

Increasing Throughput with Streamlined Manufacturing

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Many lubricant blending businesses find themselves in a challenging situation: there are opportunities to increase their overall business volume and profits by improving production flexibility, expanding their product slate and optimizing high-margin blends. At the same time, they find themselves constrained by current manufacturing limitations. However, launching a capital project for a significant manufacturing expansion may not be possible, and it may not be necessary.

The more practical answer is a program of manufacturing improvement to get more from your existing facility while minimizing additional investments. Throughput can increase without major capital expansions. There are two sides to such a program - integrated order processing and automated manufacturing operations - and together they affect the entire operation.

Operational Efficiency for Manufacturing

Lubricant blending is a relatively straightforward process and most manufacturing facilities do a good job of delivering quality products. The need to blend an off-spec batch into a lower-grade product is pretty rare. At the same time, few plants turn out as much product as they could. Here are some typical reasons:

- Product run sequencing calls for high amounts of equipment change-over between batches.
- Processes are largely manual, requiring operators to open valves, start mixers, connect hoses, reconfigure piping and so on, by hand.
- Inventory control is largely a manual process, requiring operators to check and verify tank levels.
- Incoming products typically arrive at unpredictable times and operators have to deal with truck or railcare unloading. Delivered products have to be directed to the correct tank and added to inventory manually.
- Production units have some instrumentation but it is generally isolated. There may be a flowmeter on the inlet of a tank or a level measuring device, but it must be read manually.
- What automated systems there are can only be controlled from a single point. If an operator has to go to the other end of the unit to open a valve, he has to call back to the controller on a walkie-talkie.
- The plant was designed to manufacture the product

slate as it was at the time of construction, which may have been a long time ago. Manufacturing requirements evolve over time but equipment does not always keep up.

Do any of these pain points sound familiar? This system works, but it does not support the highest volume or process flexibility most plants could realize.

Integrated Order Processing

Most lubricant blending businesses are largely manual operations. Sure, there is computer support, but order processing requires a high degree of human intervention. Orders come in through sales, and are entered into the system. Manufacturing orders get “cut” and issued to the plant, usually printed on paper. The interface with manufacturing is largely human. The scheduler/operator looks at the orders and selects the appropriate production sequence based on his or her experience.

Handling orders using this approach works, but it can be one of the major hurdles to growth. A more integrated system links sales, order processing and manufacturing into a single automated flow. There are various degrees of integration possible, so let's look at a fully realized example. Here's how it works:

- Orders come in from sales for a variety of products on your plant's slate. Once entered into the system, they are coordinated and compared against historical patterns.
- SKUs ordered frequently are combined into the largest manufacturing lots practical along with manageable inventory levels.
- Manufacturing receives consolidated orders to minimize the amount of product change-over, in an optimized running order to keep the amount of equipment reconfiguration and cleaning minimized.
- Products capable of being run simultaneously for most effective use of production time.
- Inventory of bulk oils and additives can be controlled to reduce the amount on your floor at any given time while ensuring critical items are there when needed.

Naturally the system allows for flexibility when needed. When human intervention is necessary to juggle schedules for some specific customer situation, it is available, but when operating correctly, it should be minimal.

A More Integrated Operation, End to End

Talking about an automated plant suggests a large operation such as an oil refinery, where a continuous process runs 24/7 making exactly the same product months and years at a time. Lubrication blending is different, but basic automation concepts still apply. Flexibility is important, and it should be a major consideration when designing an automation system. Batch manufacturing is very common in process industries, and there are many resources available, such as ISA88. This family of standards and practices has been used widely in a variety of industries.

Once a process has been more thoroughly integrated, let's follow how an order might be handled:

- Orders from sales are entered into the system. They are automatically consolidated for the most effective fulfillment from inventory or manufacturing to order.
- When issuing manufacturing orders, the system considers historical patterns and optimizes lot sizes for the most efficient manufacturing unit. Feedstock inventory is confirmed, or the order is automatically sidelined until ingredients are in stock. If the ingredients are not on order, the order is released based on the optimal purchase quantity.
- Manufacturing orders go directly to the plant system, pulling the most current version of the recipe for that product. Any changes or notes from the most recent manufacturing lot are added.
- Along with the recipe, equipment configuration notes are issued so any manual setup instructions are clearly spelled out.
- Production units committed to high-volume products have piping manifolds with automated valves and instrumentation to minimize the amount of piping changeover and cleaning.

- Operators doing setups have clear instructions accessible from a wireless device such as a smartphone or tablet. As steps are completed, they are checked off the list.
- Once a final product is blended, the order for lab checking is automatically issued, and when complete, it goes to a loading bay or appropriate packaging line.
- Strategic flow, level and weighing instruments ensure correct ingredient proportions and final inventory values.

Ultimately, the plant's utilization is maximized and operators use their time efficiently and effectively. The total output and agility of the plant can reach new levels without extensive additions of new production equipment. Your people work smarter and become more productive, while profitability improves as more items on your product slate move into the high-margin category.

Implementing programs for these kinds of improvements can be handled incrementally. They can start in the plant, but more typically begin with the office systems and work their way to manufacturing. Existing plant equipment can normally be integrated along with new instrumentation and controllers.

The ultimate benefit is tightening up the fragmented elements of manufacturing resources. This is what unlocks companies to realize their full potential as they work to meet customer needs.

Like the Battle of the Beams in 1940, process manufacturers are engaged in electronic warfare; this conflict is constantly changing and escalating. Criminals may attack using conventional hacking methods through the Internet or other means. Those vectors are understood and suitable defensive strategies exist. New approaches with drones and other mechanisms to disrupt networks have opened new fronts, which also must be defended.

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