CASESTUDIES

MODULARIZATION & ECI

A Dual Strategy Approach for Reducing Risks in Building Large-Scale Industrial Projects

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CASE STUDY

New Headframe at a Mining Facility: Lesson Learned in Planning Ahead

OWNER:
NUTRIEN (FORMERLY POTASHCORP)

LOCATION:
SASKATCHEWAN, CANADA

CHALLENGE

The owner of a mining operation in Saskatchewan, Canada, was expanding an existing facility and required a new large-scale headframe for the project.

On-site construction was planned during the cold winter months.

STRATEGIES

Nutrien (formerly PotashCorp) had set an original procurement strategy of erecting the headframe on-site as a stick-steel structure. Initial design parameters involved assembling the headframe on location in five 50-foot tall modules and one 29-foot tall module, to be lifted into place with a strand jack system.

As the traditional procurement process unfolded, Saskarc was invited to price a modular fabrication of the headframe after the original design was already completed. A contract was established with Saskarc to perform a re-design for modularization with the required connections, detailing, supply, fabrication, and painting of the structural steel and plate work.

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After review of the existing design, the team at Saskarc developed a modular approach that would complete the entire headframe project more efficiently and with less risk, especially during harsh winter conditions. The recommended strategy would involve pre-assembling the steel frame off-site into eleven modular sections and shipping these larger components to the site for faster installation.

Although the owner was willing to consider the proposal, Saskarc was asked to provide a quote for both strategies – the on-site stick build and off-site modularized options - so that the two bids could be compared.

Following a review of the options, the owner did select the modular approach. The advantages of off-site modular fabrication would include reduced on-site work, lower total installed costs (TIC), and help in keeping the project on schedule by avoiding weather delays.

RESULTS

Saskarc worked closely with the engineer to redesign the build, adjusting the column splice locations of the modules to meet height restrictions set by the power lines during transportation. When they arrived on location, the headframe components went together like Lego blocks in only a few weeks, instead of the months that had originally been expected.

The project owner was extremely impressed with the end results of using a modular fabrication strategy.

Ultimately, it was a lesson learned for the owner. Had a contractor/fabricator, such as Saskarc, been involved earlier in the design process, a modularized design could have been developed from the start. This would have eliminated any redesign cost and schedule impact, and possibly would have uncovered a more efficient solution.

CASE STUDY

Fabrication of a Mega Superpot in North America: A Collaborative Approach

OWNER:
OIL AND GAS COMPANY

LOCATION:
ALBERTA, CANADA

CHALLENGE

An Oil and Gas company needed to fabricate a Superpot for one of its existing mining operations in northern Alberta, Canada, and the dimensions of this new Superpot would make it one of the largest ever built in North America.

The total modular fabrication had to be completed in a short timeframe and, when delivered on-site, the Superpot would need to be installed quickly to coordinate successfully with other critical path events.

STRATEGIES

A Superpot is a large mixing pump box that allows multiple trains of fluid to enter the pump box, mix together, then exit into several different downstream trains.

For this large-scale project, the owner first approached Saskarc to discuss the concept and specific function of the Superpot. A tight schedule needed to be met, and the owner wanted to understand the feasibility of fabricating the Superpot off-site in the largest sections possible, to minimize the amount of time needed for on-site construction.

