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MRP-Based Scheduling and PAC

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MRP-Based Scheduling and PAC

1. Relationship Between MRP and PAC

MRP (Material Requirements Planning) generates planned orders that determine *what*, *how much*, and *when* to produce or purchase. PAC (Production Activity Control) executes and monitors these orders on the shop floor. Understanding the connection between planning (MRP) and execution (PAC) is critical because MRP relies on accurate feedback from PAC to adjust priorities, update lead times, and ensure planning integrity. Together, they ensure synchronized materials, capacity, and shop-floor activities. CPIM candidates must understand that MRP sets the plan while PAC ensures actual work aligns with requirements and schedules.

2. MRP-Based Order Release

MRP generates planned order releases based on gross requirements, inventory balances, BOM explosions, and lead times. Order release is the transition from planning to execution, converting planned orders into actual production or purchase orders. Timing is critical: too-early releases increase WIP and congestion; too-late releases risk shortages. PAC uses these releases to schedule resources and track execution. Understanding proper release timing ensures stable shop-floor flow and supports accurate capacity utilization.

3. Priority Control in MRP Systems

Priority control manages which orders should be worked on first based on due dates, customer priorities, or bottleneck demands. MRP assigns due dates, but PAC adjusts priorities

based on real-time shop-floor conditions such as machine breakdowns or material shortages. Tools like dispatching lists, queue management, and expedite/de-expedite decisions help maintain alignment with MRP requirements. Mastering priority control ensures reliable and efficient order execution.

4. Input/Output Control

Input/Output Control monitors and balances the flow of work released into a work center (input) against the work completed (output). When input exceeds output, WIP grows, causing delays and inefficiencies. MRP-based scheduling must coordinate release timing, while PAC tracks actual performance and adjusts release rates. Input/output reports help planners identify overloaded or underutilized work centers. This concept is crucial for maintaining capacity alignment and schedule reliability.

5. Detailed Scheduling from MRP Orders

MRP provides due dates but not detailed sequencing. Detailed scheduling determines the specific order in which jobs will be run at each work center. PAC uses dispatching rules, sequencing techniques, and real-time conditions to create executable schedules. The goal is to minimize queues, reduce lead times, and meet due dates. CPIM candidates must understand how detailed scheduling supplements MRP's broad planning outputs.

6. Dispatching Rules in PAC

Dispatching rules determine the sequence of work when multiple jobs are waiting. Common rules include First-Come–First-Served (FCFS), Earliest Due Date (EDD), Shortest

Processing Time (SPT), and Critical Ratio (CR). Choosing the right rule affects lead time, throughput, and due-date performance. In MRP-based scheduling, dispatching helps PAC implement planned priorities while responding to real-time shop-floor constraints. Knowing when to apply each rule is key for CPIM.

7. Exploded BOM Requirements in Scheduling

MRP-based scheduling relies on BOM explosions to identify component requirements at each level. PAC must ensure components are available at the right time to support scheduled operations. BOM accuracy affects order release, sequencing, and resource allocation. PAC monitors shortages, communicates with purchasing, and updates planners on material constraints. Understanding BOM-driven dependency relationships is essential for coordinating scheduling and execution.

8. Lead-Time Control and Reduction

Lead time in MRP includes setup, queue, run, move, and wait times. PAC influences most of these components by managing shop-floor performance. Reducing queue time and setup time significantly improves responsiveness and schedule accuracy. MRP relies on valid lead times; outdated or inflated lead times distort planning. Understanding how PAC contributes to accurate and reduced lead times strengthens the overall MRP system.

9. Capacity Verification Against MRP Plans

MRP generates schedules based on infinite capacity assumptions. PAC verifies whether capacity aligns with the plan and recommends adjustments. Shop-floor data—actual

run times, utilization, delays—feeds back into capacity planning. Without this verification, MRP schedules may become unrealistic. CPIM candidates must understand how PAC protects feasibility and supports capacity planning updates.

