DRAFT—*Preliminary Use Only*

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Cyclical Curved Rail Replacement

Mixed Use Suburban Commuter Environment

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Focus of the Discussion

- Define the operating environment
- Define the work/labor environment
- Define the preliminary steps required to prepare for the job
- Define the process
- Establish minimal benchmarks for crewing, duration and equipment
- Explain finding/results of the study

Operating Environment

- Northeast Corridor
  - Approximately 300 trains daily
- Four Track System
  - Approximately 150 miles of track within Connecticut from MP 26.1 to MP 74
- Mixed Use
  - **Freight:** CSX, Genesee & Wyoming
  - **Passenger:** Metro-North, Amtrak, Shoreline East
- Gross Tonnage
  - 50 megatons per year

Work/Labor Environment

- **Labor Environment:**
  - All field employees are represented: Teamsters, ARSA, IAMS
  - Work Rule agreements apply:
    1. **Weather**—Work cessation in the rail
    2. **Equipment Qualification**—All Machine Operators must be qualified on the specific machine they are using
    3. **Maintenance Subdivision**—"Traditional Work"
- **Work Environment:**
  - Isolated location(s)
  - Distance from raw material/scrap accumulation locations
  - Loss of sidings/yards to tie-up equipment when not in use

Job Preparation & Planning

- Confer with Assistant Chief Engineer of Track to determine critical wear curves
- Site visit location(s) of proposed work to determine if there is rail on site
- Determine marshalling points for raw material, personnel, and equipment
- Coordinate track outage with Planning and Transportation
- Order Material and coordinate pick-up from the Storeroom(s)
- Coordinate with MOW Production Equipment to have all equipment prepared for work

Eight Step Analysis Framework

1. Roles, responsibilities, and organization
2. Work process and procedure
3. Current personnel assignment
4. Time study
5. Production rate matching analysis
6. Schedule and utilization analysis
7. Rightsizing
8. Benchmarking

22 Step Work Process

1. Drop rail
2. Drag rail
3. Drop tie plates
4. Remove anchors
5. Pull spikes
6. Pick up scrap
7. Thread rail out
8. Remove tie plates
9. Plug ties
10. Adze ties
11. Lay tie plates
12. Align tie plates
13. Thread rail in
14. Tamp ties up to rail
15. Drop Pandrol clips
16. Adjust plates
17. Gauge
18. Drill holes
19. Lag plates
20. Start clips
21. Adjust rail temperature
22. Fasten clips

