Maintenance Planning: Employing Schedule Compliance

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About schedule compliance
The issue

"To be or not to be, --that is the question"

From *Hamlet* (III, i, 56-61)
William Shakespeare
The issue

“How much work should the workforce do, -- that is the question”

for us interested in scheduling
The questions

- How much work should the workforce do?
- How do we know if they are doing it?
- How do we know if they are not doing it?
- How can we improve?
- These are issues of managing productivity
How much work should the workforce do?

- Determine with planning and scheduling
- Match the available labor hours with estimated hours on jobs in the backlog
- Need estimated hours on backlog jobs
- Need a forecast of available labor hours
- Schedule for a week at a time
Essence of planning and scheduling

- Planning supports improving individual jobs repeated over time: a cycle of improvement for each job.
- Planning also supports scheduling by identifying craft skills and labor hours.
- Scheduling sets goals by assigning a sufficient amount of work for a week.
How do we know if they are doing it or not?

- Compare the scheduled work with the work actually done
- This is called schedule compliance
How can we improve?

- Analyze why crews have low schedule compliance and take action
  - Tool: A cause map helps identify areas of low schedule compliance to investigate
Cause Map for Low Schedule Compliance

- Low Schedule Compliance
  - Did not do all scheduled work
    - Did other work?
      - High priority WO schedule breakers
      - True Emergencies
      - Inadequate maintenance
      - Inadequate operation
      - Inadequate design/ construction detects
      - (See priority cause map)
      - Management does not enforce
      - Maint supervisor preference
      - Management preference
      - Operator preference
      - Maint supvr allows
      - Wrong equipment?
      - Wrong craft or skill?
      - Number of persons or time estimate too low?
      - Wrong parts or tools?
      - Wrong scope, step, or other info?
      - Wrong equipment clearance?
      - Parts or tools not available?
      - Inadequate plant processes?
      - Coordination with operations?
      - Poor plan?
      - No plan?
      - Poor support?
      - Inadequate field supervision?
      - Assignment method?
      - Poor motivation
      - Inadequate skills
      - Reasons not available
      - Wrong parts or tools?
      - Weather?
      - Inadequate plant processes?
      - Coordination with operations?
- Mgt directive/ schedule comp calculated
  - Work is scheduled/ schedule comp calculated
    - Mgt directive/ schedule comp calculated
      - High priority WO schedule breakers
      - True Emergencies
      - Inadequate maintenance
      - Inadequate operation
      - Inadequate design/ construction detects
      - (See priority cause map)
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      - No plan?
      - Poor support?
      - Inadequate field supervision?
      - Assignment method?
      - Poor motivation
      - Inadequate skills
      - Reasons not available
      - Wrong parts or tools?
      - Weather?
      - Inadequate plant processes?
      - Coordination with operations?
- Scheduled work not done
  - Work is scheduled/ schedule comp calculated
    - Mgt directive/ schedule comp calculated
      - High priority WO schedule breakers
      - True Emergencies
      - Inadequate maintenance
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      - Inadequate field supervision?
      - Assignment method?
      - Poor motivation
      - Inadequate skills
      - Reasons not available
      - Wrong parts or tools?
      - Weather?
      - Inadequate plant processes?
      - Coordination with operations?
- Overall time estimates too low?
  - Planned estimates not matched to labor forecast?
- Labor forecast too high?
  - Scheduled more work than done
    - Did other work?
      - High priority WO schedule breakers
      - True Emergencies
      - Inadequate maintenance
      - Inadequate operation
      - Inadequate design/ construction detects
      - (See priority cause map)
      - Management does not enforce
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      - Assignment method?
      - Poor motivation
      - Inadequate skills
      - Reasons not available
      - Wrong parts or tools?
      - Weather?
      - Inadequate plant processes?
      - Coordination with operations?
- Did not do all scheduled work
  - Overall time estimates too low?
  - Planned estimates not matched to labor forecast?
- Low productivity?
  - Crew low productivity?
  - Technician problems?
  - Supervisor problems?
- Poor support?
  - Overall time estimates too low?
  - Planned estimates not matched to labor forecast?
- Overall time estimates too low?
  - Planned estimates not matched to labor forecast?
Low Schedule Compliance

Scheduled work not done

Did not do all scheduled work

Scheduled more work than done
Low schedule compliance causes

- We measured SC!
- Did not do all scheduled work
- Scheduled more work than done
Cause Map for Low Schedule Compliance

- Did other work?
  - Did not do all scheduled work
    - Crew low productivity?

