

Equipment Performance Part 4

Optimization Through 4M Analysis and Improvement

The 4M analysis is a tool found in the TPM / RCM toolbox which focuses on understanding the issues that prevent machines from running at optimal rates. We utilized this tool with a client in the high-speed printing industry when their equipment refused to run to the stated (purchased) capacity. They attempted to increase the output multiple times, but only managed to raise it to 140 feet per minute (fpm), which was less than half of the specified and promised 300 fpm. The client did not have the luxury of excess capacity on other presses, so they hid this problem with excessive overtime that strained employees.

After a two-week 4M Analysis and Correction exercise, we were able to run the machine at almost 400 fpm with near-perfect quality. Three years later, the client was still running this machine at our improved rate. Regarding our work with this particular machine, the client said, "We have done nothing but make bags of money with the machine since you guys fixed it."

WHY 4M?

The ultimate reason to utilize 4M is to maximize the performance of our current assets. This method also delays capital expenditure and avoids problems such as employee turnover and firefighting culture. Most of us simply cannot afford to buy capacity, so we must first improve the throughput of our existing machines. By extending the life of our equipment beyond industry standards, we position ourselves ahead of the competition.

This life-extension cannot be achieved by relying solely on charts and graphs. Machines run down for reasons we do not always completely understand. Data may suggest something entirely different from the real root of the problem. Therefore, we attempt to solve problems that are not fully understood. This is where a 4M analysis is able to improve equipment performance. We focus on the constraint equipment and ascertain whether the problem is internal to that asset or if that asset is blocked and/or starved. We achieve this information by collecting data while the machine runs and letting the data speak to us. If the majority of the issue is either being blocked or starved, then the 4M analysis must move to the asset where a majority of the issue is internal to that asset. We then focus on the items that kept us from maximizing performance, which are categorized into manpower (was the constraint asset ever not manned?), materials (did we ever either run out of materials or experience a problem due to materials?), method (did we ever run outside the standard?), and machine (what are the machine issues keeping us from maximizing throughput?). We observe the process for days while teaching people how to see waste and problems and collecting real-time, personally observed, and verified data about our problems. The Gemba holds the answer to most of our questions. Machines are predictable and explainable; we just have to know how to interpret what they are telling us. The 4M analysis allows us to prioritize our improvement efforts on that which truly is keeping us from success.



[Click here for a copy of our 4M analysis worksheet](#)

We at DRIVE enjoy the “shoulder to shoulder” approach to improving machines, processes, teams, and entire organizations. As veterans in our field, we understand the inner workings of the process. We partner with you to ensure you get the initial step improvement plus the understanding of how to continuously improve after we leave. If you need help with improving your asset capacity or capability, please contact Paul Eakle at 865-323-3491 or e-mail him at paul.eakle@driveinc.com

