

SMED Steps Would Include a. Videoing The Process Of Changeover b. Segregating Internal From External c. Moving

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Implementing SMED (Single-Minute Exchange of Die) is a critical strategy for manufacturing efficiency, enabling rapid changeovers to minimize downtime and maximize productivity. The core of SMED revolves around streamlining the changeover process through meticulous steps. These steps include videoing the process of changeover to identify inefficiencies, segregating internal from external activities, and moving tasks to optimize flow. By carefully executing these steps, organizations can dramatically reduce setup times, improve flexibility, and enhance overall operational performance.

Understanding the Fundamentals of SMED

Before diving into the specific steps, it's essential to grasp the fundamental principles of SMED. The primary goal is to convert as many changeover activities as possible from internal (requiring machine shutdown) to external (performed while the machine is running). This transformation enables faster setups, reducing machine downtime and increasing production capacity.

Key Objectives of SMED:

- Minimize changeover time to less than 10 minutes.
- Increase equipment uptime and flexibility.
- Reduce inventory and lead times.
- Improve responsiveness to customer demand.

Step 1: Videoing the Process of Changeover

Purpose and Importance of Videoing

The first step in implementing SMED involves recording the entire changeover process. Videoing provides a visual and detailed account of every activity

involved, from start to finish. This documentation allows teams to analyze each step critically, identify unnecessary movements, delays, or redundancies, and formulate strategies for improvement.

Benefits of Videoing:

- Clear visualization of the changeover process.
- Identification of bottlenecks or inefficiencies.
- A basis for training and standardization.
- Facilitation of team discussions and continuous improvement.

How to Effectively Video the Changeover Process

To maximize the benefits of video analysis, follow these best practices:

- Use high-quality cameras or smartphones with good resolution.
- Record the entire changeover process in real-time, from shutdown to completion.
- Capture multiple changeovers to observe variations and common issues.
- Annotate the video if necessary to highlight specific steps or problems.
- Involve operators and team members in reviewing the footage for insights.

Analyzing the Video Footage

Once the videos are collected:

- Break down the process into discrete steps.
- Measure the time taken for each activity.
- Identify activities that can be eliminated, combined, or performed differently.
- Note activities that are performed as internal or external tasks.

Step 2: Segregating Internal from External Activities

Defining Internal and External Activities

In SMED, activities are classified into:

- Internal activities: Tasks that can only be performed when the machine is stopped.
- External activities: Tasks that can be performed while the machine is running or outside the changeover period.

Why Segregate?

Segregating these activities is crucial because external activities can be prepared in advance, thus reducing overall changeover time.

Strategies for Effective Segregation

- Identify Internal Activities:

Tasks such as mounting or demounting tools, adjusting machine parts, or cleaning components that require the machine to be offline.

- Identify External Activities:

Activities like gathering tools, preparing parts, or arranging necessary components that can be done before the machine halts.

- Prepare External Activities in Advance:

For example, pre-positioning tools, pre-setting parameters, or pre-loading materials.

- Convert Internal to External Activities:

Where possible, modify procedures so tasks traditionally performed during downtime are completed beforehand.

Practical Examples of Segregation

- Tool preparation:

Instead of assembling tools during machine shutdown, prepare and set them up beforehand.

- Workstation setup:

Arrange and check materials and components outside the machine's operational window.

- Adjustments and calibration:

Perform these while the machine is still running, if possible, or in advance.

Step 3: Moving Tasks for Optimization

Transferring Internal Activities to External

Once tasks are identified and segregated, the next step involves moving as many internal activities as possible to external ones. This shift reduces the

need for machine stoppages and speeds up changeovers.

Approaches to Moving Tasks:

- Pre-assembly:

Assemble components or tools outside the machine during operation.

- Pre-setting parameters:

Configure settings or calibrations in advance.

- Staged changeovers:

Break down the changeover into smaller steps that can be performed sequentially without stopping the machine.

Implementing Moving Tasks: Practical Techniques

- Standardize procedures:

Develop checklists and routines for external activities.

- Design ergonomic workstations:

Ensure that external activities are easy to perform quickly and efficiently.

- Use quick-change tooling:

Implement tools and fixtures that facilitate rapid swapping.

- Train staff:

Educate operators on efficient external activity execution to minimize delays.

Monitoring and Continuous Improvement

After moving tasks externally, it's essential to continuously monitor the process:

- Use video recordings to verify improvements.

- Gather operator feedback.

- Measure actual changeover times.

- Adjust procedures as necessary to further streamline.

