

Ethanol

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CONSTRUCTION



The Mystery of Modularizing

A top modularizing firm, Roeslein & Associates Inc., has formed a partnership with BlueFire Ethanol Inc. to integrate its concepts into the construction of a new ethanol biorefinery. They have now opened a door into the world of renewable energy—serving as a short cut to the market.

By Anna Austin

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Modularizing is not a new concept—but it is evolving. The process, which mainly entails the construction and pre-assembly of equipment, machine components and modules indoors to later be transported to a final destination, is a technique that many companies have embraced.

Roeslein & Associates Inc., a full consulting, engineering and construction management firm, specializes in modularizing, unitizing and pre-assembly. The company, headquartered in St. Louis and with branches in Denver and Birmingham, U.K., has been recognized as one of the leading modularizing firms in the world.



Leebolt

Integrated Manufacturing Technologies, located just outside of St. Louis in Red Bud, is a wholly-owned subsidiary of Roeslein. The facility, consisting of an impressive 236,000

square feet—swallowing up 17 acres of land—provides customers with complete process systems constructed under IMT's roof, according to their wants and needs. This includes paint, steel and pipe fabrication, equipment, electrical panels, cable/ladder tray, lighting, and power and control wiring.

IMT is divided into four shops of different sizes, each designed for a specific purpose. Approximately 35,000 square feet are designated for fabrication processes; a smaller portion of that space is isolated for the sole purpose of stainless steel production to prevent cross-contamination. Painting procedures account for 29,000 square feet, and up to 35,000 square feet is used for shipping, receiving and storage. A



Integrated Manufacturing Technologies consists of 236,000 square feet and is located in Red Bud, Ill.

PHOTO: IMT

large amount of modern office space is also available to provide IMT sufficient space to handle company needs, and segregated areas for customers to use for on-site project management.

Upon completion, the structure, system or unit is tested in the 115,000-square-foot pre-assembly shop to ensure desired capabilities, safety and accuracy. Then, it is partially disassembled. Whether it be by rail, truck or barge, each unit is then carefully transported in large sections—all of the braced and packaged pieces, which may include piping, electrical components and ductwork—to arrive intact and ready to be easily re-assembled. To hasten the process, each piece is specially marked or bar coded.

Having provided service to customers for more than 30 years, Roeslein has completed work in more than 16 countries on nearly every continent, with several projects currently underway. In the

past, the company mainly specialized in modularizing units for can manufacturing and packaging plants, but now it's working with clients in the corn ethanol and biomass industries. "We do agree that this has been a step forward for renewable energy facilities, as well as ourselves," says Terry Leebolt, director of engineering for Roeslein.

Befriending BlueFire

Recently, Roeslein has attracted a new customer. BlueFire Ethanol Inc., which intends to use its patented Arkenol process to convert wood wastes, urban trash, rice and wheat straws, and other agricultural residue into ethanol. The company has strived to partner with landfill owners and municipalities among others to build its plants at waste disposal sites.

In 2007, BlueFire was selected as a recipient of a \$40 million grant from the U.S. DOE and is using the funding

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Klann



Comeau

to build its first commercial-scale waste-to-ethanol production biorefinery. The facility will be in northern Los Angeles County near Lancaster, Calif. To test the efficacy of the new technology, the company has constructed and operated a pilot plant near its southern California offices for the past several years. In an April press release, BlueFire announced the company had selected Roeslein and IMT to help develop the plant using unitizing, modularizing and pre-assembling concepts.

“Prefabrication and modular construction has proven itself time and again to be the best method for maintaining quality, controlling costs and creating the fastest to-market time for the deployment of complex facilities,” says Arnold Klann, president and chief executive officer of BlueFire Ethanol. “Roeslein came highly recommended to us.” Having found modular concepts to be efficient in the construction of power and water treatment plants, Klann points out that this is the first time BlueFire will utilize the modularization for an ethanol plant. “This isn’t a new concept,” he adds. “But the way in which it is being deployed is significant. It is greatly reducing cost and completion time for us. We are working with very good teams of people working diligently to get things accomplished.”

According to Klann, BlueFire is “knee-deep” in engineering issues for the Lancaster facility. “We’ve just started drilling wells,” he says. “But by this time next year (June) we should be producing ethanol. Modularizing is really giving us a leg up.”

The Lancaster plant will convert post-sorted green waste and other cellulosic materials, taken from landfills in southern California, into roughly 3.1 MMgy of fuel-grade ethanol. Process Automation Concepts Ltd., MECS and Brinderson are also members of the engineering team. Klann says that the size of the Lancaster facility will better suit and assist the capabilities of developing countries that are unable to produce mass amounts of useable feedstock. “[Modularizing] also allows us to potentially sell our facilities as a turn-key manufactured product, leveraging our capabilities and expanding our market reach several fold,” he says. “The Lancaster facility will bring a new dimension of thinking to BlueFire, one which combines cost-effective modules for rapid deployment to meet the burgeoning demand for renewable fuels.” Klann believes that the design of the facility is “right-sized” to seize market opportunities for landfill sites of any size.

“We encourage our clients to get us involved right away in the first part of the project to better identify which parts of the facility lend themselves to modular concepts,” says John DeMoulin, Roeslein manager of business development.

Other cost savings include minimizing change orders and contract growth, controlled shop fabrication, which reduces field labor, a lower hourly rate and increased productivity. “The bottom line is there is a much faster recovery of committed capital and financing costs,” DeMoulin points out.