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Did not do all scheduled work

- Did other work
  - High priority
  - Low priority
- Low productivity problems
  - Jobs
  - Technicians
  - Supervisors
Low Schedule Compliance

Did other work?

High priority WO schedule breakers

High priority was not scheduled

True Emergencies

Inadequate maintenance

Inadequate operation

Inadequate design/ construction defects

False Emergencies

(See priority cause map)

Low priority WO schedule breakers

Operator preference

False

Emergencies

Management preference

Management does not enforce

Maint supervisor preference

Inadequate plant processes?

Inadequate field supervision?

Inadequate skills

Poor motivation

Poor support?

Assignment method?

Parts or tools not available?

Inadequate plant processes?

Inadequate field supervision?

Inadequate skills

Poor motivation

Poor support?

Assignment method?

Parts or tools not available?

Inadequate plant processes?

Inadequate field supervision?

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Parts or tools not available?

Inadequate plant processes?

Inadequate field supervision?

Inadequate skills

Poor motivation

Poor support?

Assignment method?

Parts or tools not available?
High priority schedule breakers

- Wasn’t scheduled
- True emergencies
  - Poor maintenance
  - Poor operation
  - Poor equipment
- False emergencies
High priority schedule breakers

“Weekly schedule compliance is the ultimate measure of proactive maintenance”
John Crosson, Clorox, 1997
Cause Map
for Low Schedule Compliance

Did other work?

- Low priority WO schedule breakers
  - Management preference
  - Management does not enforce
  - Operator preference
  - Maint supervisor preference
  - Maint supvr allows

- Did not do all scheduled work
  - Overall time estimates too low
  - Labor forecast too high
  - Planned estimates not matched to labor forecast

- Weather

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Low priority schedule breakers

- Operators preference
- Managers preference
- Supervisors preference
Why low priority breakers?

Persons would rather work on (in order)
  1. What they enjoy
  2. What they are good at
  3. What they think is important

BEFORE

What the plant thinks is important

John E. Day, Jr. Alumax, 1993
Cause Map for Low Schedule Compliance

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Low productivity problems

- **Job problems**
  - Poor or no plan, poor support, weather

- **Technicians**
  - Absent, poor skills, poor motivation

- **Supervisors**
  - Assignment method, not in field, follow-up work
Cause Map for Low Schedule Compliance
Scheduled more work than done

- Planned job time estimates are too low
- Labor forecasts are too high
- Planned estimates not matched to labor forecast
Cautions with using schedule compliance:

- Schedule compliance is not under total control of the crew supervisor; call it “schedule success”
- It’s “okay” to break the schedule
- We just want to know why and see what we can do about it
- Our objective is not schedule compliance; it is managed productivity
The application

"Why, then the world's mine oyster,
Which I with sword will open."

From *The Merry Wives of Windsor* (II, ii, 2-3)
William Shakespeare
Scheduling at a chemical company in USA

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Schedule compliance scores

Composite Schedule Compliance
E/I & Mechanical

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Problems encountered

- Operations ignored schedules
  - Perceived as maintenance only process
  - Inadequate work requests
  - Did not care about backlog
- Supervisors ignored schedules
  - WBR (Work By Radio)
  - Did not care about backlog
- Poor work plans
- Poor PM’s (scope and frequency)
Problem resolutions

- Work with operations supervisors
  - Use SAP (CMMS), less WBR
- Work with maintenance supervisors
- Weekly backlog reviews
- Attention to improving plans with feedback over time
Success in maintenance

Completed Routine Orders
Success in maintenance

Completed Emergency Orders

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Success in maintenance

Wrench Time Surveys

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Lessons

- Must have formal processes
- Scheduling is critical
- Advance weekly schedule demands discipline from operations and maintenance
- No single KPI does it all; Schedule compliance is a good addition
Success in maintenance

Managed productivity is achieved by focusing on schedule compliance
The end

"Now go we in content"

From As *You Like It* (I, iii, 139-14)
William Shakespeare
Question time
Maintenance Planning: Employing Schedule Compliance

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