

Joint Grinding Operations – Application of a Gradual Preventive Strategy to Specialty Grinding Operations



The Grinders

- Mainline Production Grinders (PG)
 - 650 feet in length
 - 1 x 88 1 x 120 stone machines (10 inch stones)
 - Grind tangents and curves (skip the obstacles)
- Specialty Rail Grinders (SRG)
 - 150 in length
 - 2 x 24 stone machines (10” and 6” grinding stones)
 - Grind switches, crossings, and special assets (obstacles)



Agenda

- The challenge
- Progression of strategies of grinding
- Joint grinding program Pilot
- The benefits of joint grinding
- What's next



The challenge – coverage and cycles

- Limited resources to grind complete network
- Most grinding programs focus on mainline track (tangent and curves)
- Specialty asset take second place
- Turnouts, crossings, and switch component replacement costs can be greater than mainline rail
- Machines run as individual maintenance programs



Progression of grinding strategies

- Corrective grinding approach
 - Grind to ideal state before moving on
 - Limited network coverage due to time spent at a grind
 - Other limitations
 - Equipment supply/availability (budgets)
 - Manpower available to support the programs
 - Required excess track time at each location



A change in the Production grinder strategy

- Preventive gradual grinding approach
 - Grind to restore running band (profile radius)
 - Remove enough RCF to control growth before next cycle
 - Less time spent at each location
 - Greater network coverage with same resources
 - Closes the gap on time between grind cycles



“Why don’t we work them together?”

- Good question, it’s never been done before
- Cons
 - Inspections done differently
 - Pre-inspection days prior to production grinder (PG)
 - Ground man inspects as work is performed for SRG
 - Machine grind speeds differ too much
 - 12 mph vs 5 mph average working speeds



“Why don’t we work them together?”

- Pros
 - Fewer RR resources
 - RR manpower
 - Water truck
 - Reduces track time by working two machines in same window
 - Increased coverage of specialty assets being ground



The “Ah Ha” moment

- Apply the preventive gradual grinding strategy to the SRG and operate as a joint grinding team



Operational changes

- Keep up with the production grinder!
 - Focus in the mainline side of turnouts
 - Adjust patterns and move to a 3 pass standard
 - Pull the ground man
 - Work off of a prioritization list
 - Skip as necessary to keep up
 - Maintain a skipped asset list for next cycle