1. Drop Continuously Welded Rail

2. Drag Rail into Place

3. Drop Tie Plates

4. Remove Rail Anchors

5. Pull Spikes

6. Pick Up Scrap

7. Thread Rail Out

8. Remove Tie Plates

9. Plug Ties

10. Adze Ties (Adzer/Cribber)

11. Lay Tie Plates

12. Align Tie Plates with Plate Cart

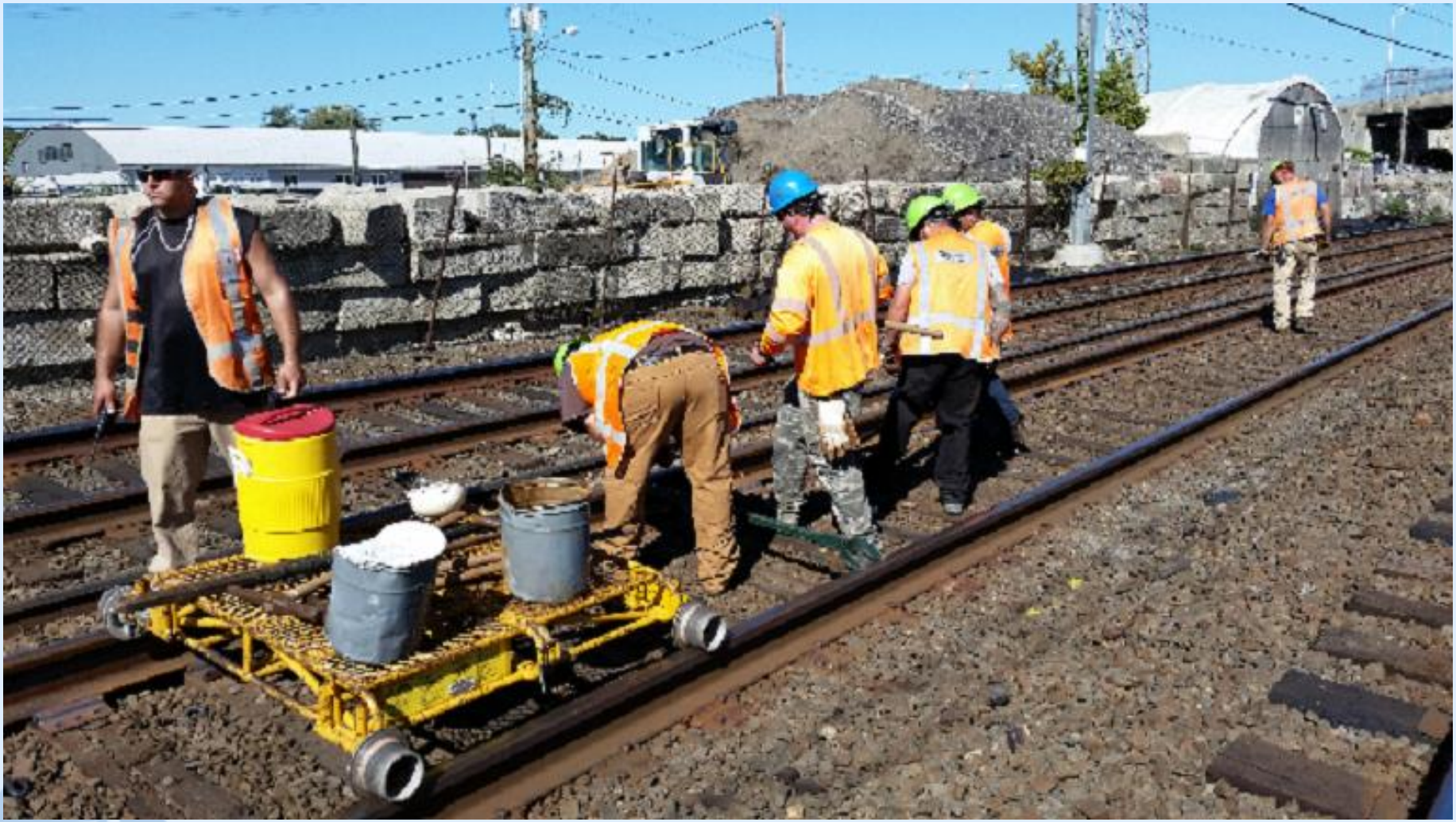
13. Thread Rail In

14. Tamp Ties Up to Rail

15. Drop Pandrol Clips

16. Adjust Tie Plates

17. Gauge Using Gauging Rod



18. Drill Holes (Quad Drill)

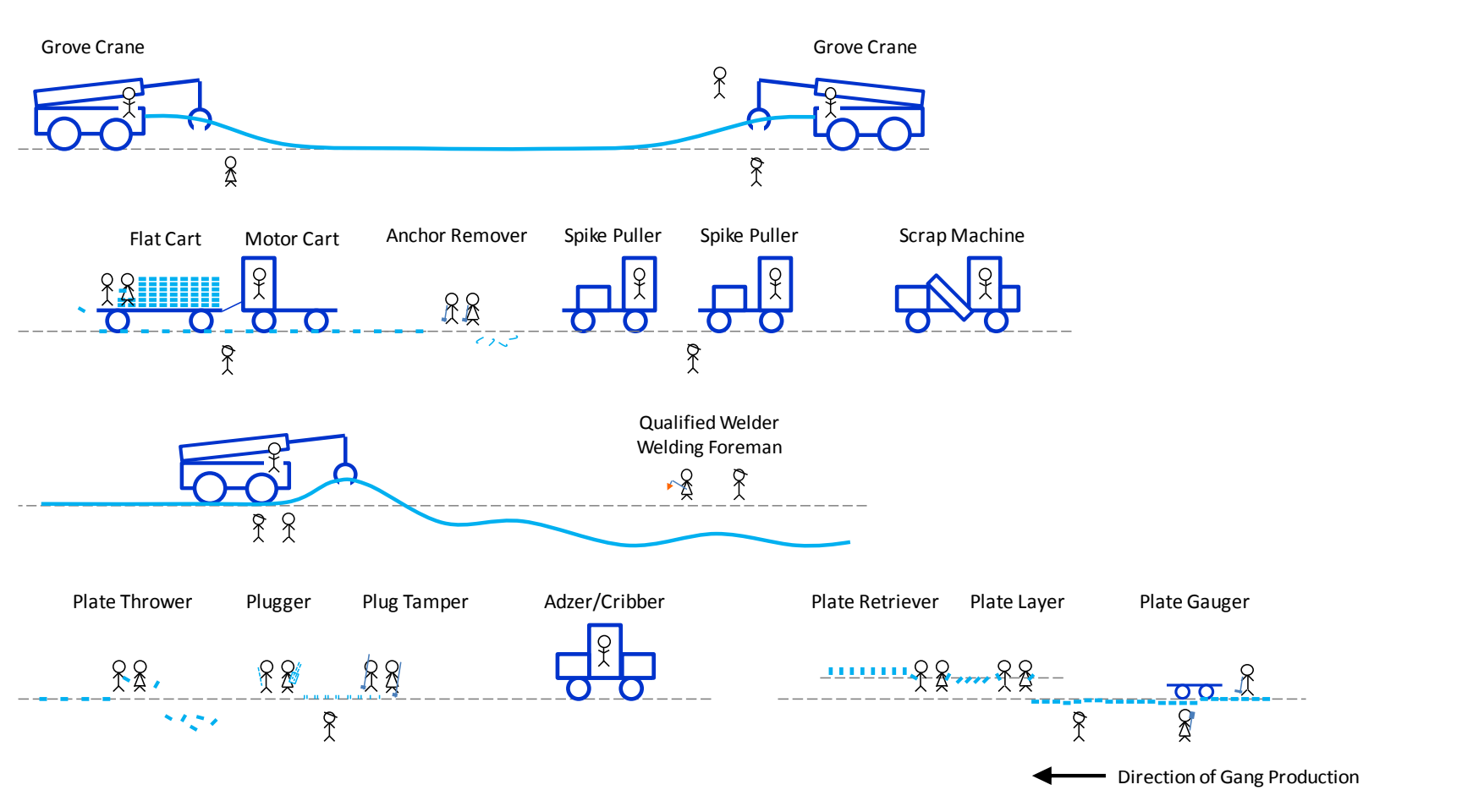
19. Lag Plates to Tie

20. Apply Pandrol Clip

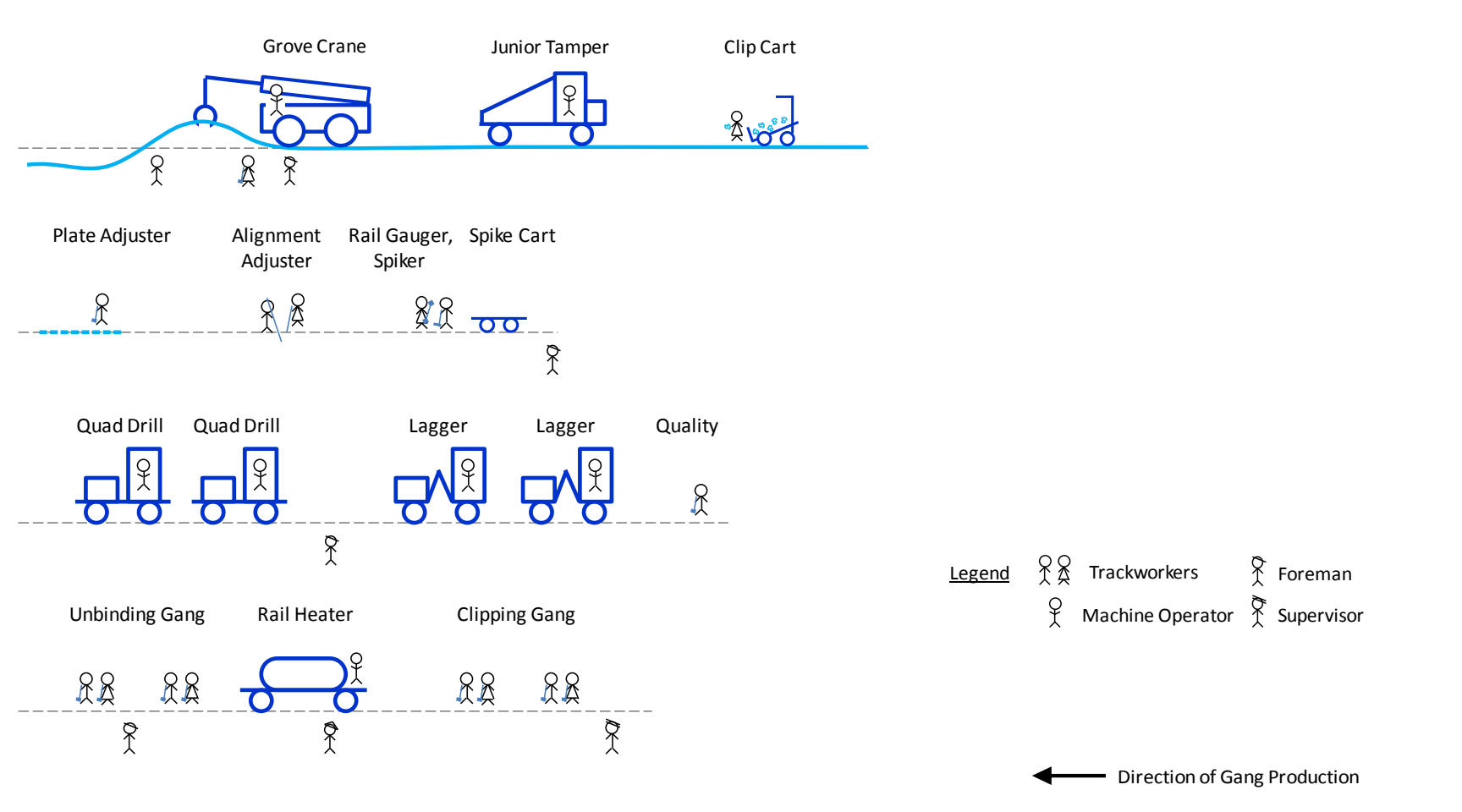
21. Adjust Rail Temperature

