Drive & Control profile

Geothermal Equipment Manufacturer Heats Up Assembly Line With Lean Manufacturing Overhaul

The new lean configuration has reduced work-in-progress by 40%, and FHP has gained much better control of the overall assembly process, thanks to more predictable and orderly progression of components down the line.

Overnight transformation of geothermal heat pump products assembly line to a visual demand-pull one piece flow yields balanced production sequences and increased throughput.

One of the most energy-efficient and environmentally sound ways to heat and cool residential and commercial spaces is to harness the power of the earth's natural energy through geothermal heat pump technology. These heat pumps use the earth's natural temperature cycles to provide consistent and balanced heating and cooling. But for Florida Heat Pump (FHP Manufacturing), part of the Bosch Group, (www.fhp-mfg.com) a Fort Lauderdale-based manufacturer of water source and geothermal heating and cooling equipment, the assembly process for these

Challenge

Balance production sequences and increase throughput for geothermal heating and cooling equipment assembly line.

Rexroth Solution

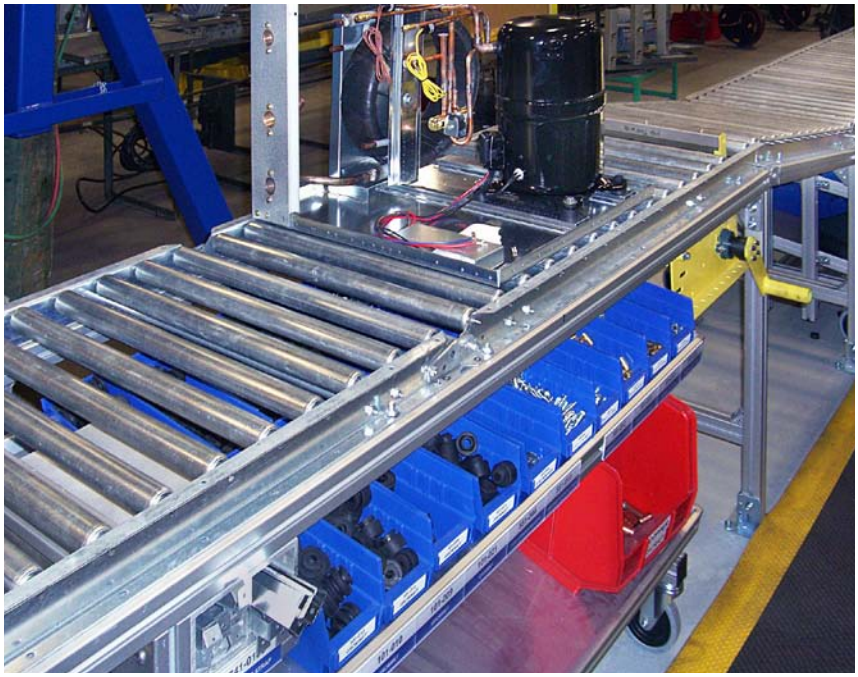
- Bosch Rexroth Lean Manufacturing concepts demonstration and training
- Bosch Production System expertise
- MPScalc lean cell design software
- Aluminum framing components

Benefits

- Balanced one-piece-flow line meets aggressive takt time goals of 25% increased production rate
- 40% reduction in WIP
- 30% reduction in conveyor length; reduced equipment footprint and equipment needs
- Elimination of downtime, as line operators no longer need to stop work to retrieve parts
- Reduced risk of accidents, worker injuries, and damage to products, due to cleaner and less cluttered assembly area

energy-efficient heat pump units could sometimes be anything but consistent and balanced. FHP found a solution utilizing the Bosch Production System (BPS) principles in lean line design which led to its heat pump assembly line being completely transformed into a one-piece-flow production line which has yielded striking benefits.

Before the implementation of the lean line design concepts in its assembly processes, FHP's geothermal heat pump assembly lines used a batch-and-queue process. Because much of FHP's business (roughly 80%) is custom build to order, finished goods, raw and WIP inventory had to be kept at high levels to account for the peaks in demand.