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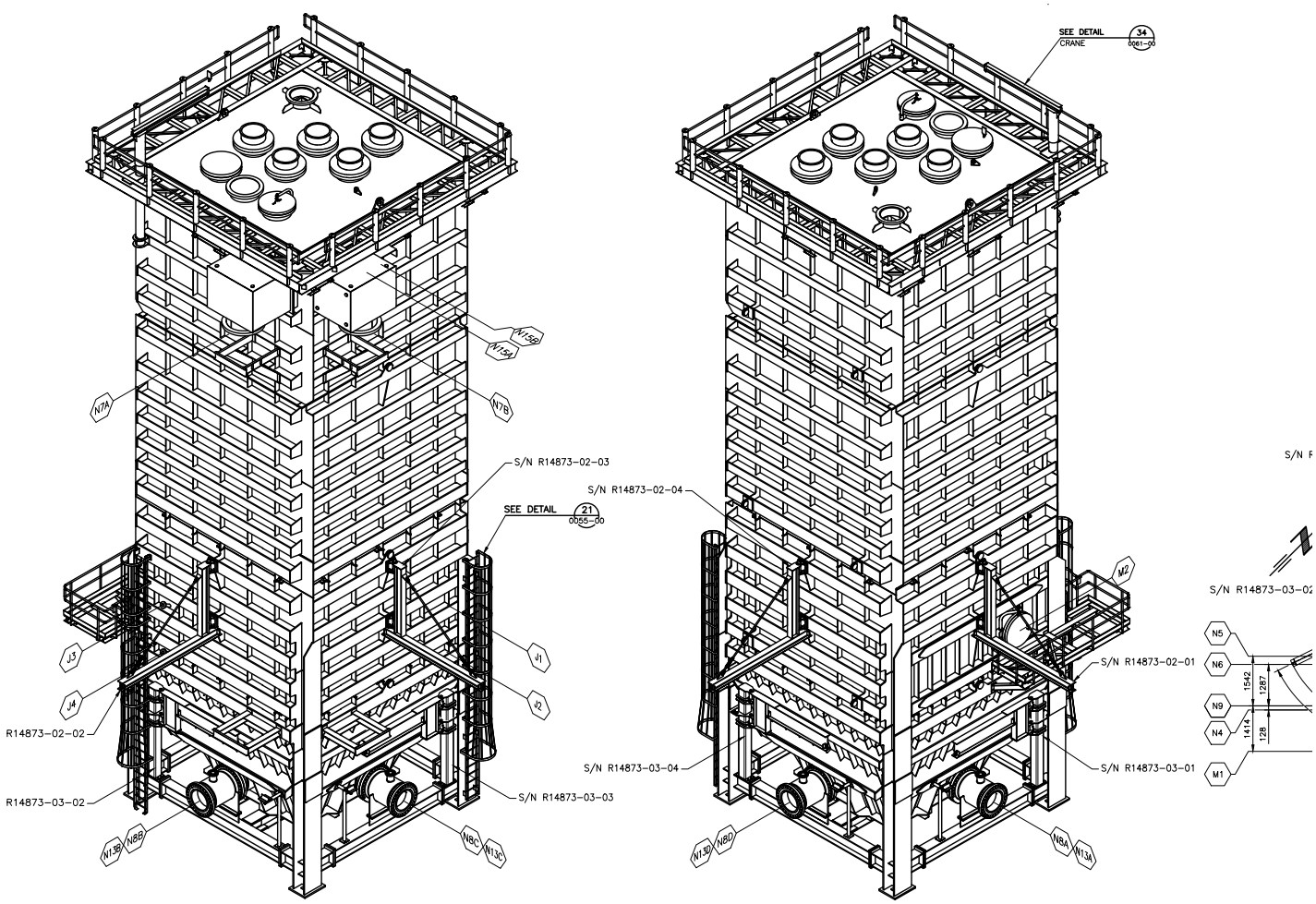
Applying the team's extensive experience in modular fabrication of large-scale projects, Saskarc worked closely with the project owner's engineering firm to do a preliminary design and to estimate the overall build strategy, weight, and costs.

When the final quote and detailed execution plan were presented, Saskarc was awarded the Superpot project. Although the bid was not the lowest received, the owner recognized the total delivered value and the careful considerations in the modular strategy for reducing associated risks.

As contract fabricator, Saskarc collaborated early with the project team of sub-contractors, engineers, and owner representatives to improve the final design of the modular components. Because of the pump box's size and extreme material requirements, a square design was used instead of the round shape typically found in mines. It included four walls for each section, and all the sections were of a similar size.

The off-site fabrication process went very smoothly, primarily because the final design of the modules remained unchanged through completion. The modular design was efficient and had considered the many factors that could potentially arise during the installation process.

The Saskarc fabrication facility was able to build the Superpot modules to the maximum constraints of the high-load corridor, as well as to test-fit the entire pump box on its side inside the fabrication structure using overhead cranes. Pre-testing, at the off-site location, of how the fabricated modules fit together allowed Saskarc to check each joint and to eliminate most assembling issues in the field.



For the delivery process, Saskarc worked with an experienced freight company to ship the four large-scale section modules and get them to the project site on-time. Saskarc had also received quick approval on the detailed safety plan before the modules arrived on location, and installation began immediately.

On-site, the sections were stacked on top of each other within a few days. The process of welding out the sections was begun from inside of the modules, which provided a more controlled environment for quality. Although some concerns were raised about welding in such a confined space, Saskarc overcame the obstacles and took all the precautionary measures to ensure a safe working environment.