22. Fasten Pandrol Clip

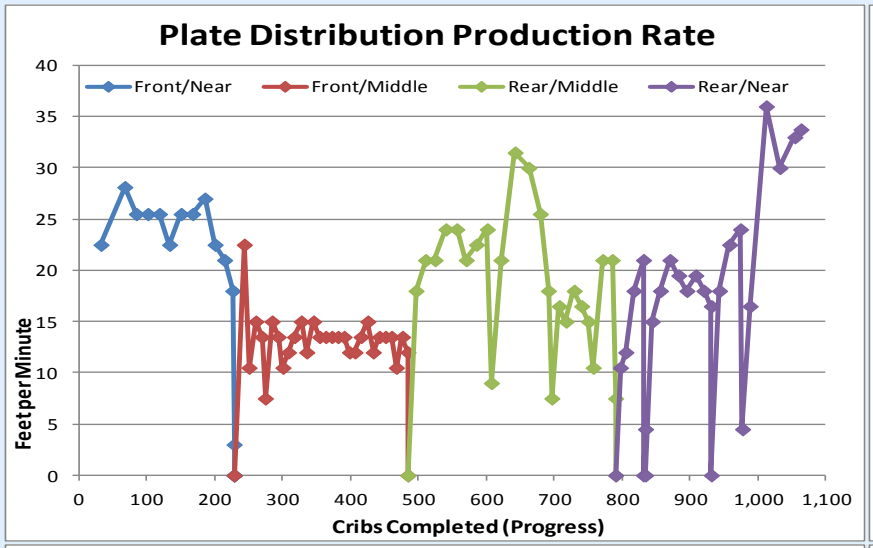
Current Personnel Assignment

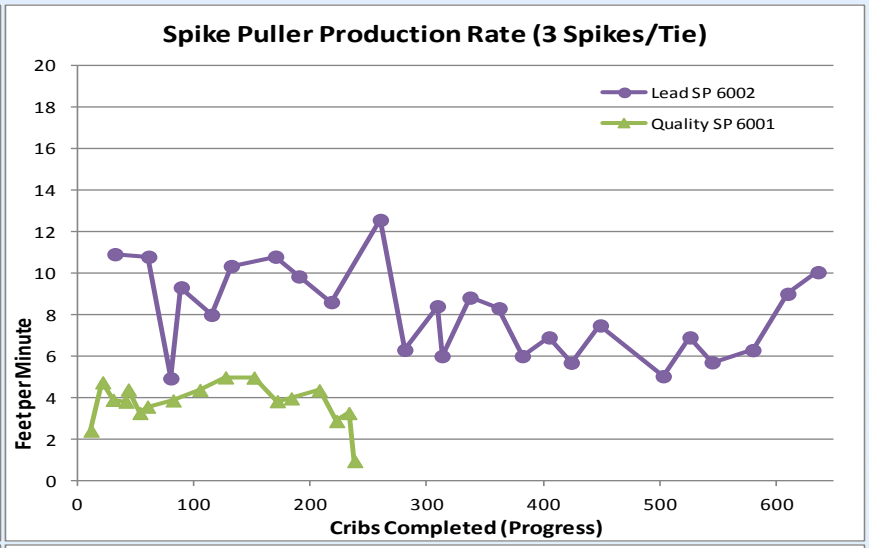


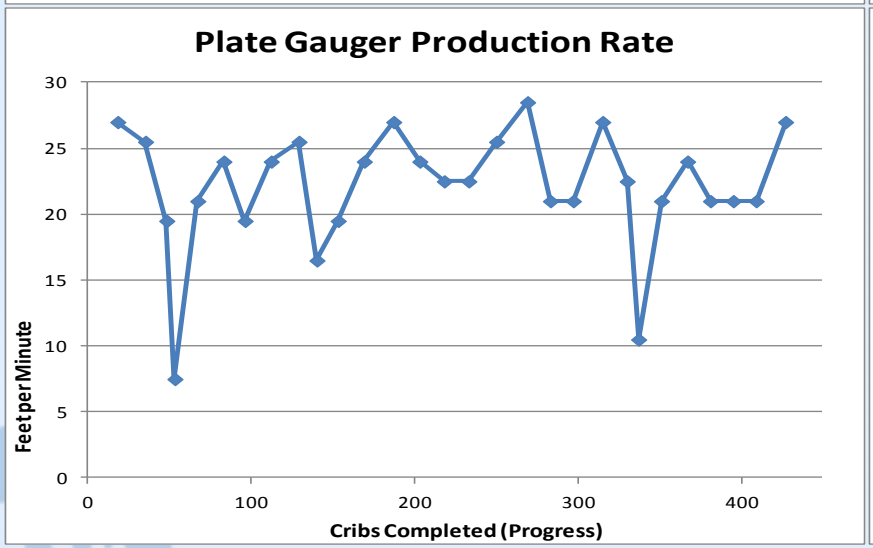
Current Personnel Assignment

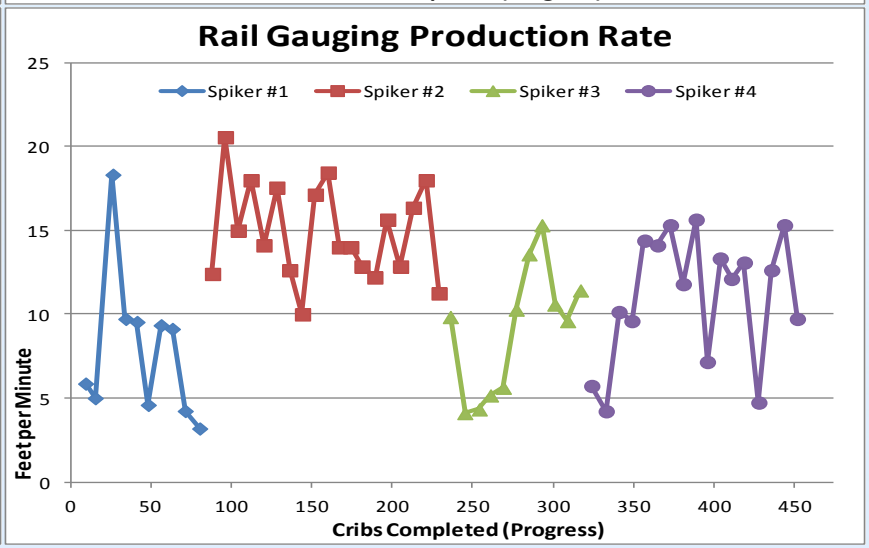


Production Rate Measurement





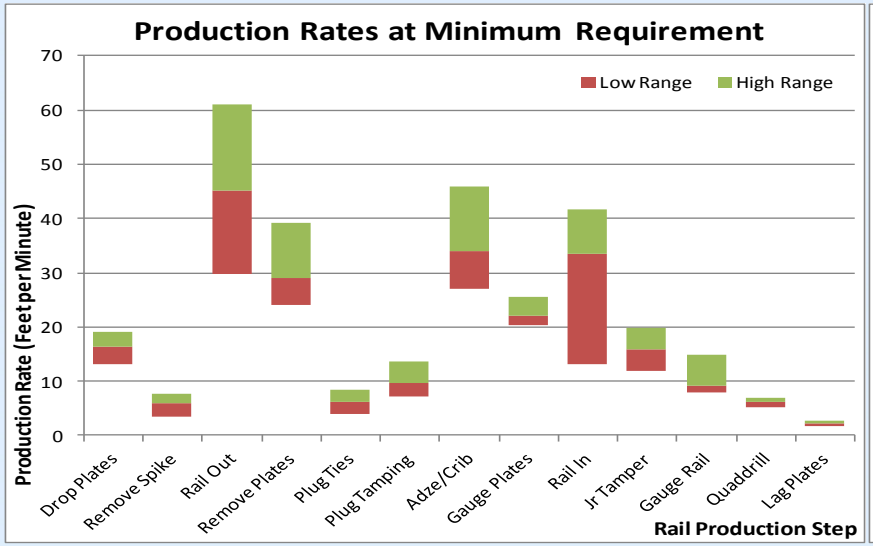


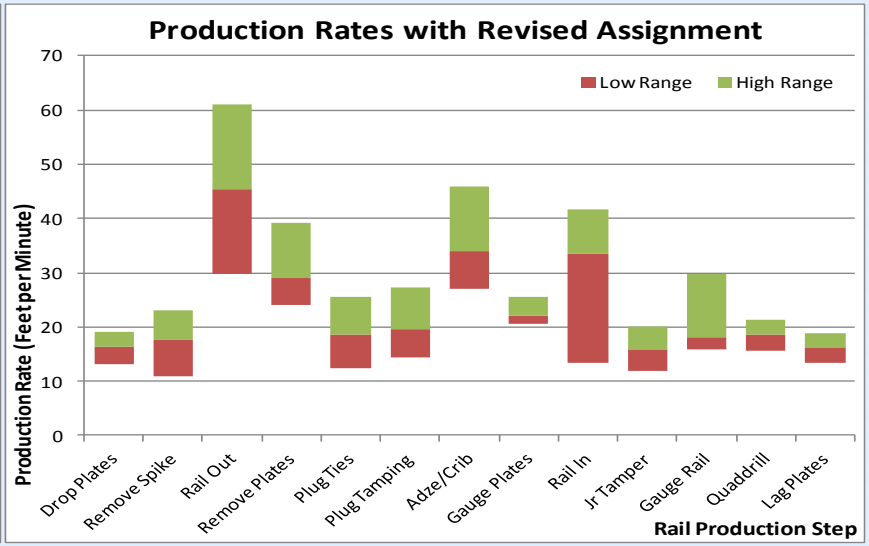


Production Rate Results

Work Step	Machines	Sample		Production Rates (Ft./Min.)		
		Size (Feet)	Interval	Low	Wt. Avg.	High
2-Drop Tie Plates		1,595	1 Min.	13.2	16.4	19.1
4-Remove Spikes	SP 6001, 6002	1,308	2~5 Min.	3.6	5.9	7.7
