

C. RENTSCHLER, Al Bassami Industries, Lititz, Pennsylvania; A. PARMAR, MilliporeSigma, a Merck KGaA Company, Sheboygan, Wisconsin; and G. SHAHANI, Independent Consultant, Allentown, Pennsylvania

Overcome inflation and supply chain issues in construction

Inflation and supply chain disruptions are not new to the construction industry, but the severe combination of these factors and the rapid pace of change driven by the COVID-19 pandemic are unprecedented. This disruptive change in essential factors affecting construction company performance and sustainability requires companies to make quick adjustments to project execution. While these and other challenging issues have been spiking quickly due to COVID, the problem is not short term and will require focused corrective efforts for the near future.

The major contributors to the latest construction industry woes are material shortages and spiking prices when materials can be found. These challenges are further compounded by a tougher labor market. Many domestic mills and fabrication facilities were forced to shut down when the pandemic hit. When production facilities were allowed to reopen, they faced issues in receiving their raw materials, establishing sufficient labor and securing reliable shipping. All of this led to material availability issues and higher material costs. Foreign manufactured products and materials also faced production and shipping shutdowns during the pandemic, and this further exacerbated an already grave situation regarding supply shortages.

The combination of spiking commodity prices, supply interruptions and tight labor markets—mainly from the pandemic

—has been fueling market uncertainty and inflation. In some cases, the escalating cost of equipment, materials and labor are making projects financially unviable. In other cases, projects are being postponed. Projects that were already under execution when the pandemic hit were impacted both financially and schedule-wise. Future viable projects will be impacted by increased project demands spurred by low interest rates causing price pressures and supply shortages. Solving the problem is not a matter of just raising prices, since construction companies must still be competitive to win much-needed work. Contractors and owners must take steps to deal with the situation as best they can by addressing those factors within their means. Suggested steps are discussed in this article.

More than anything, the current situation driven by the pandemic should not be looked at as a once-and-done scenario. History has shown that supply shortages and increasing inflation can be sporadic events. While experience has demonstrated that the price spikes eventually subsided (in nearly all cases), contractors that were unable to pass on the price increases for an extended period were harmed.

Contractors should be equipped with the knowledge and structure to fight through the inflation situations when they occur. An example is to reexamine the terms and conditions of contracts, especially if they are based on fixed or lump

sum pricing and/or completion deadlines. It is a good idea to review sourcing and procurement strategies for materials and hiring plans to expand the resource pool. Lessons learned from the current pandemic situation are a perfect knowledge platform for situations that may occur in the future.

Communication between owners and contractors is key during times of inflationary material costs. Owners should expect different pricing and may want to consider design variations, cost sharing and time flexibility. Contractors must closely monitor costs and delivery schedules for materials and communicate this information to the owner both during the bid stage and throughout construction. In the end, price spikes do eventually reverse course—when this happens, both the owner and contractor benefit. Along the way, staying aligned will promote a cooperative working relationship, avoid dissension and lead to a successful project, even during challenging times.

Commodity prices and availability. Media has been rife with references to inflation on a global basis caused by supply-demand imbalances and easy monetary policies.

The Associated General Contractors of America (AGC) published an alert in April 2022 regarding how inflation is impacting the construction industry.¹ The trends presented here apply to non-resi-

dential construction. Additional details can be found in literature¹ and Bureau of Labor Statistics. FIG. 1 shows that while the material costs went up by 21% in the 12 mos prior to February 2022, bid prices increased only 17% during the same period. This illustrates the contractor’s ability to pass on some price increases to owners.

As a result, contractors have to look for creative solutions to deal with this issue. Based on prior experience, this issue will not be transitory and is likely to persist for several years until equilibrium returns to the marketplace.

Project development. Project development usually requires a detailed financial analysis to obtain approval for investment. This entails a discounted cash flow analysis, which requires an estimation of revenue, capital and operating costs and risk. If a project has an internal rate of return (IRR) that is higher than the cost of capital—accounting for risk—the project will be approved.

Every component of future revenue and costs contains uncertainty; future revenue depends on volumes and price; operating costs depend on unit consumption and unit costs of raw materials, utilities and labor; and capital costs depend on the cost of engineering, procurement of major equipment and the cost of construction. While operating costs can be accurately estimated with modern process simulation software, capital costs are much more difficult to estimate precisely due to the variability of labor and materials. As a result, many owners and their engineers carry a contingency in their capital cost estimation to cover unexpected costs.