RESULTS

The project owner was extremely pleased with the end results of this Superpot project, and it was an achievement to have created one of the biggest Superpots ever built for the oil and mining industry.

Saskarc's modularization approach – from the detailed design plan, to the exceptional size of the fabricated modules completed, to the streamlined success of the on-site installation – provided the owner with advantages that included improved project scheduling and reduced risks.

The entire development process of the Superpot was a perfect example of how a large-scale capital project can benefit from modularization, partner collaboration, and Early Contractor Involvement.

CASE STUDY

ECI Strategy and Modularization Create Success at Mosaic's K3 Mine Expansion Project

OWNER:
THE MOSAIC COMPANY

LOCATION:
ESTERHAZY, SASKATCHEWAN, CANADA

CHALLENGE

For this major mining expansion project, innovative strategies were sought to optimize the entire build process. The large financial investment created a strong incentive for finding ways to reduce total installed costs (TIC), as well as to improve quality, safety, and the scheduled timeframe.

The new shaft and headframe steel would be primary components of the mine. Saskarc was challenged to help the project owner, and their engineering consultant, determine the business value of a modular approach and, subsequently, to manage the highly efficient final design and fabrication process.

STRATEGIES

In the early stages of planning for the Mosaic Company's Esterhazy K3 mining project, Saskarc was invited by Hatch, the owner's engineering representative, to present the advantages of modular off-site fabrication for the new shaft and headframe. Hatch facilitated this process of Early Contractor Involvement (ECI), which allowed Saskarc to recommend a winning solution to the owner from the start.

As a result of this meeting, Mosaic and Hatch decided to embark on a modularization approach for building the North shaft and headframe steel structure. The scope of the project would include 1,000 tons of structural steel and platework: 500 tons for the large modules to create an above-ground headframe, and another 500 tons for the pre-assembled units (PAUs) installed down the shaft.

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The overall project strategy phases for the K3 Mine headframe would involve:

- Design and constructability planning
- Completion of the Request For Proposal (RFP) package for competitive bidding
- Fabrication and modularization of the structural and platework modules
- Transportation and installation

To complete the first phase, Hatch engaged Saskarc to provide technical assessment and expertise for the design and constructability planning. This early involvement by Saskarc – applying ECI strategies – would prove to help avoid both added time and cost to the final project.

During the initial design phase, Saskarc provided consultation and analysis through emails, design drawings, conference calls and online meetings. As the plan was further developed, Hatch, on behalf of Mosaic, contracted one of Saskarc's technical experts to spend three months at their engineer's office to review and provide input on the design, schedule and execution plan. This more detailed input provided the project owner with a highly-experienced perspective related to the fabrication, off-site modularization, transportation and installation processes.

Upon completion of the planning phase, the RFQ package was prepared and issued to the market for competitive bid. Saskarc, together with their partners, Procon and Waiward, also participated in the bidding process. The submittal put forward was competitive, and it provided a solid execution plan, with professionally presented details of the proposed process.

In the end, Saskarc was successful in winning the contract. Ultimately, the Saskarc team was responsible for the materials supply, fabrication, coatings, modularization, and delivery and installation of all the large modules (both platework and structural) for the new headframe at the K3 Mine site.

The completed modules for the Mosaic project were very large - up to 29 feet tall x 23 feet wide x 61 feet long - and weighing up to 90 tons. An important part in the project scope involved the test-fit of the modules off-site before delivery. This would confirm that all the fabricated components fit together as designed – and that the process could be repeated, with no fit-up issues on site during installation.

RESULTS

The final shaft and headframe modular fabrication project for the Mosaic K3 Mine expansion site in Esterhazy was completed as planned. Saskarc maintained the highest level of quality and safety, met the construction schedule, and lowered the project owner's total installed costs.

Saskarc's dedicated approach to working as a team from start to finish - with the owner (Mosaic), their engineering consultant (Hatch), and partners Procon and Waiward - ensured the most efficient and successful completion of this large industrial project.

Mosaic was highly pleased with the results of Saskarc's services in all phases of this project.

"We highly recommend Saskarc for providing their expertise through early contractor involvement, modularization input, as well as for metal fabrication and modularization projects of any large-scale project."

Let us take your project from concept to reality.
We look forward to working with you.

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