Additional SMED Steps and Best Practices

While the three core steps outlined above form the foundation of SMED, additional practices are vital for sustained success:

- Documentation and Standardization:

Create detailed standard operating procedures (SOPs) based on optimized changeover processes.

- Employee Involvement:

Engage operators and maintenance staff in identifying improvements and testing new methods.

- Use of SMED Tools:

Utilize checklists, flowcharts, and time-tracking sheets.

- Regular Review and Refinement:

Periodically revisit changeover procedures to adapt to new equipment, tools, or production requirements.

Conclusion: Achieving Operational Excellence with SMED

Implementing SMED is an ongoing journey that requires meticulous analysis, strategic planning, and continuous refinement. The process begins with videoing changeovers to gain visual insights, segregating activities to maximize external preparations, and moving tasks to eliminate unnecessary downtime. By systematically applying these steps, manufacturers can significantly reduce setup times, enhance flexibility, and boost overall productivity. Embracing SMED not only accelerates changeovers but also fosters a culture of continuous improvement, leading to sustained operational excellence and competitive advantage.

Keywords: SMED, changeover, setup time reduction, internal activities, external activities, process improvement, manufacturing efficiency, rapid changeover, lean manufacturing, continuous improvement

Frequently Asked Questions

What is the importance of videoing the changeover process in SMED implementation?

Videoing the changeover process helps in identifying inefficiencies, provides visual documentation for analysis, and facilitates training by allowing team members to observe best practices and areas for improvement.

How does segregating internal and external setup activities enhance SMED efficiency?

Segregating internal from external activities allows for the external activities to be performed while the machine is running, reducing overall changeover time and minimizing machine downtime.

What are the key steps involved in moving from internal to external setup activities?

Key steps include analyzing the setup process, identifying tasks that can be performed externally, reorganizing tools and parts for quick access, and training staff to perform these tasks efficiently outside of machine downtime.

Why is the 'moving' step crucial in the SMED process?

The 'moving' step involves transferring tools, parts, and materials efficiently during changeover, which reduces delays and helps streamline the entire process for faster machine readiness.

Can video documentation of changeover processes aid in continuous improvement efforts?

Yes, video documentation provides a clear visual record that can be reviewed to identify bottlenecks, standardize best practices, and foster continuous improvement in changeover procedures.

What role does team training play in the SMED steps of videoing, segregating, and moving?

Team training ensures that all members understand the new procedures, can perform external activities efficiently, and adhere to standardized methods, which collectively reduce changeover times and improve overall productivity.

Additional Resources

SMED Steps: A Deep Dive into the Critical Phases of Changeover Optimization

In the realm of manufacturing and process improvement, the term SMED (Single-Minute Exchange of Die) has become synonymous with efficient changeover procedures aimed at drastically reducing downtime and increasing productivity. Central to SMED's success are its core steps, which systematically analyze, categorize, and streamline the changeover process. This article explores the fundamental phases of SMED – videoing the process

of changeover, segregating internal from external activities, and moving – providing a comprehensive review suitable for industry professionals, quality analysts, and academic researchers committed to operational excellence.

Understanding the Significance of SMED in Modern Manufacturing

Before delving into the specific steps, it's vital to understand why SMED has garnered widespread adoption. Traditionally, changeovers—switching equipment from one production run to another—were time-consuming, often resulting in significant downtime. SMED aims to reduce this to less than ten minutes, ideally under one minute, thereby improving throughput, flexibility, and responsiveness to market demands.

The methodology was pioneered by Shigeo Shingo in the 1950s and has since evolved into a cornerstone of Lean Manufacturing. Its success hinges on meticulous analysis and process re-engineering, making the detailed steps of SMED critical for achieving meaningful gains.

The First Step: Videoing the Process of Changeover

Why Video Documentation Is Essential

The initial phase of a SMED project involves capturing the current state of changeover activities through video recordings. This step is often underappreciated but serves as a powerful tool for several reasons:

- Visual Clarity: Video provides a clear, unambiguous record of each step, movement, and tool used during changeover.
- Objective Analysis: It minimizes subjective bias, allowing teams to observe inefficiencies and bottlenecks objectively.
- Training and Communication: Visual documentation becomes a valuable resource for training new operators and communicating best practices.

Implementing the Videoing Process

To effectively video the changeover process, teams should:

- Select the Right Equipment: Use high-resolution cameras capable of capturing detailed movements from multiple angles.
- Ensure Proper Lighting and Framing: Clear visuals prevent misinterpretation of actions.
- Record the Entire Process: Capture from the start to finish, including preparation, disassembly, cleaning, setup, and testing.
- Annotate and Review: Post-recording, annotate key points, pauses, or issues to facilitate analysis.

