Feature Study

Cycle Planning Optimization

For MedTech &
Pharma Manufacturing Industry

In the MedTech & Pharma industry of testing and manufacturing, precise workflows and compliance with testing regulations in various countries are crucial for quality and regulatory adherence.

This is particularly challenging when testing components requires multiple workflows with repeated cycles, sometimes exceeding 100 times. The complexity of variations and regulatory requirements makes planning difficult and increases maintenance efforts. Additionally, obtaining insights into the current status of testing orders and assessing workload utilization is highly labor-intensive.

By leveraging **digital cycle planning**, manufacturers can optimize their workflows, improve efficiency, and ensure compliance while reducing overhead costs.

Process Challenges

Managing Repetitive Testing Cycles

Medical device testing often requires components to undergo repeated test cycles, sometimes ranging from 50 to 500 work steps. Managing these cycles manually within standard work plans increases complexity and workload.

Ensuring Regulatory Compliance

Only test orders that adhere to the same regulatory requirements can be processed together. For example, EU orders must not be mixed with those designated for the US market, adding another layer of complexity.

Limited Resource Utilization

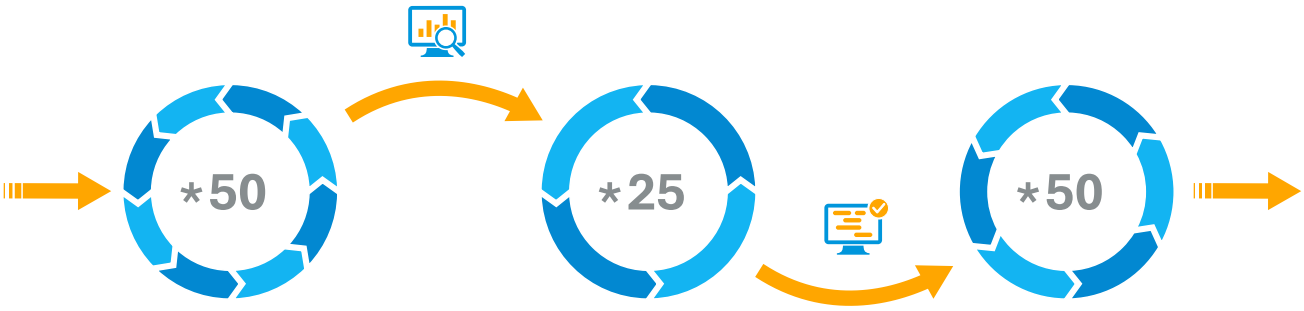
Sterilizers and other critical testing equipment have limited capacity. Common scheduling method cannot ensure that multiple test orders can always be processed simultaneously without disruption.

High Maintenance Efforts

Frequent work plan updates require significant maintenance, particularly when regulatory requirements or product specifications change.

Fixed and Monolithic Planning

Test sequences need to be adjusted dynamically based on order priorities, compliance requirements, and resource availability. Common planning method are either paper-based or time-consuming to adjust, causing delays and bottlenecks.



The Feature: Digital Cycle Planning

By leveraging digital cycle planning, manufacturers can make their planning more flexible and efficient. Here's how:

Optimized Workflows & Resource Management

Test cycles are directly integrated into work plans, reducing manual effort and increasing planning flexibility. Resources, such as sterilizers, are automatically considered to ensure efficient scheduling.

Digital Documentation & Transparency

All test cycles and documentation are digitized, cutting down on manual work and paper use. This makes cycle execution and tracking more transparent, ensuring full traceability.

Dynamic Scheduling & Visualization

A Gantt chart provides a clear overview of the planning process, making scheduling more transparent and adaptable. Orders can be rescheduled or postponed even after execution has started, allowing for greater flexibility.

Integrated Batch Processing Principle for Higher Equipment Utilization

A key principle in efficient test cycle planning is the "Batch Processing Principle", ensuring maximum utilization of sterilizers and testing equipment:

- Multiple test orders are grouped together before execution to ensure full machine utilization.
- Once a test cycle starts, it runs without interruption, like a dishwasher completing a full load.
- This reduces idle time, optimizes resource usage, and improves overall efficiency.

Modern production planning and control solutions, such as planeus, have already built-in these principles and features to ensure smooth and efficient execution.

Maximizing Efficiency with planeus

By using intelligent scheduling tools like planeus, companies can simplify complex workflow planning, test cycles, and resource management in Life Science testing and manufacturing processes.

- planeus not only supports digital documentation and cycle planning but also integrates block and occupancy scheduling, ensuring multiple test orders can be efficiently managed.
- By integrating batch processing principles, planeus ensures that multiple test orders run smoothly and without interruption in a sterilizer, maximizing equipment utilization.
- Close collaborations with customers and frequent cloud updates ensure that planeus remains flexible and adaptable to specific regulatory requirements and industry challenges.
- Adopting characteristic-based planning enables businesses to optimize their production or testing processes with greater intelligence and precision.

With its transparent and future-ready approach, the software provides a **reliable solution for both laboratory and production environments**, helping manufacturers streamline operations and maintain compliance in an increasingly complex industry landscape.