6-Thread Rail Out	CH 2201	1,179	1 Min.	29.7	45.3	61.0
7-Remove Tie Plates		147	<1 Min.	24.1	29.1	39.3
8-Plug Ties		233	1~2 Min.	4.1	6.2	8.5
9-Plug Tamping		225	1 Min.	7.2	9.8	13.6
10-Adzer/Cribber	KA 1001	1,109	Cat. Pole	27	34	46
12-Gauge Tie Plates		641	1~2 Min.	20.5	22.1	25.6
13-Thread Rail In	CH 2002	714	1 Min.	13.3	33.6	41.7
14-Junior Tamper	MJ 3002	806	1 Min.	12	15.8	20
17-Rail Gauging		678	1 Min.	7.9	9.1	14.9
18-Drill Holes	TY 1205	461	2~5 Min.	5.2	6.2	7.1
19-Lag Plates to Tie	SM 4001, 4003	310	2 Min.	1.9	2.3	2.7

Production Rate Matching





No.	Step	Curr. Assign. (Teams)	Revised Assign. (Teams)	Old Work Rate (Ft./Min.)	New Work Rate (Ft./Min)	New Machine Utiliz.* (%)
4	Remove Spike	2	3	11.8	17.7	8%
17	Gauge Rail	1	2	9.1	18.2	—
18	Quaddrill	2	3	12.4	18.6	7%
19	Lag Plates	3	4	6.9	9.2	15%

* **Note:** (Machine Utilization %) = (Utilized Machine Hours) ÷ (Available Machine Hours).

Rightsizing

Category	Total Workdays	Coverage Required	Relief not Req'd
Days in a Year	365		
Rest Days	–104		
Holidays	–10		
Vacation Days		–25	
Sick Days		–12	
Personal Days		–3	
Training*		–3	
Discipline*		–3	
Bid Out Status*		–7	
Annual Total	**251**	**–53** *(21%)*	**198** *(79%)*

Emp. Avail.	Emp. Unav.	Prob.	Total Prob.	Days	Total Days
19	0	0.0113	1%	3	3
18	1	0.0573	7%	14	17
17	2	0.1371	21%	35	52
16	3	0.2065	41%	52	104
15	4	0.2196	63%	56	160
14	5	0.1751	81%	44	204
13	**6**	**0.1086**	**92%**	**27**	**232**
12	7	0.0536	97%	14	245
11	8	0.0214	99%	5	251
≤10	≥9	0.0092	100%	2	253

- 61 heads needed to staff 45 positions!

Problem!

- Projects are crewed, equipped and conducted over a defined duration based on:
  - Site conditions,
  - Varying scopes:
    - rail type/length,
    - component replacement, etc.
  - Track outage.
- Benchmarks are therefore:
  - Not easily facilitated
  - Not 100% accurate

The Takeaway

- Slowest machine(s)/process(es)/operator(s) set the pace of the entire workgroup
- Reliance on support departments, and conflicting goals (corporate service goals versus maintaining the right of way), affect both productivity and cost of the job
- Fixed population of workers within the workgroup may lead to overstaffing on some projects
- Additional manpower cost incurred with FRA/CBU required training of incumbent machine operators
- Management and supervision must take a proactively embrace and foster new/newer technology, processes and machinery
- Foster relationships with other Class 1 and commuter roads to review their processes/machines, and incorporate