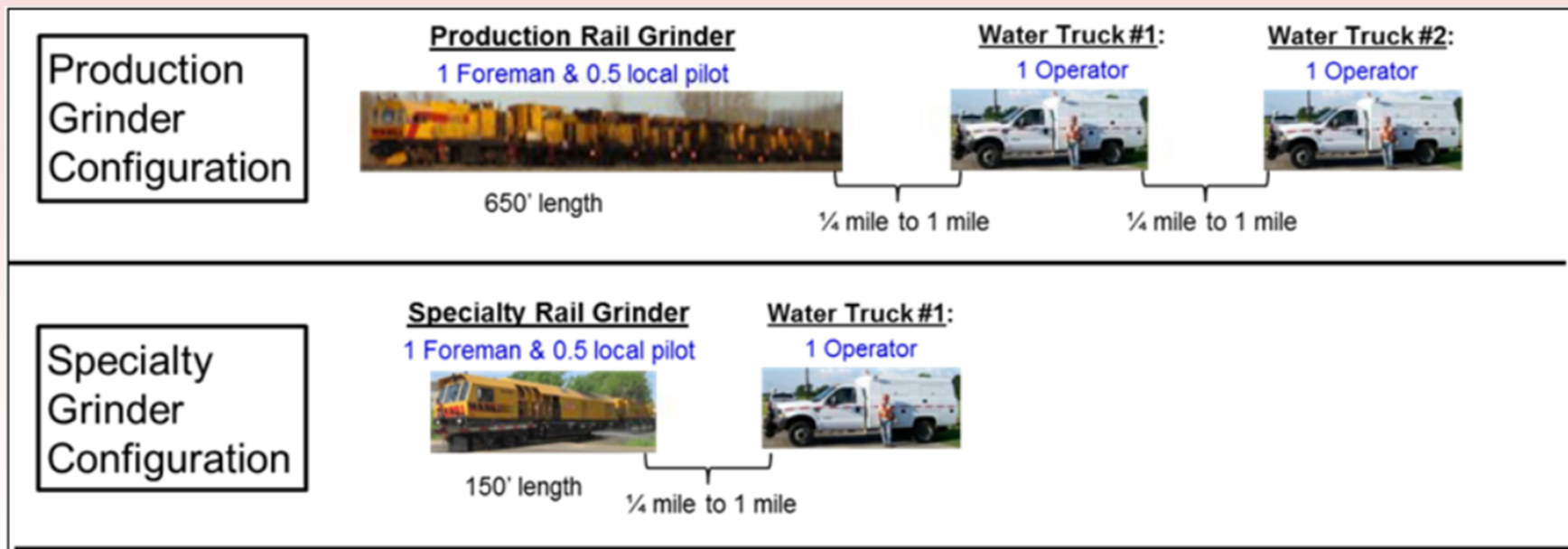
Operational changes

- Prioritization list

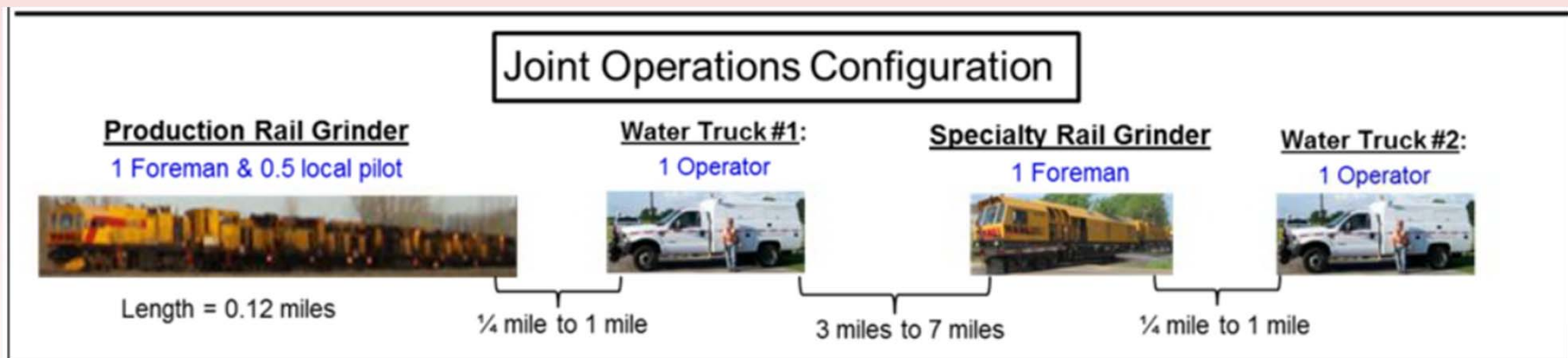
Priority	Asset
1	Locations unable to test ultrasonically due to surface condition interference (rail defect code: SSC, where length \leq 250')
2	Skipped assets from previous cycle
3	Switches, straight side
4	Crossings, curved track
5	Crossings, tangent track
6	Switches, turnout side and crossovers
7	AEI detectors, defect detectors, wayside lubricators
8	Small surface defects (engine burns, crushed head, etc)
9	Surface conditions not achieved by production grinder or needing additional work by grind plan (less than 85% of a track segment)
10	Profile conditions not achieved by production grinder or needing additional work by grind plan (less than 85% of a track segment)



