

# Equipment Utilization

## Shift Scheduling for Capital Efficiency

Expert guidance from consultants who have worked with hundreds of 24/7 operations.

SHIFTWORK SOLUTIONS LLC

Guide 3

### WHO WE ARE

Shiftwork Solutions LLC is a leading U.S.-based management consulting firm specializing in shift schedule design, workforce engagement, and operational optimization for 24/7 industrial operations. For over 30 years we have helped hundreds of manufacturing plants, distribution centers, mines, utilities, and processing facilities across more than 16 industries build better schedules, reduce costs, and create workforces that stay.

### OUR PROCESS

1

#### Assess

We start by understanding your operation, schedule, costs, and workforce composition.

2

#### Design

Schedule options built for operations AND people — with full cost and coverage clarity.

3

#### Deliver

Rollout support, employee education, policy development, and ongoing guidance.

4

#### Sustain

Post-implementation survey, results review, and adjustments to ensure it holds.

### OUR EXPERIENCE

30+

Years of dedicated shiftwork consulting

Hundreds

Operations helped across North America

16+

Industries served in every engagement

Fixed

Fee model — no hourly billing surprises

Ready to discuss your operation? The conversation is free.

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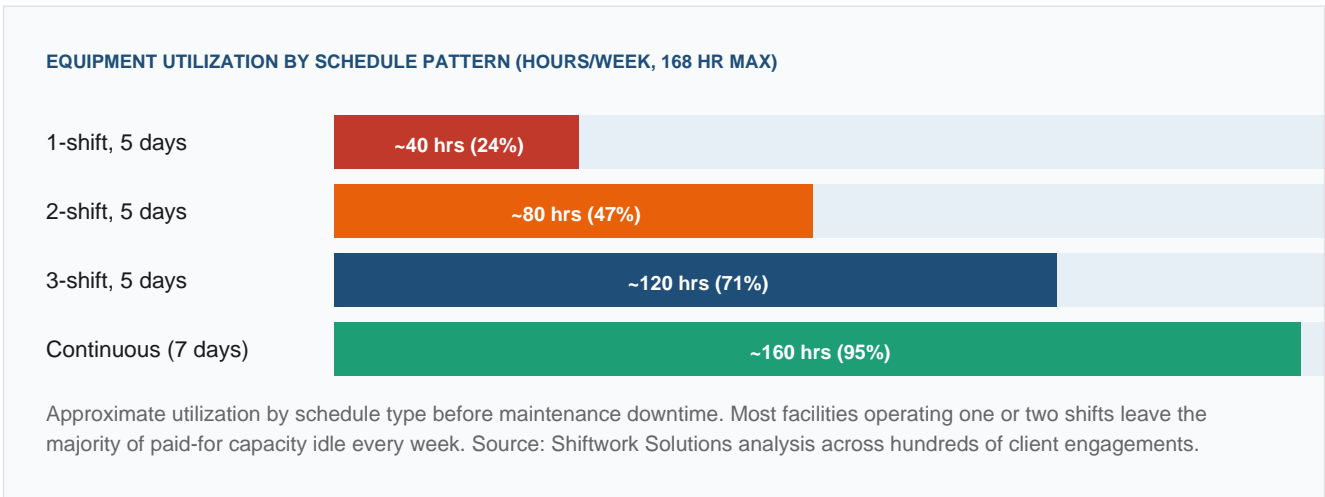
INTRODUCTION

## The Asset You're Already Paying For

Most manufacturing leaders eventually face a familiar challenge: demand is growing, but capital budgets are tight. The instinctive response is to request funding for new equipment or expanded facilities. Yet many operations already own the capacity they need. They simply aren't using it.

Equipment utilization — the percentage of available hours your assets actually produce value — represents one of the largest hidden opportunities in manufacturing. A typical five-day operation utilizes equipment roughly 60% of theoretical capacity. The remaining 40% sits idle during evenings, nights, and weekends. For a facility with \$25 million in capital equipment, that idle time represents millions in unrealized productive potential every year.

The connection between utilization and scheduling is direct but often overlooked. Your shift schedule determines when equipment runs — whether expensive machinery sits idle for 56 consecutive hours every weekend or operates continuously. When done correctly, schedule-driven utilization improvements can deliver capacity increases of 10% to 40% without purchasing a single new machine.



