TO: George Washburn

FROM: Manny Jones

SUBJECT: Scheduling project in the Zinc Die Cast Molding Group.

REVIEW OF THE CURRENT SITUATION

This report provides the necessary information regarding the scheduling project in the Zinc Die Cast Molding Group, per your request. This problem is not part of the general yearly planning process, but is rather a situation that has occurred over the last several months. The situation has reached a point where action is required.

The current situation has evolved into one where the orders for end items that use zinc die cast components, i.e., knobs, pulls, towel bars, towel rings and robe hooks, have become highly backlogged. In many cases, the backlog is as long as 10 weeks order to ship time for some products. This long lead time is unacceptable to our customers who have become accustomed to our policy of providing shipments in a 4 to 6 week time frame.

The zinc die cast machine group has nine machines which produce 73 components. This machine group is currently running 3 shifts per week, 6 days per week. The furnace is put into a low temperature holding state on Sundays, and brought back up to melting temp early Monday mornings.

The backlog of orders has increased by about 5 weeks of order to ship time and seems to be on a track for continuing indefinitely unless we take action. We are currently running at nearly 97% utilization of capacity of the 3 shift, 6 day schedule. And this will push to the 100% capacity if unchecked. Normal capacity utilization has been around 90% for this machine group.

The problem has been diagnosed as caused mostly by the Zamak zinc material. High amounts of scrap parts are being produced, which has reduced the effective capacity of the machine group. Scrap rates as high as 30% on a frequent basis has become the norm. The zinc material seems to be the main issue. Apparently we have switched zinc suppliers about two months ago for a portion of our Zamak. This has been diagnosed with some impurities. Also, the single stage furnace is also part of the root cause. Holding the molten zinc at melt temperature creates additional stress in the cooling cycle of the die casting process. Furthermore, the poor material quality, which creates high scrap, also causes problems in the dies themselves. There is some amount of sticking in the dies during the ejection part of the cycle, causing the machines to be stopped. High scrap rates and excessive machine down time has eroded the effective capacity of this machine group. Finally, the problem was initially diagnosed as a scheduling problem – which machines should run which orders and what the Order Quantities should be. The scheduling solution has been effective only marginally. Yet, we should continue to work on the best scheduling algorithm.

The bottom line is that the problem is not scheduling, but rather a material problem. The remainder of this report will provide recommendations on how to proceed.

GOALS AND OBJECTIVES

The goal is to bring the order to ship time back to the 4 to 6 week levels for the products involved. Secondarily, the capacity utilization in the zinc die cast molding group will be returned to the 90% level. The material issue will be resolved and all Zamak zinc will meet purity specifications. The zinc oven issue will be resolved so that the melting and holding of zinc will be at optimum levels. Finally, the scheduling of the orders on the nine zinc die cast machines will continue to be reviewed for optimum production scheduling.

ACTIONS/PLANS

1. The first action necessary is to isolate the poor Zamak material and prevent it from being used. At the same time, orders from this vendor need to be put on hold. The Zamak needs to be tested and certified, then returned to the vendor for credit. Materials management needs to work with this vendor to determine if they can supply Zamak of the required purity, and if not, find another source. During this time, Zamak from our other vendor must be purchased in larger quantities to ensure adequate supply.
2. The zinc furnace must be purged of the current melt, which has some of the impure zinc. This should be done immediately by not adding any new zinc and using the current level in production, even though it will produce high levels scrap, until the furnace is empty of the current melt. Then pure zinc will be used.
3. A new two-stage furnace should be purchased and installed to replace the current furnace. This has been studied in the past, and a quote has been previously obtained from Acme Furnace. Given a three week lead time, the current furnace will continue to be used with pure Zamak until the new two-stage furnace arrives and can be installed. Installation should take two days.
4. Operations in the zinc die cast machine group should run 24/7, including Sunday for a period of several weeks. Once purified zinc is begun to be used again in the furnace, the scrap levels should be reduced.
5. Each die should be carefully cleaned before and after each use during the time that the current impure melt is being used up.
6. Scrap levels should be monitored closely. And this scrap should not be used for re-melt, as it is impure.
7. Die changeover processes need to be studied and setup times improved. Economic Order Quantities will be calculated for each part and implemented. Optimization of scheduling algorithms will continue.

As each of these steps are implemented, the backlog of orders will slowly reduce back to the normal levels of 4 – 6 weeks order to ship time. The zinc die cast machine group will return to the normal 3-shift, 6-day week.

EXPLANATION/JUSTIFICATION

1. Quality of the Zamak zinc is of the utmost importance, as seen from what we experienced in this situation. Using certified vendors is the best way to achieve this. ISO9000 certified vendors should be used. Validating the impurity of the zinc from the current supplier is necessary to show justification for returning the zinc for credit.
2. Since there is already some impure zinc in the current melt in the furnace, it must be purged. It can be used or simply drained and thrown away. Using this impure melt will provide some good parts, at about 70% yield. This yield level is better than a 0% yield while the furnace is being drained which would increase the backorders even more. Then pure zinc can be used from this point on in this furnace, until it can be replaced with the new two-stage furnace.
3. A two-stage furnace can be justified on cost savings of scrap from poor quality. With a two-stage furnace, the melt stage, which uses a higher temperature, can be much more easily monitored for quality. If impurities are found during the melt stage, the molten zinc can be run-off rather than run into the holding tank, which holds the zinc melt at a lower temperature. And holding the zinc at a lower temperature rather than at the higher melt temp, allows for better cooling during the cooling cycle of the die casting process. This will ensure less scrap and a better quality of zinc.
4. Operating the zinc die cast group 24/7 will increase the capacity by about 16%. This will stop the increase in the backlog of customer orders and even begin to reduce the backlog once the impure zinc is purged and pure zinc is used.
5. Dies that have been exposed to the impure zinc may contain small trace amounts which could affect the quality of subsequent parts even if pure zinc is being used. These dies should be cleaned before and then after, if they are using the impure zinc during the purging period.
6. Monitoring scrap levels will provide accurate yield counts, which will assist in tracking the use impure zinc and in projecting the amount time needed to achieve the goals. Since the scrap that is produced during the purge period is contaminated, it should not be put back into the mix by re-melting, but rather it should be simply scrapped.
7. Optimum Scheduling will result in optimum production levels and capacity usage. Reducing setup times will reduce the shop order quantities, which will then reduce WIP levels and overall inventory levels, providing a higher return on the material investment.

This report provides the action plan and its justification, which will solve the problem of the backlog of parts that utilize the zinc die cast production.

Assuming your approval, as we move ahead, I will oversee this plan and monitor the progress. You will receive weekly progress reports which identify which steps have been implemented and the levels of the backlog of the customer orders at that time.

Let us meet for a final discussion and hopefully your approval to proceed. I will setup a time on the calendar to meet in about three days.

--Manny