For large projects like the cracking furnace shown in FIG. 2, construction can be ~30% of the total installed cost. If the capital cost increases, the expected returns from a project can jeopardize the economic viability of a project. Over a period, if enough projects are not approved, the aggregate demand for construction materials and labor will decline. This will help moderate pricing, and eventually prices will come down.

However, in the short term, creative solutions are needed to deal with uncertainty. It must be noted that all the projects that were once put on hold or postponed may emerge again in the future and will end up creating a supply-demand issue. It is prudent to continue seamless communication with the owners (or potential owners) during this postponement period impacted by the pandemic. The same applies with the current or potential suppliers of materials used in construction. Lead times for equipment and a large range of construction materials have grown exponentially due to the current situation.

Coping with uncertainty. While risk and uncertainty cannot be eliminated, ways to manage risk are discussed below. All projects have a certain degree of risks in executing—it is always prudent to identify risks and make attempts to mitigate the identified risks. A risk register should be maintained in agreement with the customer, and if needed, with customer inputs incorporated. These registers would address any uncertainties, such as pricing, the management of change (MoC) process and its impact on the project, and safety aspects.^{2,3}

Schedule flexibility. The ongoing COVID pandemic over the last 2 yr has made the world a more uncertain, volatile and a complex place to continue business. Contractors should explore opportunities to continuously evolve to support business, such as exploring flexibility in the project schedule if it allows mitigating risks, especially escalating costs. Allowing reasonable time during the beginning phase of a project (e.g., in the engineering phase) facilitates more value creation or addition in the front end. This may result in a reduction in bill of materials or promote alternative materials to reduce costs, gain process efficiencies, reduce eventual operating costs, encourage creative automation, etc. Possibilities to reduce overall costs can be found, especially if timing is not a critical factor due to current business conditions. An overall review of the project schedule makes complete sense to optimize cost factors. If possible, tweaks in a project schedule should be made to accommodate design reviews to reduce project cost, accommodate expected lead-time issues, and synchronize/minimize staffing and workforce deployment in different phases of a project, especially in construction.

Open book with customer. Transparency shown by the contractor leads to a more confident and trusting owner, and thereby results in a closer working relationship. Disclosing a certain level of information—with a non-disclosure agreement in place, if required—helps gain an owner’s trust. At the same time, assisting the owner to ensure the degree of change management also helps. Depending on the project phase and execution model adopted, change orders can be expected in real life. This is also the basis for contingencies defined by the owners.

Long-term relationship with vendors. A returning customer with an invitation for bid tells a lot about past performance. The relationship with a customer should nurture itself with con-

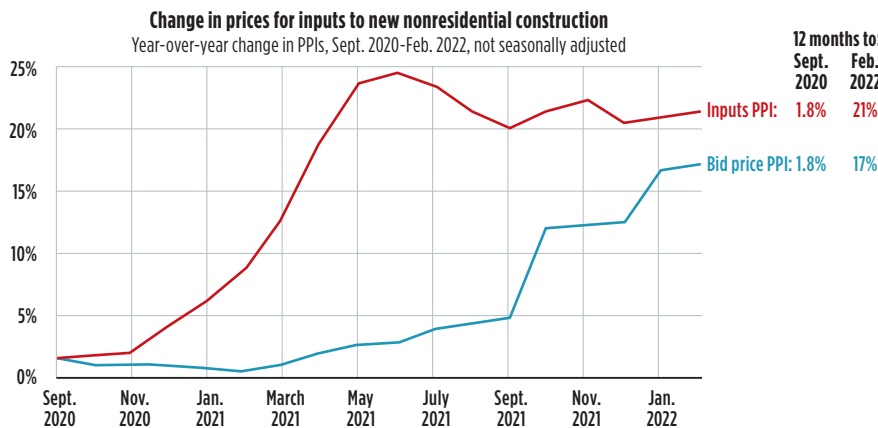


FIG. 1. Change to construction inputs and bid prices, September 2020–February 2022. Source: Associated General Contractors of America and Bureau of Labor Statistics.



FIG. 2. Large cracking furnace in the Middle East. Source: Al Bassami Industries.

sistently good performance and quality of work, agreed-upon timeliness and cost factors. With a carefully maintained long-term collaboration, partners will have a stake in working through inflation and supply chain issues as a team. Rather than finger pointing, there will be an understanding of the difficulties and a team effort to move the project forward with minimal impact.