» Learn More about how planeus helps optimize your production.

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Feature Study

Personnel Planning

More Flexibility
in Workforce Scheduling

Planning Challenges

High Planning Effort

The availability of personnel, teams, and departments **changes every day**, which makes workforce scheduling a slow and difficult job for planners and managers.

Mismatch Between Planned and Real Workforce Capacity

Planners need to consider not only when machines and tools will be available, but also how many qualified employees will be available each hour. If they make a mistake, production can be delayed or disrupted **because no one is there to complete the tasks.**

Hard to Manage Qualification-Based Assignments

Some employees have **unique skills and qualifications**, so they need to be matched to the right tasks. Without a clear plan, it's hard to make sure the right people are doing the right work.

Disconnected Resource and Personnel Planning

Traditional planning tools are mainly focused on machines, materials, and workflows, but ignore details like availability, skills, and shift patterns, leading to **disconnected processes** and **missed chances** to improve efficiency.

Need for Customizable Planning Rules

Most planning systems cannot handle **company-specific rules** like custom shift models, labor agreements, or unique working time setups. This means planners often have to make manual adjustments, which takes extra time and increases the risk of errors.

The Feature: 2-Stage Personnel Planning

To meet these demands, the "Personnel Planning" module features **a two-stage approach** that covers both resource scheduling and detailed staff assignment by combining long-term planning with real-time flexibility.

Stage 1: Long-Term Personnel Demand Forecast

In the first planning stage, customer orders are scheduled **over a set time period** (e.g., the next 4 weeks), based on the required tasks and the availability of machines and tools.

Key Functions:

Automated Demand Calculation
The system calculates **how many employees are needed** based on the planned tasks and how long each one takes.

Skill-Based Groups (Pools)
Employees are grouped **by their qualification** (e.g., licenses, skills, training, etc). Each group includes how many people are available and how many hours they can work.

Multiple Pools per Task
Several employee groups can be assigned to one task, giving more flexibility in **skill-based planning**.

Stage 2: Real-Time Workforce Assignment

Once production and staffing needs are planned, the module will take over and assign employees to specific tasks by their qualifications as well as company-specific rules and shift models.

Key Functions:

Automated Personnel Assignment:
The system assigns employees based on their skills, shift times, and current workload.

Customizable Extension Module:
Companies can adjust the module to handle their **company-specific customization**, like

- Different shift patterns
- Different labor contracts
- Different employee preferences

Manual Adjustments Always Possible
Planners can still make changes manually whenever needed — especially useful **when last-minute updates or special adjustments** are frequently needed.

Flexibly Managing Your Teams with planeus

By using the advanced workforce planning features of planeus, companies can simplify resource scheduling, personnel assignments, and operational management.

Fast Reaction to Absences or Shift Changes

Real-time visibility allows planners to instantly adapt schedules without compromising production stability.

Better Use of Skilled Workers

By linking production plans with skill pools, planeus ensures each qualified worker is assigned where their expertise creates the most value.

Minimized Overload and Idle Time

By detecting gaps and conflicts in the planning phase, the system avoids overstaffing, underutilization, and scheduling conflicts.

Seamless Integration into Existing Planning

The module complements the established exception-based planning logic, offering a layered, end-to-end solution that combines machine, tool, and personnel planning in one ecosystem.

With its intelligent scheduling approach, planeus enables manufacturers to optimize their workforce planning, improve productivity, and maintain operational efficiency in increasingly dynamic production environments.

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Feature Study

Characteristics

Automated Machine Assignment Made Easy

Increase Efficiency.
Reduce Downtime.
Strengthen Agility.

The Need for Change

In today's life sciences manufacturing, efficiency, compliance, and flexibility are key to staying ahead of the competition. This is especially true in industries such as pharmaceuticals, biotechnology, and medical devices, where companies must ensure precise, validated, and compliant production planning.

By leveraging **"Characteristics"**, a feature-based attributes for equipment, products, and production processes — manufacturers can optimize their operations while ensuring regulatory compliance and quality assurance.

Production Challenges

Handling Similar Machines

In life sciences environments, there are often multiple vessels, bioreactors, or filling lines capable of performing similar tasks but with different validation statuses or containment levels. It's essential to assign production batches to the right or best-suited equipment based on its specific qualifications, cleaning status, or volume capacity. This ensures compliance, maintains product integrity, and prevents deviations that could affect quality or batch release.

Planning in the Right Sequence

Choosing the optimal sequence for processing batches is critical for maximizing throughput and maintaining compliance. Proper sequencing minimizes changeover and cleaning times — for example, by organizing campaigns from non-potent to potent products, or allergen-free to allergen-containing formulations — reducing downtime and contamination risk while maintaining operational efficiency.

Choosing the Proper Equipment

Each piece of equipment has unique certifications, capabilities, and operational limits. It's vital to match processes with qualified and available assets. Misassigning a batch to the wrong equipment can lead to costly deviations, extended downtime for revalidation, and potential non-compliance with GMP standards.

