Reliable Predictable Manufacturing process eliminates defects in can line at Coors, improving performance and cutting costs.

There is universal agreement that improved machine performance can control and reduce manufacturing costs. That was the goal of Coors Brewing Co., Golden, CO, when it commissioned a maintenance benchmarking study of its can and bottle packaging lines and the warehouse operation.

The study results compared the maintenance operations at Coors to a world class model and other companies in similar industries. The benchmarking process, developed and administered by Charles Brooks Associates, Inc., uses a grading system to determine a company's level of maintenance effectiveness.

Although the brewery's maintenance operations performed better than most of the comparison companies, two major opportunity areas were identified: planned maintenance and mechanic training.

As a result, Gene Rowe, senior consultant, and Coby Frampton, partner and president of Charles Brooks Associates; and Paul Altimier, director of can packaging at Coors, designed a program for the company that later became known as Reliable Predictable Manufacturing (RPM). The goal of RPM is to improve equipment performance and control or reduce manufacturing costs.

The RPM process includes many of the elements of other improvement processes such as critical component analysis, equipment upgrading, planned maintenance, and performance evaluation. It differentiates itself through the use of Defined Equipment Standards (DES) as the basis for maintaining and operating equipment, as well as being the vehicle for achieving employee participation, skills enhancement, and production/maintenance cooperation.

The 20 steps required to implement RPM are shown in the table "Steps for RPM Implementation." The first eight have to do with proper planning and setting the stage for change. The last 12 steps outline the implementation of the DES, modification of preventive maintenance routines and audits, and mechanic training. While quite specific in application, DES is essential in implementing Total Productive Maintenance

(TPM) and Reliability Centered Maintenance (RCM).

To insure that the project goals were being met, a baseline was established measuring unscheduled downtime, quality, and production.

Monika Seiler, the plant's RPM process manager, and Rowe involved the hourly mechanics and electricians from the onset to gain support for the RPM process. They developed the DES, prepared updated preventive maintenance (PM) routines, and conducted extensive, formal peer-level training. They also made presentations to upper management explaining their work and the benefits that were accruing. Hourly maintenance personnel took ownership of the analysis of line performance data and developed specific action plans to correct recurring problems.

Understanding how the program works and how it will affect them was essential in gaining their confidence and cooperation. The mechanics and electricians were empowered by the knowledge that they had an opportunity to participate in and assist with the development of a key business strategic program that would affect the company's bottom line. In order to request program funding, the supervisors, mechanics, and their appointed peer leaders met with L. Don Brown, senior vice president, operations and technology, to voice their support of and commitment to the program.

In order to determine the pilot production line, the team analyzed downtime data and identified the line with the greatest problems.

The variables analyzed were quality, production data, unscheduled downtime, and maintenance spending. Can Line No. 10, it turned out, produced the most can defects and received the most maintenance dollars.

Can Line No. 10 was broken down into major equipment systems or subassemblies. An analysis of subassembly downtime and maintenance cost determined which subassemblies were causing the can defects.

Next, current machine settings were identified, documented, and evaluated with input from mechanics from all shifts. Not unusual with many companies, each mechanic used a different setting. After gaining consensus from the mechanics, machine settings were adjusted to a set standard and were documented. This standard setting became part of the DES.

Once the can line's collator was upgraded and set to the new machine standard, can defects were reduced by 87 percent. After further evaluation, a variable speed drive was added to reduce pressure from the accumulator table, thereby eliminating all defects that prevented shipments.

Machine performance was monitored at the set standard and adjustments were made as necessary to optimize machine and line performance. When optimal machine and line performance were achieved, the machine settings were documented in the DES. Maintenance personnel took digital pictures of each machine and documented how the settings were achieved.

The use of digital pictures proved to be an important training tool as well as a creative way to document the DES for all the line equipment.

As a result, PM procedures were modified to reflect changes in the machine settings and new PM procedures were developed. Machine audits also were developed and implemented to assess the level of maintenance received and the current machine condition to ensure optimal machine performance.

Detailed PM procedures were developed once the optimal level of PM was achieved, and entered into the computerized maintenance management system.

At this point, the training process was begun to train mechanics on the new machine settings and PM procedures. A technical job skill training process called the Analytical Method of Training (AMT), used by Charles Brooks Associates since 1971, was implemented.

It begins with a thorough analysis of training needs, followed by standardization on the best trainable method. Once the method is known, skill development begins with peer-level instructors providing training until the trainee can perform at the expected level. When single-cycle skill has been achieved, the stamina buildup phase begins. The entire process is measured and monitored through extensive testing and performance demonstration.

Through an improved planned maintenance process starting with Defined Equipment Standards and mechanic training, reduced maintenance costs and improved efficiency can be achieved. The involvement and assumed ownership of the program by hourly employees, supervisors, and managers assures long-term results can be realized. **MT**

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Steps For RPM Implementation ***Stage*** ***Step***

Description

Planning and setting the stage for change

1 Educate unit management on benefits of RPM

2 Procure necessary equipment (cameras, printers) and identify work area

3 Identify a unit RPM champion

4 Appoint a RPM coordinator

5

Conduct RPM orientation for unit management, team leaders, and support personnel

6

Conduct shift meetings to describe the process to all hourly personnel and recruit volunteers

	7	Conduct RPM workshop
	8	Implement RPM
Implementation	9	Review existing documentation
	10	Establish benchmark measurements
	11	Break equipment down into subassemblies
	12	Develop timeline to track progress
	13	Develop Defined Equipment Standards (DES)
	14	Upgrade equipment to new standards
	15	Monitor equipment performance
	16	Modify preventive maintenance procedures
	17	

Develop machine audits

18	Develop and install revised CMMS PM checklists
19	Train mechanics
20	Implement new PM procedures