Line feeders deliver parts to the lean production line workstations on an as-needed basis.

In search of a better way, a Lean Line Design workshop was conducted with the FHP team, led by Mr. Wilhelm Dieter (TT/BPS) from FHP's BPS group in Germany. This workshop was attended by six FHP representatives, including the line supervisor and a logistics specialist as well as Lean Manager David Francis. After this Lean Line Design workshop, FHP's David Francis took the lead to implement the recommendations from the Lean Line Design workshop into FHP's assembly processes. To get started, David Francis turned to Bosch Rexroth's Linear Motion and Assembly Technologies division (Buchanan, MI; www.boschrexroth-us.com) and scheduled several one on one training sessions with Thomas Brown, Bosch Rexroth District Distribution Manager, and Chris Lupfer, Bosch Rexroth Project Engineer Manager who introduced two key elements that would eventually play a crucial role in the redesign of the heat pump assembly line—the Manual Production System (MPS) and a lean software simulation tool called MPScalc.

The MPScalc design software enabled FHP to create virtual lean manufacturing workstations, or "lean cells," and then "drop in" the workstation at any point in a factory floor plan—and move the workstation around to find the optimum positioning. "MPScalc really helps bring lean processes to life," says Thomas Brown of Bosch Rexroth. "The MPScalc user can simulate the construction of whatever a customer is thinking of ordering, and then watch the results on-screen. It's a great way to see lean manufacturing principles in action." Once a virtual lean workstation has been created in MPScalc, the software creates a build sheet that lists workstation dimensions, features and pricing. Then, the components can be ordered quickly through Rexroth's online framing shop.

FHP's David Francis and team—now equipped with the necessary tools for designing a new lean line—determined that Line 1 of their six residential product assembly lines (FHP also runs two commercial assembly lines) would be the first assembly line to implement lean production. The initial goals of Wilhelm Dieter's lean line design workshop were to balance out the process sequence of the workpieces, and achieve a stable takt time which would yield a 25% increased production rate. Chris Lupfer and Thomas

The heat pump assembly line was transformed from a batch-and-queue process into a one-piece-flow production line.

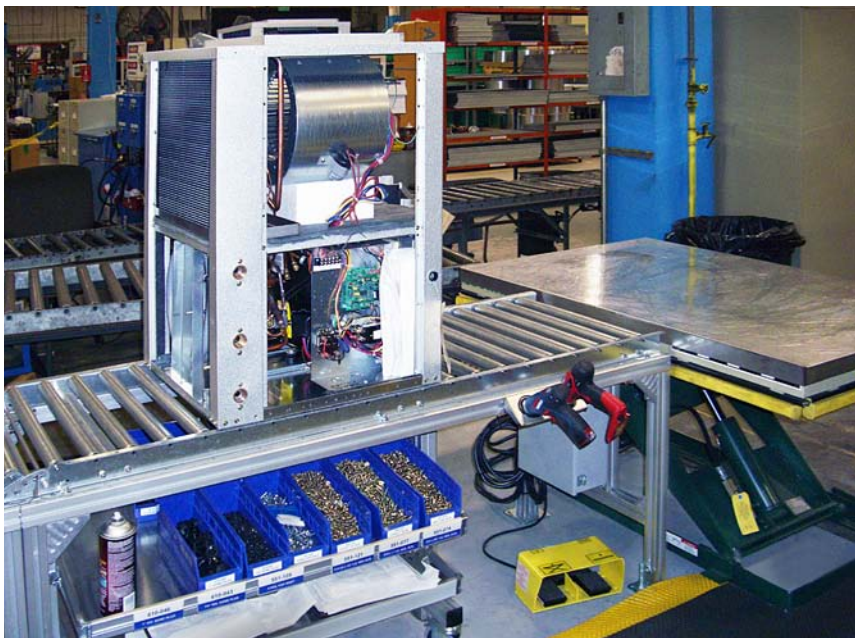
Brown supported the effort with product bulletins, further MPScalc software training, software updates, and information on how Rexroth's aluminum structural framing could be integrated into the new lean line.

