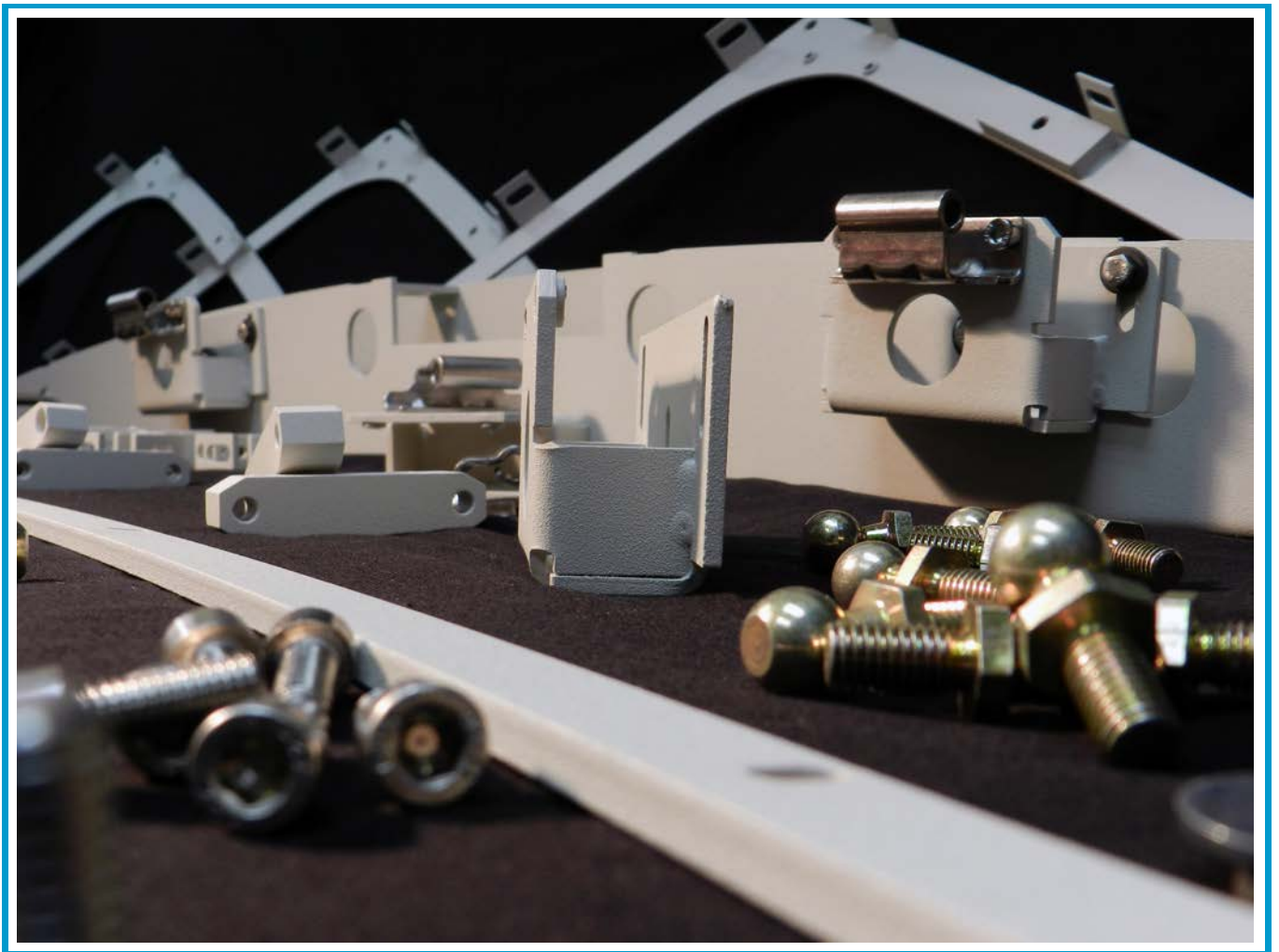


The Value of Strategically Sourced Sub-Assembly.

Outsourced sub-assembly creates measurable savings and fulfillment flexibility.



Introduction

Strategic Sourcing of Value-Added Assembly provides benefits that address the ongoing need for efficiency in the manufacturing process. The sourcing of components and the sub-assembly of products provides a wide array of advantages in several distinct areas:

- (a) **Cost Savings**
- (b) **Improved Material Flow with Reduced Supervision**
- (c) **Increased Flexibility Meeting Customer Demand**
- (d) **Improved Quality**
- (e) **Positive Environmental Effect**

The cumulative effect of strategically sourced sub-assembly results in significant savings for the OEM.

Cost Savings on Assembled Items

Value-added sub-assemblies will reduce or eliminate OEM component inventory, lower labor and overhead costs, while facilitating easier part replacement if necessary. Management of component purchasing and efficient sub-assembly by a qualified supplier can generate significant savings.

Firstly, sub-contracted assembly generates savings by eliminating the labor and overhead tied to component sourcing and purchasing, magnified by the number of individual items per product assembled. The elimination of administrative time and materials involved in research, negotiation, processing purchase orders, and managing inventory levels converts to direct savings or man-hours available for other uses.

