satisfactory to both sides in terms.

In terms of an economical proposal, a well suited equipment manufacture should be in a position to present options if required to meet specific financial goals of the project. This could include such items as outsourcing components outside the U.S., or providing remanufactured equipment in certain areas, to even providing detailed drawings that the foundry may want to supply.

Complete Project Proposal

A thorough proposal should include a well prepared layout that leaves no future surprises that may unfold during the course of the project. Typically during the negotiations and development of the firm proposal, several iterations of layouts are produced and presented for review. A cartoon from a sales proposal may not be the best approach for a specific solution unique to the foundry.

Foundries usually have some plant layouts available for reference. These may be old, hand drawn reproductions from the original building structure, or 2D CAD drawings, or in some cases, you may have current 3D models to work from. In any event, these drawings should be considered references at best. Actually field measurements and validation of all equipment and building structures in the area of interest should be confirmed before confirming a purchase order.

In the case of Fall River, we were fortunate to receive the older blue prints with minimum equipment information. Some data was available for the recently implemented sand system, and we performed field measurements to complete a comprehensive preliminary layout that was more than adequate to capture all the facets for a detailed proposal.

Not all engineering layouts are that easily developed. Due to the specific space and flow requirements that were well thought out and dictated clearly to us, we were able to confirm a workable layout to quote. In other cases, when the solution may not be that clear cut, several iterations are made to find the most feasible

solution for the foundry. When this becomes a work in progress, sometimes engineering orders are let to cover the amount of effort that the engineering or manufacturing company is performing. Sometimes these costs can be applied and deducted from the final order.

Fall River Project

Having confirmed a viable cost proposal and layout for the Fall River match plate molding line addition, the Gantt chart was reviewed for specific timing benchmarks that are expected milestones to hit. And after the order is let, this Gantt chart provides the measuring stick of our progress throughout the project. The closer we stay on track – will impact overall project success of meeting or exceeding objectives. Typically bi-weekly Gantt chart reviews are held during the first half of the project, and more frequent timing reviews are held as we get closer to the run off, shipping and installation. This project had an aggressive 30 week ship date, (100% completed), including the custom engineered mold handling system.

So with a contract in hand, the first kick off meeting was set up at Fall River. As mentioned above, all the team members were present. Notably, this is one of the more exciting events of the project, followed closely by the run-off at the manufacturer's facility, and subsequent acceptance and approval at the foundry. Actually, all parts of the project are exciting; just some parts are more exciting than the others!

Custom Engineering

This project was well defined; however it did have some design constraints that influenced our engineering solutions. We needed to fit under an existing sand system delivery belt. We needed to provide Fall River with the engineering design for them to implement a small holding hopper and plow-off from the existing system.

The machine foot print could not include a large pit and had to interact with the return sand belt conveyor. We also needed to miss some building and sand system columns and assure proper operator and machine access around these items. Fall River also wanted a safely guarded machine, but did want access for core setting from both sides for their operators. This also required an elevated bottom board system to allow far side operator access.

They also had a special request that we de-couple the hydraulic power unit from the machine to save on floor space. This was to be put above on a mezzanine. To save even more floor space, we designed a common power unit that handled the match plate machine and all the mold handling. We provided general platform drawings for Fall River to build and install.

The mold travel out needed to be an accumulation type conveyor system, which in our case needed to be a walking beam. This walking beam also needed to turn back on itself and change elevation in two steps. This really was the keystone between the molding machine and the mold handling pouring line, and the timing needed to work for both systems that were dependent on manual pouring of the molds.

The pouring area, or melt delivery aisle was pretty straight forward, and fortunately we were able to use an existing pit and sand shakeout conveyor that allowed for the proper work flow through the pouring area. The one challenge that needed to be overcome was that the end transfer after pouring, back to shake out could not protrude out into the metal delivery aisle way. This was accomplished by designing an underslung index and brake system, and incorporating a unique rotary actuator solution for the end cart transfer.

Since the line was going to be pouring brass products, there was some concern about the adhesion to the pallet cars and the weight and jacket design. We developed a replaceable graphite mold car top, that rather than glue and fixing to the pallet cars, which is a nightmare for replacement, we through bolted with stainless steel stove bolts.

The weight and jackets needed to be flexible for three positions of pouring. This was accomplished by making the top weight easily moveable by casting in locating lugs that could secure the weights in different positions. The jackets were actually a two piece design that was unique from a cost saving manufacturing standpoint.

Installation

With the system engineering design challenges addressed, the installation of the system is also a key component that needs to be well thought out. The installation time and costs associated with field plumbing and foundation work can sometimes become a surprise cost to the overall project budget. We were determined to work with Fall River's maintenance department to ensure a smooth installation.

We incorporated quick connect electrical harnesses (Sine, Harding) for the main machine and power unit to the main panel connections. The field J boxes were also equipped with these. We worked with Fall River to locate and layout the J boxes and electrical panels so that they were accessible and did not interfere with pouring operations, mold shake out or ventilation. This was a big time saver for installation and reduced I/O validation time after installation.

In addition, the area where the mold handling and pouring were installed was recently all new concrete that Fall River did not want to have to disturb too much. The foot mounted pads and support pads were designed within ¼" elevation wise over the area, and required simple foundation bolts only for installation.

Successful Startup

Startup of the system was actually very smooth, due mostly in part to the talented group at Fall River. In fact, very little rework was required and the system went in as envisioned. We did have to perform minor modifications on the walking beams, most in part because we only dry cycled the machine with no molds on bottom boards available to test and walk through.

The Fall River team actually ran sample molds on the machine before our service personal arrived for startup! EMI service people worked with them to finalize program changes to operate the system in a manner that they preferred.

A seasoned project manager once stated in a meeting, "We won't accomplish a thing, until we get something done". This project did accomplish successfully all the objectives of a clearly defined plan. The results produced a well done turnkey installation project executed by two talented companies. And EMI now has another excellent reference in Wisconsin to show our future customers.

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