THE CORE CALCULATION

## The Economics of Equipment Utilization

Understanding equipment utilization requires looking beyond simple uptime calculations. The real question is: what percentage of available weekly hours does your equipment actually produce value?

A week contains 168 hours. A traditional five-day, three-shift operation covers 120 of those hours — roughly 71% of available time. But operational realities reduce this further. Planned maintenance, shift changeovers, breaks, and startup procedures typically consume another 10-15% of scheduled time. The result: many five-day operations achieve actual productive utilization of just 60-65%.

The alternative is extracting more value from existing assets. Moving from five-day to seven-day operations can increase equipment availability by 40% or more. One plastics manufacturer increased capacity by over 10% without adding labor costs or purchasing new equipment — simply by restructuring how shifts covered their most productive machinery. The financial leverage is compelling: delaying a \$25 million capital investment by even 2.5 years at a 10% cost of capital saves over \$6 million.

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#### THE SCHEDULING CONNECTION

## Why Scheduling Drives Utilization More Than You Think

Equipment doesn't run itself. Every hour of potential production requires someone qualified to operate the machinery, monitor quality, and respond to problems. Your shift schedule directly controls your utilization ceiling.

Consider a common scenario: a facility runs three shifts Monday through Friday but shuts down weekends. Their most expensive equipment sits idle for 48 hours every week — 2,500 hours annually of zero production from assets that cost millions to acquire. No amount of efficiency improvement during operating hours can recover time that was never scheduled.

The relationship extends beyond simple coverage hours. Each shift change involves handoffs, startups, and ramp-up periods where production runs below optimal rates. An eight-hour shift operation experiences three transitions daily; a twelve-hour operation cuts this to two. Continuous operations that minimize shutdowns eliminate startup losses entirely for long stretches.



Equipment utilization is often the difference between needing capital investment and not needing it. Most operations have more capacity than they realize — they just haven't structured coverage to access it.

— Jim Dillingham, Shiftwork Solutions

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#### WHERE TO FOCUS

## Identifying Your Utilization Opportunities

Not all equipment deserves equal scheduling attention. Start with your bottleneck equipment. In any production process, one stage limits overall throughput. Increasing utilization everywhere except the bottleneck produces inventory, not output. A furniture manufacturer discovered their finishing line constrained overall capacity — their response was extending finishing coverage to six days while the rest of the operation remained at five. The incremental labor cost was modest. The capacity increase was substantial.

Next, examine your highest-value equipment and equipment with the highest startup and shutdown costs. Some machinery requires hours to reach operating temperature. Shutting down Friday afternoon and restarting Monday morning might consume 10% of potential weekly production in transition losses alone. Continuous operation can dramatically improve effective utilization. The analysis isn't complicated, but it requires looking at scheduling as a

strategic lever rather than an administrative function.

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#### THE STARTUP MYTH

## Why Continuous Running Reduces Breakdowns

One of the most persistent objections to extended running schedules is the belief that running equipment longer will cause more breakdowns. The maintenance engineering community largely disagrees.

Most maintenance engineers confirm that equipment startup represents the highest-risk period for mechanical failure. Thermal cycling creates expansion and contraction stresses. Cold lubricants flow poorly. Pressure differentials stress seals and fittings. The moment of startup — not the sustained running that follows — is when failures most commonly occur.

Continuous running eliminates repeated startup cycles. Equipment that never shuts down avoids the mechanical stress that shutting down and restarting imposes. From a pure reliability standpoint, running continuously is often preferable to repeated starts and stops, provided maintenance can be scheduled within the running pattern.

#### MAINTENANCE INTEGRATION

### Scheduling Maintenance Within Continuous Operations

The practical challenge for continuous operations is performing maintenance without shutting down production. The solution is planned maintenance windows built into the schedule, typically rotating equipment through maintenance cycles rather than shutting the entire facility. One approach: run five machines continuously while rotating two through maintenance — the five-machine output matches the seven-machine output of a traditional schedule, with two machines always available for maintenance.

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#### THE BREAKEVEN ANALYSIS

## When Does Adding a Shift Make Financial Sense?

The financial case for extending operations depends on comparing the cost of adding labor versus the cost of adding capital. When a facility running two shifts reaches capacity constraints, the conventional response involves capital requests and equipment purchases. A third shift produces the same additional capacity for a fraction of the cost.