Secondly, it eliminates the cost of receiving and inspecting hardware and other components used in the assembly. Savings occur in both the direct labor and facility

allocated for handling inventory, plus economies in overhead costs ranging from utilities to receiving materials. The direct savings in man-hours come from the reduction of incoming freight handling/dock-labor costs. Additional economies appear as reduced freight costs. By using sub-assembly practices, a manufacturer simplifies receiving and inspection with one PO and JIT delivery.

Once components are received, they need to be inspected and inventoried, with the added burden of documentation and system updates. This can be time and space intensive. Also, components not appropriately inspected and documented, may lead to the discovery of rejects or shortages at the final assembly point, which can affect costs in several different areas:

- a. Labor - direct manufacturing,
- b. Administrative expense
(returns, replacements, paperwork, vendor relations, etc.),
- c. Inefficient space utilization (quarantine and rejected goods areas),
- d. Missed deliveries and the associated implications,
- e. Carrying Costs -- WIP on hold, production delays,
and reduced cash flow.

Thirdly, sub-assembly with a qualified provider reduces or eliminates the impact of rejected and / or non-conforming parts. WIP rejections negatively influence process inventory and the JIT balance. By avoiding non-conforming part interruptions, the manufacturer circumvents the



financial impact of reworking parts and holding up final assembly. These bottlenecks in final assembly profoundly effect labor, missed deliveries, and the cost of production. Most importantly, by taking advantage of sub-assembly and avoiding the negative effect on direct manufacturing labor, more resources can be devoted to the fulfillment process,

contributing to greater efficiency in fill rates and eventual impact on profit. In turn, final assembly production times remain consistent, and subassembly providers are able to test and assure **Form, Fit and Function** at the fabricating point rather than the final assembly location.

The importance of **Form, Fit and Function (F3)** is critical. **F3** quality control of a sub-assembly avoids costly interruption at the final assembly point. Sub-assembly provides a valuable service by consolidating multiple components and mating various pieces to **F3** guidelines assuring that parts fit as designed. There is often waste during final assembly attributable to pieces that do not comply to **F3** requirements – even though they all meet specification.

Finally, a common practice when allocating parts for sub-assembly is to outsource the most labor-intensive items. A review of direct cost savings when comparing internal sub-assembly to outsourcing usually proves beneficial towards subcontracting.

Sub-assembly labor can be more efficient when building a particular component. Individual workers are assigned to manufacture a given part as opposed to rotating work on different line pieces. Over time the workers develop expertise in manufacturing a component which contributes to efficiency and translates into savings.

Therefore, the cost savings of sub-assembly becomes apparent in the form of greatly reduced costs in:

- a. Purchasing / Accounts Payable Processing
- b. Receiving / Component inspection,
- c. Inventory management,
- d. Assembly labor,
- e. Overhead associated with WIP rejects, and form, fit and function issues at final assembly, and
- f. Freight handling and associated processing charges.



One Purchase Order. The photos above show a typically sub-contracted assembly. (a) reflects 51 total parts required for one assembly; added to this are intangible items such as adhesives and special tools, (b) second stage of the subassembly combining the RIM molded plastic pieces with other parts, and (c) the final component ready to ship for use at the OEM. Section (a) may require as many as nine individual purchase orders coordinated with nine different suppliers. Sub-assembly allows for management of one qualified supplier and in many cases just one purchase order.

Subassembly affords the benefits of low or zero component inventories, uninterrupted fulfillment, and contained overhead costs. Less cash is tied-up, contributing to the ideal JIT manufacturing environment; little or no inventory other than a small WIP cache needed to satisfy orders in-hand.

Beyond the cost savings, additional benefits become apparent in improved material flow.

Improved Material Flow

Sub-assembly as part of the extended supply chain significantly reduces OEM manufacturing complexity, and the implications of in-house inventory, while improving efficiency and cycle time.

Every component used in a sub-assembly becomes an item that will not require planning or purchasing by the OEM. Only one purchase order is needed for a higher level assembly, tested for **F3** and ready to install. In addition, sub-assembly reduces costs associated with warehousing components. Space and associated labor can be reallocated to higher value functions.

By using outsourced assembly to produce a part, the material flow through a work cell improves in speed and quality while lowering expense. Flexibility to accommodate customer demand improves measurably as the responsibility for managing and maintaining the inventory is passed down the supply chain. Increased adaptability for special orders becomes achievable as lead-time issues are managed by qualified suppliers.



As mentioned before, sub-assembly components no longer require receiving, staging and inspection. There is no inventory to carry. There is no payment processing. The managed flow of sub-assembled product for JIT or KANBAN fulfillment, allows swift integration into a final assembly.

This streamlined assembly process shortens the final build cycle. OEM's using qualified sub-assemblers as part of a well-defined "pull" model can expect to identify a series of process improvements that boost not only their performance, but also competitiveness.

Not only are benefits found in the improved material flow of existing orders. There is the important advantage of increased flexibility meeting customer demands.