Traditional Grinding Program



Joint Grinding Program



- Eliminate 1 water truck and operator by joining the teams



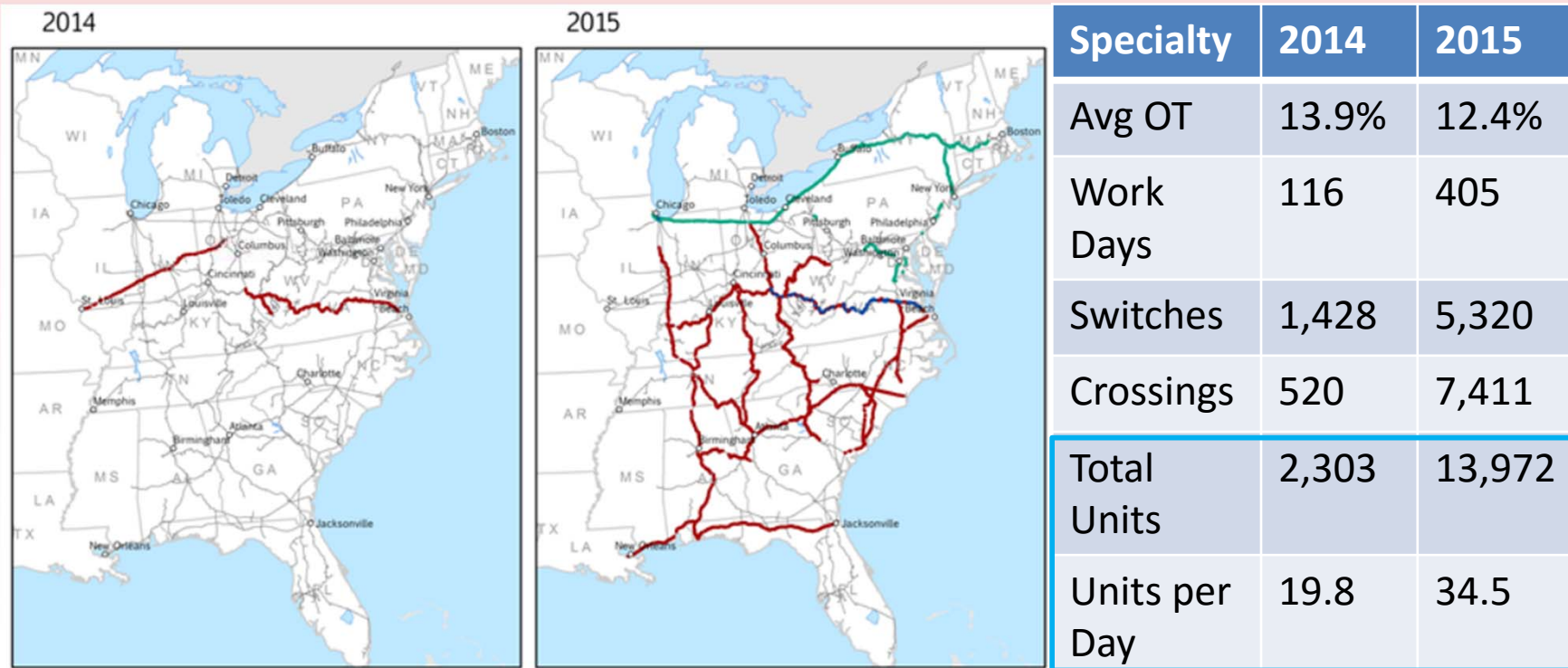
CSX Pilot Program Results

RGS6	Operating Time %	Speed	PM/Day	TM/Day	PM:TM	Units/Day	Units/Operating Hour	Spark Time/Oper Time
Previous Average (1/1/14 – 3/8/15)	14.61%	2.5	3.86	1.09	3.54	22.05	14.30	2.27
Pilot Average (3/9 - 6/22/15)	11.94%	3.51	4.88	1.98	2.57	43.36	31.88	1.69
Improvement	-2.67%	1.01	1.02	0.89	-0.97	21.31	17.57	-0.58
Improvement %		40%	26%	82%	-27%	97%	123%	-25%