Managing Product and Process Variations

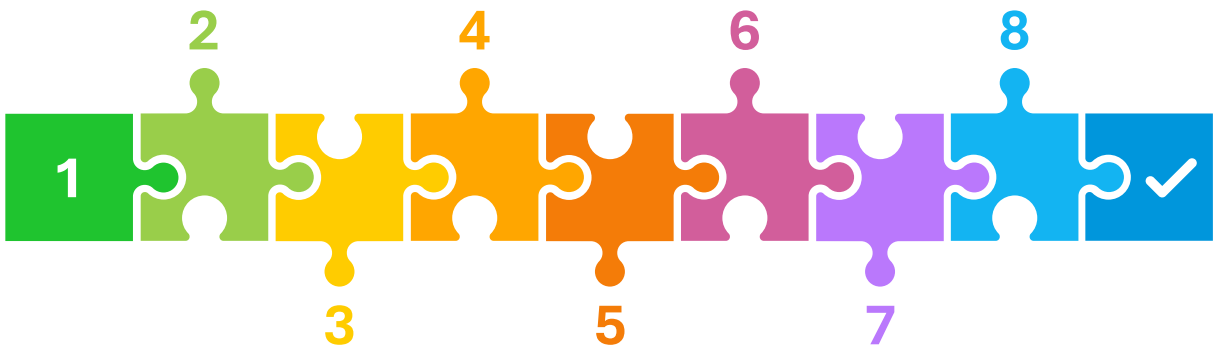
Life sciences manufacturers often deal with variations in batch size, potency, formulation, or production scale.
Managing these variations becomes increasingly complex as regulatory and product requirements evolve. Assigning each batch to appropriately validated equipment ensures product consistency, reduces the risk of cross-contamination, and maintains compliance throughout the manufacturing process.

Meeting Special Regulatory Requirements

In pharmaceutical and medical device production, regulatory standards such as GMP, FDA, and ISO 13485 require strict control over every step of the manufacturing process.
Special considerations like cleanroom classification, allergen segregation, and sterilization procedures must be reflected directly in the planning process to ensure compliance and quality.

Common Industry Examples:

- **Pharmaceuticals:** Managing multiple reactors or mixers qualified for different APIs or batch sizes. Automatic assignment ensures validated equipment is used for the intended product.
- **Biotechnology:** Sequencing cell culture or fermentation runs by containment level or cleaning status to optimize equipment utilization and minimize sterilization cycles.
- **Medical Devices:** Planning sterilization and assembly lines based on cleanroom classifications and material compatibility to maintain ISO and FDA compliance.



The Feature

By leveraging specific features of products, processes, and equipment, life sciences manufacturers can make their production planning both more compliant and more efficient.

Automatic Matching of Equipment to Overcome Production Complexity

One of the main challenges in life sciences manufacturing is managing multiple pieces of qualified equipment with different validation scopes. Instead of manually assigning equipment to batches, let the system automatically select the right resource based on attributes such as validation status, cleaning status, containment level, and capacity.
This ensures that only suitable, qualified equipment is used, eliminating manual errors and reducing time spent on compliance checks.

Optimized Workflow Sequencing to Reduce Cleaning and Downtime

Determining the best production sequence minimizes cleaning, sterilization, and validation time.
For example:

- In pharmaceutical production, you can plan campaigns from low-potency to high-potency batches to reduce changeover effort.
- In biotechnology, sequence runs based on cleaning validation groups to avoid unnecessary CIP/SIP cycles.
- In medical device manufacturing, group similar materials or assembly steps to minimize sterilization or line requalification needs.

Equipment-Specific Assignment to Maintain Compliance

Each piece of equipment has defined capabilities and qualification limits. Assigning the wrong process or batch can cause non-compliance or deviations. Characteristic-based planning ensures every batch is matched to validated equipment with the correct process capability, qualification, and cleaning status. For instance, a bioreactor validated for a specific cell line will only be scheduled for that process, ensuring compliance and reducing quality risks.

Efficient Handling of Batch and Product Variations

Managing multiple formulations, batch sizes, and product variations is complex. By using product and process characteristics as the basis for planning, these variations are automatically handled — ensuring each production run uses suitable equipment and parameters while maintaining traceability and reducing human error.

Ensuring Compliance in Regulated Production

Adhering to GMP, FDA, and ISO standards is critical in life sciences manufacturing. Characteristic-based, automated planning ensures that equipment assignments always respect qualification, cleaning, and environmental requirements. This guarantees that production remains compliant, efficient, and audit-ready at all times.

Key Benefits

Adopting characteristic-based planning enables life sciences manufacturers to optimize production processes with intelligence, traceability, and precision.

Unlike rigid, manual, or paper-based planning methods, planeus is purpose-built for the regulated, data-driven environment of modern life sciences manufacturing. Its approach supports compliant, goal-oriented planning that considers the unique characteristics of every product, process, and equipment asset.

This allows companies to manage complex operations more effectively while ensuring full regulatory adherence.

The result is improved equipment utilization, minimized downtime, reduced deviations, and a stronger compliance posture — enabling a true digital transformation in pharmaceutical, biotech, and medical device production.

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