Locked-in prices. With any project, an effort should be made to finalize engineering as soon as possible so material prices can be locked in early. When executing multiple projects with one or more customers, it makes sense to review the common bill of materials to obtain good bulk purchase prices. The savings can be shared with the customer, keeping in mind a long-term relationship. Also, some synergies and efficiency gains can be achieved by deploying labor to project jobs that are similar in nature or short-term repetitive tasks. A project agreement with the customer, whether on a lump-sum or cost-plus basis, allows any foreseeable cost savings to be shared with the customer, further opening the transparency part of the relationship.

Multiple suppliers. A good procurement policy and the team behind it should work creatively to address materials requirements. The availability of materials during the pandemic, especially the longer lead times, poses challenges. This can be mitigated by exploring the availability with multiple suppliers. Eventually, a supplier's relationship can be maintained just like the customer relationship. Strong supplier performance is key to good project execution and a satisfied customer.

Contract with escalation. Contracts with an escalation clause can be agreed with customers and should be mutually favorable and win-win for both parties. A due diligence process should be in place, also adding to transparency.

Takeaways. Inflation and supply chain concerns can be project development and execution issues that are often ignored as a project progresses—they can become significant problems when they develop. The pandemic has demonstrated the seriousness of these issues as they relate to successful project execution. As a result of the pandemic, many companies have been faced with a large disparity between their bid prices and actual costs, with no ability to pass on increases. Failure to take the proper steps to address these issues

can have a dramatic effect on a company's balance sheet.

Maintaining transparency is a good start to a guarded position relative to inflation and supply chain issues. This includes establishing and maintaining a long-term relationship with vendors and keeping an open book with the customer. Buying in bulk and locking in prices early are other positive steps. Maintaining multiple suppliers is a safeguard to inflation and delivery issues, as not all vendors are impacted to the same degree. Having the foresight to structure contracts with escalation is the ultimate protection for inflation, but this may not always be possible in a bid situation.

Finally, open communication between owner and contractor is the best means to work through inflation and supply chain issues. The best approach is always one that ensures cooperation and understanding during project challenges, and the sharing of rewards when times are good. **HP**

LITERATURE CITED

Complete literature cited available online at www.HydrocarbonProcessing.com.

CARL RENTSCHLER is the U.S. Sales Representative for Al Bassami Industries, a premier global steel fabrication company based in Jeddah, Saudi Arabia. He has more than 40 yr of varied engineering and management experience with Parsons, Air Products and Linde in the power and petrochemical fields. Mr. Rentschler is a licensed Professional Engineer, holds a BS degree in civil engineering from Penn State University, and earned MEng degree from Cornell University.

ASHIM PARMAR is Head of project engineering at MilliporeSigma, a Merck KGaA Company. He brings 28 yr of experience in project management, operations and maintenance, reliability, and green field startups. His primary responsibility is leading projects from conceptual phase to successful completion. Mr. Parmar is focused on continuous improvement and is passionate about the Internet of Things (IoT), automation and digitization with a value-added approach. He has international experience and previously worked for Eastman Chemicals, International Flavors and Fragrances, Symrise Asia Pacific, Novartis and Pfizer Pharmaceuticals.

GOUTAM SHAHANI works as a Sales and Marketing Consultant in the construction industry. He teaches business and mathematics at area colleges, and has more than 40 yr of experience in industrial marketing, business development and asset management at Air Products, Linde and ShureLine Construction. Mr. Shahani has more than 50 publications and patents in the energy and environmental sectors, and holds BS and MS degrees in chemical engineering, as well as an MBA.

NEW VERSION

InstruCalc 9.0

CONTROL VALVES • FLOW ELEMENTS • RELIEF DEVICES • PROCESS DATA

InstruCalc 9.0 calculates the size of control valves, flow elements and relief devices and calculates fluid properties, pipe pressure loss and liquid waterhammer flow. Easy to use and accurate, it is the only sizing program you need, enabling you to: size more than 50 different instruments; calculate process data at flow conditions for 54 fluids, in either mixtures or single components, and 66 gases; and calculate the orifice size, flowrate or differential range, which enables the user to select the flowrate with optimum accuracy.

Updates include Engineering Standard Upgrades and Operational Improvements in InstruCalc Version 9.0

Please contact **J'Nette Davis-Nichols** for more information at Jnette.Davis-Nichols@GulfEnergyInfo.com

GULF PUBLISHING COMPANY