"We quickly realized that lean manufacturing principles gave us advantages over our existing processes in many different areas—efficiency, materials utilization, parts inventory, product inventory, safety—you name it," David Francis says. "The next step was to get the actual lean production line started as soon as we could."

To get the new line up and running quickly, FHP devised an imaginative plan. The company had purchased a building next door to their existing facility for expansion reasons, soon after the lean initiative had begun. This building next door became the site of building the new assembly line, designed and constructed by David Francis and bolted together in sections by FHP personnel. After live tests proved the assembly line was ready for use, FHP quickly moved the new lean assembly line into the main production facility—between a Friday evening and the following Monday morning. The bolt-together simplicity of the aluminum structural framing profiles, connectors and accessories allowed for quick disassembly and re-assembly, so FHP could get the new line up and running with no downtime.

By applying lean manufacturing principles to the assembly line, FHP has seen dramatic improvements in both information and material flow, reduced inventories, and created a production environment that benefits employees by making the transfer of heavy components easier.

The new lean configuration has reduced work-in-progress (WIP) by 40%, because only 12 products need to be on the line at once instead of 20. FHP has much



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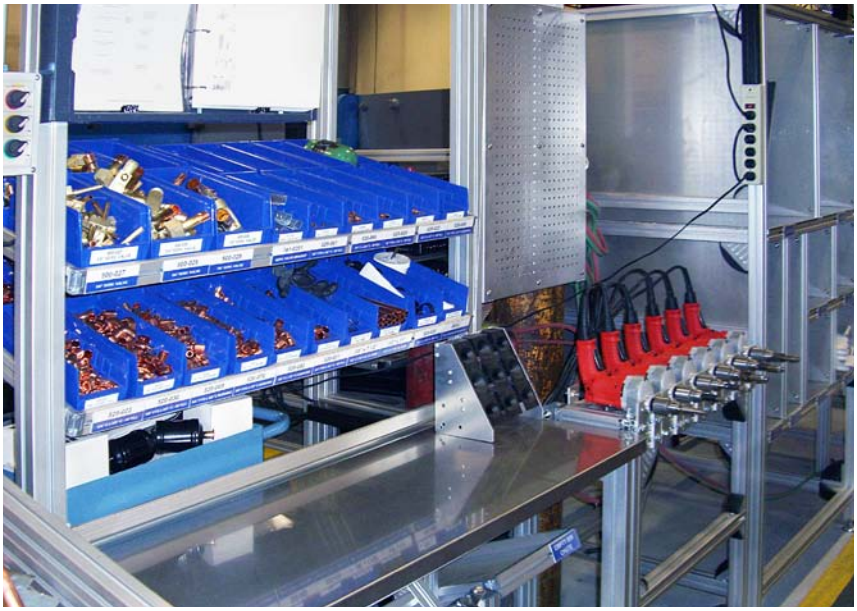
better control of the overall assembly process, thanks to more predictable and orderly progression of components down the line. This has helped the FHP lean production initiative to balance out the workflow between operations, avoiding bottlenecks that, in the past, invited possible safety or damage hazards.

While waste and downtime have been reduced, production is up. Takt time goals have now been met, thanks to increased throughput. At the same time, costs have been reduced, thanks to a smaller equipment footprint. The impact on FHP employees has also been impressive. Operators appreciate the new lean line's smooth, well-controlled, and safe environment. According to Bosch Rexroth's Chris Lupfer, "Everybody at FHP wants to work on Line 1."

Thanks to solid Bosch Production System training, the convenient MPScalc simulation software, and easy online ordering, FHP now has all the tools it needs to pursue continuous improvement and implement lean manufacturing in other areas of its operations. "Bosch Rexroth got us going—they provided the training, showed us the aluminum framing catalog, and taught us how to use the simulation software—and now we can apply lean principles on our own," David Francis says. "The components are flexible and easy to work with, but the most important thing is that our team now has a solid grasp of lean manufacturing." That's a contribution that FHP didn't order from a catalog, remove from a box, or even touch. But they can see it every time they look at their assembly line—and their bottom line.



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