Analyzing the Video Data

Once recorded, the team should:

- Break down the process into discrete steps.
- Identify unnecessary movements, delays, or redundancies.
- Quantify the time spent on each activity.
- Highlight activities that can be categorized as internal or external (discussed further below).

This visual record forms the foundation for the subsequent steps, enabling a data-driven approach to process improvement.

Segregating Internal from External Activities

Defining Internal and External Activities

A pivotal concept in SMED is the distinction between internal and external changeover activities:

- Internal Activities: Tasks that can only be performed when the machine is stopped. Examples include changing molds, adjusting settings, or swapping tools.
- External Activities: Tasks that can be performed while the machine is running, such as preparing tools, obtaining parts, or setting up auxiliary equipment.

Recognizing this distinction is crucial because external activities can often be performed in advance, significantly reducing overall changeover time.

Analyzing Activities for Categorization

Using the video recordings, teams should:

- List all activities involved in changeover.
- Determine which activities are internal, external, or a combination.
- Identify activities that can be shifted from internal to external.

Strategies for Externalizing Activities

Once external activities are identified, focus on:

- Pre-Preparation: Gathering and preparing all necessary tools, parts, and documentation before the machine stops.
- Parallelization: Performing external activities simultaneously with internal ones when possible.
- Standardization: Developing standardized procedures for external tasks to ensure consistency and efficiency.

Benefits of Proper Segregation

This step leads to:

- Reduced machine downtime.
- Smoother, more predictable changeovers.
- Enhanced planning and personnel coordination.
- Opportunities for process automation or further optimization.

Moving Activities: The Transition from Theory to Practice

Implementing Changes and Continuous Improvement

The "moving" phase refers to the practical application of redesigned changeover procedures based on video analysis and activity segregation. It involves:

- Standardizing Procedures: Developing detailed, written instructions and visual aids.
- Training Operators: Ensuring everyone understands and can execute new

methods efficiently.

- Trial Runs: Testing the new procedures to verify reductions in changeover time.
- Monitoring Performance: Using metrics to assess improvements and identify further refinement opportunities.

Physical and Organizational Movements

Movements in changeover can be physical (e.g., moving tools, parts, or personnel) or organizational (e.g., shifting responsibilities). Effective "moving" strategies include:

- Layout Optimization: Rearranging workstations to minimize movement distance.
- Tool and Part Storage: Positioning commonly used items close to the machine.
- Concurrent Activities: Performing external activities while internal actions are underway.

Moving Toward Lean Changeovers

The ultimate goal is to evolve changeover processes into lean, streamlined operations. This involves:

- Eliminating unnecessary steps.
- Automating repetitive tasks.
- Incorporating quick-release mechanisms.
- Continually reviewing and refining procedures.

Case Study: Applying SMED Steps in a High-Volume Plastic Molding Facility

To illustrate these principles, consider a hypothetical case where a plastics manufacturer seeks to reduce mold changeover time from 45 minutes to under 10 minutes.

Videoing the Process:

- The team recorded multiple changeovers, revealing redundant movements and delays in tool retrieval and setup.
- Analysis highlighted that certain tasks, such as mold cleaning and inspection, could be performed externally.

Segregating Activities:

- External activities like preparing new molds, gathering tools, and setting up auxiliary equipment were scheduled prior to machine shutdown.
- Internal activities, such as removing the old mold and installing the new one, were optimized with quick-release fixtures.

Moving and Implementation:

- Layout modifications placed storage containers near the machines.
- Operators received training on standardized external procedures.
- Concurrent external activities were performed during internal tasks, cutting total changeover time significantly.

The result was a reduction of changeover times to approximately 8 minutes, enabling more flexible production schedules and reduced inventory holding costs.

Conclusion: The Strategic Value of SMED Steps in Continuous Improvement

The meticulous application of the SMED steps—videoing the process, segregating internal from external activities, and effectively moving activities into optimized workflows—can transform manufacturing operations. These steps promote a culture of continuous improvement, operational agility, and waste reduction.

By leveraging visual documentation, precise activity analysis, and strategic movement management, organizations can achieve dramatic reductions in changeover times. This not only enhances productivity but also supports broader Lean initiatives, fostering a resilient, responsive manufacturing environment.

In an increasingly competitive landscape, mastering these SMED steps is more than an operational necessity; it is a strategic imperative for sustainable growth and excellence.

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