10. Shop Floor Data Collection and Feedback
Accurate, real-time shop-floor data is essential for effective PAC and MRP integration. Information includes order start/finish times, scrap rates, labor usage, downtime, and WIP levels. This feedback updates MRP and CRP, ensuring future schedules reflect reality. Automated data collection (barcodes, MES systems) improves timeliness and accuracy. Understanding feedback loops is crucial for maintaining planning integrity.

11. Monitoring and Controlling WIP
MRP assumes certain levels of WIP based on lead times. PAC must ensure WIP does not exceed capacity limits because excessive WIP leads to longer queues and delays. Techniques such as CONWIP, buffer management, order release control, and bottleneck management help maintain optimal WIP levels. Understanding this concept supports smoother flow and improved schedule adherence.

12. Order Status Reporting
PAC provides status updates on production orders—percent complete, delays, expected completion dates, quality issues—to ensure visibility across the shop floor. These reports help planners adjust MRP schedules, communicate with customers, and manage priorities. Accurate order status reporting improves reliability and helps identify systemic

problems early. This concept is essential for integrating planning and execution.

13. Managing Bottlenecks Within MRP-Based Systems
Bottlenecks define the maximum throughput and significantly affect MRP schedules. PAC identifies bottlenecks, protects them with workloads, and ensures constraints operate effectively. MRP must adjust load and release strategies to accommodate bottleneck capacities. Techniques like Drum-Buffer-Rope or finite scheduling improve flow. Understanding bottleneck management helps CPIM candidates balance flow and capacity.

14. Queue Management and Work Center Control
MRP-based schedules can generate long queues if not controlled. PAC manages queues to reduce delays, maintain flow, and meet due dates. Tools include workload balancing, order release restrictions, and dispatching adjustments. Queue patterns also help identify capacity issues or process inefficiencies. Mastery of queue management supports predictable throughput and reliable delivery.

15. Backflushing and Simplified Reporting
Backflushing automatically deducts component inventory when finished goods are reported complete. This reduces manual reporting and improves transaction accuracy. It works well in repetitive or flow-oriented systems but can apply to MRP environments with stable BOMs. PAC manages backflush triggers and ensures data accuracy. Understanding backflushing helps simplify scheduling and reporting workflows.

16. PAC in Job Shop vs. Flow Environments
MRP-based scheduling behaves differently depending on the production environment. Job shops require detailed order-level control, flexible sequencing, and frequent updates. Flow systems rely more on rate-based scheduling and standardized processes. PAC responsibilities differ accordingly—dispatching vs. line control, WIP tracking vs. takt adherence. CPIM candidates must understand the impact of manufacturing environments on PAC functions.

17. Rescheduling Logic in MRP-Based Systems
MRP regenerates schedules when conditions change—part shortages, delays, scrap, revised priorities. PAC provides real-time data driving these changes. Understanding net change MRP, regenerative MRP, and exception messages helps interpret rescheduling decisions. PAC must respond by executing updated schedules promptly. This concept is vital for dynamic production environments.

18. Managing Exception Messages
MRP generates exception messages such as expedite, de-expedite, cancel, or reschedule. PAC must interpret and act on these messages. Exception management ensures resources are focused only on critical adjustments, improving responsiveness and reducing unnecessary work. Understanding exception message types and their implications enhances efficiency and scheduling accuracy.

19. Integration of PAC with ERP/MES Systems
Modern PAC relies heavily on real-time systems such as MES (Manufacturing Execution Systems), ERP, barcoding, and IoT devices. These systems enable faster feedback, accurate

reporting, and automated control. Understanding system integration helps CPIM candidates appreciate how digital tools support scheduling accuracy, WIP control, and throughput optimization.

20. Performance Measurement for MRP-Based Scheduling
KPIs such as schedule adherence, queue time, throughput, labor utilization, and order lead time evaluate PAC effectiveness. MRP-based scheduling depends on these metrics to refine planning and improve reliability. By monitoring performance, organizations identify systemic issues, update lead times, and strengthen planning accuracy. Understanding KPIs ensures PAC supports continuous improvement.

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