Since modularizing brings the number of facility components to a minimum, there is a substantial reduction of on-site installation scheduling and manpower. “We work parallel with, or even ahead of on-site infrastructure,” DeMoulin says. “There doesn’t have to be any waiting for ground breaking.” In simple terms, prefabricating facility components saves time since the process of installing these components is not affected by building construction. Typically, without modularizing installation is slower as one part must be completed before work on another can begin.

Another issue affecting project completion may be a shortage of available resources in a geographical area—for example, professional welders or electricians—types of work that can be moved from the field and into the shop.

Depending on the project and where it is located, Roeslein provides on-site assembly aids as well. Typically, an installation supervisor who was largely involved in the pre-assembly process,

The Upsides in Detail

Cutting costs is the most obvious benefit to modularizing. However, as the economic scale has grown, some companies have mistakenly abandoned modular concepts. “A lot of facilities think they’ve gotten too big,” says Steve Comeau, IMT manager of business development. “Really, everything is still manageable and can be modularized to a certain point. We are trying to re-educate owners and engineers that even a large plant can still modularize. Granted, it limits us in how big the equipment is—but if we can break 50,000 compo-

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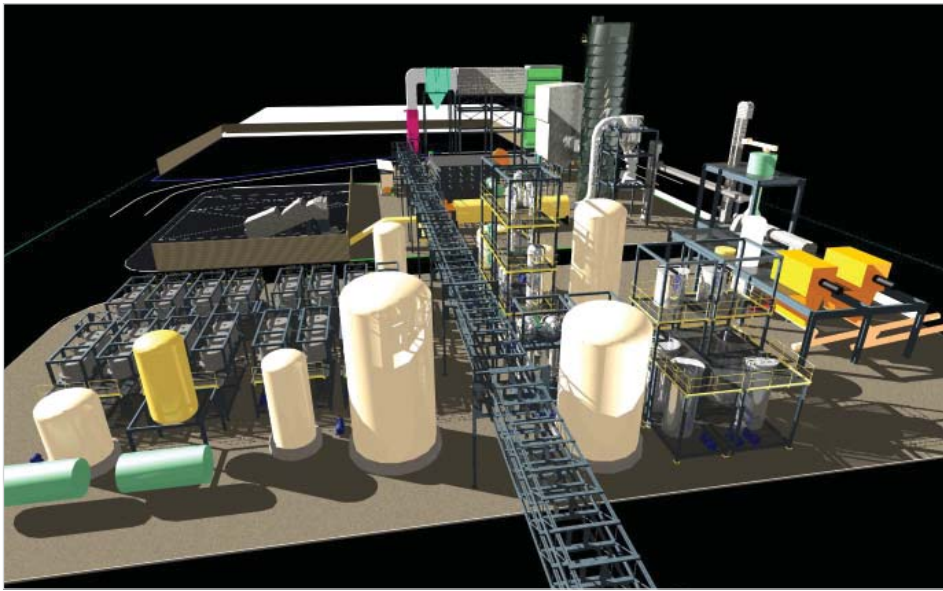


PHOTO: BLUEFIRE ETHANOL

Pictured is a preview of BlueFire's Lancaster plant.

but more recently, installation crews, have been sent. "It all depends on the owner's preference," Comeau says. "It certainly is to the customers' advantage, as we understand the complexity and design of the project."

Weather, such as extreme temperatures or storms, is another matter that may affect on-site construction; bringing work indoors may prevent loss of progress.



DeMoulin

Enhanced overall project safety allowing for a more productive work environment, is yet another benefit to modular concepts. This includes reducing site congestion—equipment and lifts—and people. Stacking of trades is also minimized by shifting pipe and structural fabrication and erection labor hours

from the field to a controlled shop environment. The need for structures that are potentially dangerous, such as temporary scaffolding, are lessened or may not be necessary, and jobs that entail workers hanging from the sides of tanks, doing electrical or mechanical work, can also be eliminated. Safety issues related to extreme temperatures that pose a danger to individuals working on the site are lessened.

The Four-Phase Approach

Customers who select Roeslein for their project at the beginning will be introduced to four different phases—preliminary engineering, detailed design/engineering, procurement/prefabrication, and installation/start up.

Comeau reiterates that getting Roeslein and IMT involved in the preliminary stages, which determine the feasibility of modularizing, associated

costs, project schedule and other applicable information, is a decision that greatly reduces the final price tag. "This is the most important item when modularizing renewable energy facilities," he says. "With more than 20 years of experience, we really have an eye for recognizing modular potential. It is much easier and more cost effective to plan a modular facility in the preplanning stages rather than later on in the design."

The second stage of this approach involves equipment specifications, mechanical/electrical design packages and bid documents, design reviews with the client's suppliers and contractors, and building design coordination. In the last two stages, all of the modularizing, unitizing and preassembly is done. The final step is running tests to ensure a quality, customer-desired product. This includes start-up support and may involve training and ongoing technical/operations support to educate and familiarize customers and staff with systems and equipment.

"Really, in the end, it is like an erector set," Leebolt says. As Roeslein continues to provide services to returning customers, the company is optimistic about breaking into this new industry.

"We have now successfully worked with every branch of the biofuels industry—ethanol, biomass, cellulosic—you name it," Leebolt says. "We've got our fingers in every piece of the pie right now." EP

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