A general principle applies: when utilization on the existing schedule consistently exceeds 65 to 70 percent, extended operations almost always represent a lower cost per unit than capital expansion. The labor cost of a third shift or weekend coverage is virtually always less than the annualized cost of additional equipment providing equivalent capacity.

**<24%****1-shift utilization**

One 8-hour shift, 5 days uses roughly 40 of 168 weekly hours. The majority of capital investment sits idle every week.

**65–70%****Third-shift breakeven**

When two-shift utilization consistently exceeds this threshold, adding a third shift almost always costs less per unit than buying additional equipment.

**5 vs 7****The machine math**

5 machines running 7 days = 35 machine-days/week. 7 machines running 5 days = 35 machine-days/week. Same output — continuous running enables maintenance rotation.

**SCHEDULING FOR UTILIZATION****The 5-Machine vs. 7-Machine Problem**

A manufacturing facility runs seven machines on a five-day schedule. Seven machines running five days per week produces 35 machine-days of weekly output. Five machines running seven days per week also produces 35 machine-days. The production numbers are identical.

But the five-machine continuous operation provides something the seven-machine five-day operation cannot: always having equipment available for maintenance without reducing output. In the seven-machine model, taking one machine down for maintenance reduces weekly capacity. In the five-machine continuous model, two machines are always available for maintenance while five machines carry full production load. This restructuring eliminates the need to purchase additional equipment while maintaining identical output, improving maintenance accessibility, and potentially reducing maintenance costs.

**THE TRANSITION QUESTION****Five Days to Seven Days**

Seven-day operations can achieve utilization rates 30-40% higher than five-day schedules. For capital-intensive industries, this often means deferring or eliminating equipment purchases entirely.

The human dimension is more complex. Weekend coverage requires employees to work schedules that differ from most of society. Successful transitions typically feature extended time off. Twelve-hour shift patterns often provide three or four consecutive days off every week. While employees work some weekends, they gain weekday time that traditional schedules don't offer.

Operations that announce seven-day schedules and expect compliance typically face resistance, grievances, and turnover. Operations that engage their workforce in evaluating options, understanding tradeoffs, and selecting preferred patterns achieve implementation with far less friction. The schedule employees choose is the schedule they'll support.

**Important:** Once you establish weekend premium pay, eliminating it later creates significant workforce disruption. Many operations avoid weekend premiums entirely by designing schedules where weekend work is simply part of the regular rotation. The compensation structure you choose at transition often becomes permanent. Design it carefully from the start.

#### AVOID THESE MISTAKES

## Common Mistakes That Limit Utilization

Even operations that understand utilization opportunities often stumble in execution. Several patterns appear repeatedly across industries.

### 1 Treating All Equipment Identically

Not every machine needs seven-day coverage. Extending hours on non-bottleneck equipment may create labor cost without corresponding output gains. The analysis must be asset-specific, not blanket.

### 2 Ignoring the Workforce Equation

Schedule changes that maximize equipment utilization while ignoring employee needs generate turnover, absenteeism, and quality problems. Sustainable utilization requires sustainable schedules.

### 3 Underestimating Transition Complexity

A new schedule touches vacation policies, overtime calculations, holiday pay, shift differentials, and union agreements. Changing schedules without addressing these interconnected policies creates confusion and conflict.

### 4 Focusing on Coverage Hours Rather Than Productive Hours

Scheduling more shifts doesn't automatically increase output. If additional hours involve inexperienced workers or quality problems, utilization may actually decline. Coverage must translate to production.



Utilization improvement isn't just a scheduling exercise — it's an organizational change that touches compensation, policies, training, and supervision. Operations that treat it as simple arithmetic consistently underperform their expectations.

— Dan Capshaw, Shiftwork Solutions

**CONCLUSION****The Schedule as Capital Strategy**

Equipment utilization represents one of manufacturing's most accessible improvement opportunities. The capacity sitting idle during nights, weekends, and between shifts often exceeds what capital investments would provide — at a fraction of the cost and timeline.

The schedule is the key. It determines when equipment runs, how transitions affect productivity, and whether your most valuable assets produce value or sit idle. Operations that treat scheduling as strategic unlock capacity their competitors must purchase. The opportunity is real. The question is whether your operation will capture it.

**Ready to improve equipment utilization in your operation?**

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