Increased Flexibility Meeting Customer Demand

Sub-assembly and inventory management by sub-contractors results in an efficient and stabilized material flow where the qualified supplier assumes the responsibility for replenishing inventory as material moves through to final assembly.

Unpredictable upward shifts in customer demand many times affect profit margins due to elevated costs incurred meeting the increase in last minute requests. By leveraging a sub-contractor's expertise in procurement, assembly and **F3** compliance, a producer is relieved of the burden of time, labor, material procurement, and sub-assembly part management. During times of increased demand, many companies realize great benefits by expanding the scope of material flow to include the efficiency of sub-contractor relationships in the extended supply chain.

Working together as a partner with an OEM, and through use of MRP software to monitor supply and forecast needs, the sub-contractor provides a valuable service by monitoring inventory trends in terms of both historical data and future projections. This service helps to assure an appropriate response when inventory management flexibility is required.

It is incumbent upon the sub-contractor to understand the manufacturer's needs and to utilize MRP software effectively. They have a vested interest in a customer's success as it is interwoven with their own.

Sub-component inventory held at the final assembly point must be stored and managed in anticipation of not only orders in hand and/or pending, but a forecast of product delivery related to sometimes varying conditions, which are seldom easy to predict. Sub-assembly parts managed by a sub-contractor significantly reduces a manufacturer's costs, and the handling needed in order to accommodate unexpected increases in final assembly demand. A properly functioning sub-contractor relationship can eliminate, or dramatically reduce, the costs of on-hand component inventory a manufacturer must maintain to satisfy upswings in unit production. This inventory reserve not only affects cash flow, but also warehouse space, sub-assembly staging needs, and related overhead.

By closely coordinating with a sub-contractor, a manufacturer can assure fulfillment of its steady-stream schedule for JIT or KANBAN releases while accommodating last minute customer demands. The sub-assembly resource helps maintain consistency in the dock-to-stock timing of standing orders while dramatically reducing costs and improving speed, quality, flexibility and customer satisfaction with last minute orders or customizing.

Beyond the quantifiable benefits of material flow, there is the additional advantage of improved product quality.

Improved Quality

A sub-assembly is a type of Quality Assurance System (QA) that can save the OEM time and money in the long term. This due to savings generated from QA provided by the sub-contractor. These inspections identify poor quality parts well before final assembly, avoiding the impact of high internal inspection and rework costs.

Once sub-assembly practices are a normal part of the process, quality rapidly improves. Not only in terms of specification, but also in a decrease of rework orders. When parts arrive assembled and ready for drop-in, it avoids handling and damaging an integral part of the sub-assembly. Time replacing any damaged parts is eliminated.



The pure advantage is that there are fewer quality defects reported in final inspection allowing for improved through-put and reduced lead time.

Then, there is the moral obligation and societal benefit of environmentalism.

Environmentalism

More and more companies are making important manufacturing decisions based upon environmental considerations. Environmental impact has become a significant issue leading companies to explore ways of working to reduce or eliminate negative effects. Researchers find that manufacturing affects two areas of environmental consideration: waste and carbon footprint.

Manufacturing waste largely affects eco-toxicity and human toxicity. Other concerns such as global warming, acidification and ozone depletion link to carbon footprint issues.

The refuse caused by excessive packaging material plagues landfills. In some cases, products are biodegradable, or recyclable by other means; however, in a majority of instances they are not. Producing through sub-assembly allows for re-purposing of shipping and storage materials which in many cases is too time and space consuming for an OEM. Sub-assembly re-purposing reduces costs for excessive shipping and storage material. This shrinks disposal costs and greatly reduces debris that ultimately finds its way into the environment.

The OEM reduces its carbon footprint both directly and indirectly through sub-assembly. With lesser use of services and materials for internal sub-assembly, a manufacturer **indirectly** creates footprint benefits by reducing overhead, incoming freight, and packing materials. The carbon footprint is **directly** impacted by lessening utility use associated with final assembly. While some of these items do come into play at sub-assembly, the efficiencies designed into the sub-assembler's procurement, component storage, and finishing framework contribute to an overall positive net effect.

Summary

Sub-contracting of component assemblies accrues cost savings for assembled items, improves material flow, enhances quality, increases responsiveness to customer demand, and contributes a positive environmental effect.

The benefits of sub-assembly materialize as reduced or eliminated direct and indirect labor costs, time saving, overhead containment, condensed part count, reduced defects, and easier part replacement. It helps avoid costly line slowdowns and empowers your line with an enhanced ability to respond quickly to changing delivery demands and requirements. Sub-assembly creates simplified fulfillment flexibility while decreasing operating costs and efforts.

Joseph R. Passarella
Exothermic Molding, Inc.
50 Lafayette Place
Kenilworth, New Jersey 07033
1.908.272.2299
sales@exothermic.com
www.exothermic.com

Editorial Contributors: Paul K. Steck, President, Exothermic Molding
Caonabo Delgado, Manufacturing Manager
Photo Assist: Eric Scott, Production Foreman

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