

New Q.iMPACT Technology

reduces manufacturing cost by \$5 million

About the Client: Procter & Gamble

Procter & Gamble markets 250 brands to five billion consumers in 130 countries. P&G is a leading global innovator and manufacturer of consumer products, investing nearly \$2 billion annually to develop and improve its products. Among its diversified manufacturing facilities is its only North American heavy-duty liquid detergent production operation. Located in Lima, Ohio (USA), the facility manufactures Tide® liquid detergent, one of P&G's premium brands.

Context: The Problem

P&G's research had long indicated that further reductions in manufacturing costs were required for the company to continue **increasing the profitability** of Tide liquid detergent. The formula for the detergent required the engineering group to control the accurate mixing of more than 30 ingredients – a task which, because of the size of each batch, required approximately two hours to complete. The challenge was for P&G to **manufacture the product faster but with similar or reduced overhead costs**, in order to reduce its manufacturing costs. This meant that the central engineering technology group needed to develop improvements to help this facility and others become more competitive without substantially increasing the capital investments already made in existing manufacturing lines.

The engineering group determined that by increasing production speed on manufacturing lines work at or near capacity, they could defer the construction of new manufacturing lines or, better still, defer the construction of entirely new manufacturing facilities. Further, if they took the same approach on manufacturing lines experiencing less demand, they could reduce costs by decreasing production by a shift, reducing the need for marginal shifts. The problem was that increasing material transfer speed appeared to be require giving up some of the accuracy. Alternatively, maintaining the required accuracy meant giving up the potential for increased speed and the benefits it would yield.

The Solution

After investigating the advanced process control techniques commonly used in many continuous processes (but not commonly used in batch processes), the engineering group identified **model-based predictive adaptive control** (PAC technology) as a way to combine greater speed and continued accuracy. If this control technique could be successfully applied in the material transfer phase when producing liquid Tide, the engineering group could eliminate the trade-off between transfer speed and accuracy.

P&G selected its Lima, Ohio site for implementing an upgrade in the material transfer process. The Lima facility was then using several two-speed feed designs. Model-based PAC algorithms were developed and implemented in the batch control system's controllers. The material transfer control phase was redesigned as single-speed control system, using PAC technology and overlapping feed technology. Overlapping feed technology uses multiple scale- and flow meter-based measurements to facilitate simultaneous material additions without affecting the integrity of any material addition.



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The Savings

Table 1 illustrates the savings that the Lima facility realized as a result of these technologies. Savings are shown both as a percentage of the initial batch cycle time and in terms of manufacturing minutes gained.

Table 1: Production Speed Savings After Implementation of PAC and Overlapping Feed Technologies

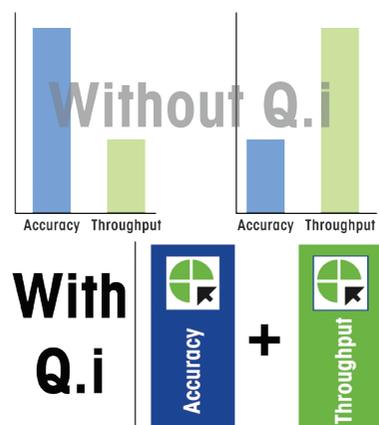
Source of Saving	Batch Cycle Time Saved (% of initial cycle time)	Time Saved (minutes)	Total Batch Cycle Time (minutes)
Initial batch cycle time:			~120
PAC Technology Implemented			
Single Speed (faster feed)	~30	~36	~84
Improved Accuracy (trim elimination)	~7	~8.4	~75.6
Overlapping Feed Technology Implemented			
Simultaneous Material Addition	~8.6	~10.3	~65.3
Total savings	~45.6	~45.7	~54.5

Summary of Manufacturing Benefits

Today, the Lima facility manufactures in excess of 120 million pounds of finished product per annum using only five manufacturing systems (mixing units) and an unusually small production team – due in part to the reduced need for trimming the amount of ingredient added.

The savings study conducted by the P&G process improvement team identified **savings and investment deferment in excess of five million dollars** (US\$5,000,000). These savings were directly attributable to the implementation of the PAC and overlapping feed technologies. Use of these technologies resulted in increased manufacturing capacity (throughput) with no incremental costs other than for raw materials. They also eliminated or deferred additional capital investment that would have been required to meet market demand, if it had not been possible to increase capacity while using the existing batch control system.

The technology behind P&G's success has now been patented and licensed to METTLER TOLEDO. It is embedded in the new METTLER TOLEDO **IND780 Q.i** IMPACT material transfer controller, and is deployed as part of the innovative METTLER TOLEDO Q.i Material Transfer Control Strategy.



About METTLER TOLEDO

METTLER TOLEDO is a leading global manufacturer of precision instruments, and the world's largest manufacturer and marketer of weighing instruments for use in laboratory, industrial and food retailing applications. The company also holds top-three positions in several related analytical instrument markets, and is a leading provider of automated chemistry systems used in drug and chemical compound discovery and development. In addition, the company is the world's largest manufacturer and marketer of metal detection systems used in production and packaging.

For more information on the savings the **Q.i Material Transfer Control Strategy** can deliver, please contact your local authorized distributor or sales office.

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