- The pilot results drove full implementation in July 2015



Benefits – Coverage and Cycles



Benefits – Labor and track time

	Headcount	Days / Subdivision	Man Days / Subdivision
RGS6 Only – 2014	2.5	11	27.5
RG403 Only – 2014	3.5	6	21
Individual Ops Subtotal – 2014	6	17	48.5
Joint Ops (RG403-6)	4.5	6	27
Improvement		-65%	-44%



Benefits – Quality & Right-Sizing

- Able to match grind marks for a continuous rail profile and avoid grinding gaps
 - Grinding gaps: corrected - uncorrected profile - corrected
- Ability to perform additional work on shorter segments for surface conditions or surface defects
 - SSC > 250', then ground by RG
 - SSC ≤ 250', then ground by SRG



Benefits – Operational Safety

- Greater fire suppression capabilities
 - Water trucks
 - 250 gallon tank, 0.4% foam mix, 100' hose, pressurized water cans
 - SRG
 - 4,500 gallon tank, fire suppression foam induction system, dual hose reels with 300' extra hose, 4 water cannons, tie sprays and ditch sprays
- Remove man from the ground



Benefits – Connect Equipment

- Self Recovery if mechanical issues
 - Faster recovery without a locomotive needed
 - Minimize impact to train operations and equipment downtime
- Single pilot travel under train profile
 - Reduce piloting costs
 - Reduce delays when obtaining 2 transportation pilots and need to keep equipment together.



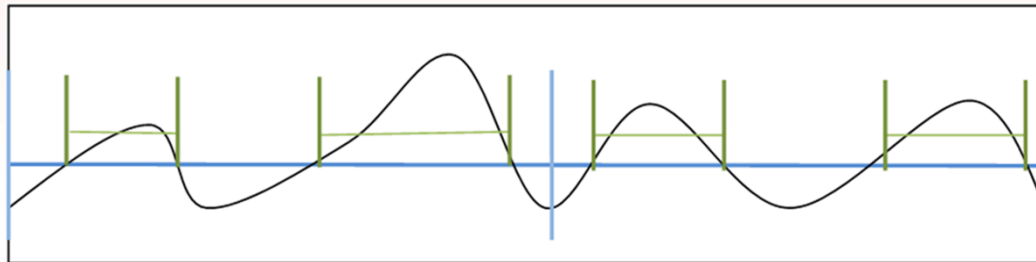
Benefits – Shared Resources

- Cross-training of manpower
 - Reduce stone delay by SRG assisting the RG
 - RG off shift maintenance team able to move SRG or relieve operational crew on an extended travel move
 - Shared expertise on maintenance issues
- SRG able to fill up water from RG during train delay



What's Next – Inspections

- Single inspection for both equipment done ahead of arrival
 - Separate complementary grind plans
 - Continuous matched profile across all assets
 - Divide workloads based on conditions and length of conditions



What's Next – Real Time Quality

- Quality monitoring systems on RG calls for additional work on RG or pushes to SRG
 - Able to target smaller segments for additional work
 - Grind Quality Index (GQI) monitoring
 - Surface Condition scoring and monitoring
 - Vision systems or Eddy Current systems under development



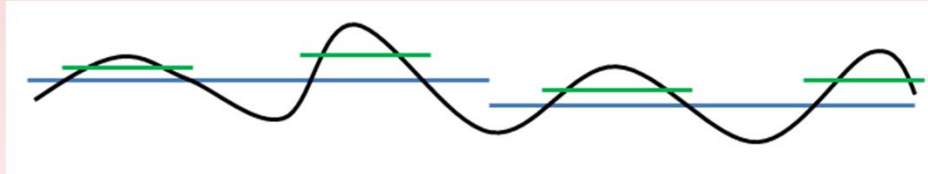
What's Next – Impact on Rail Quality

- By targeting specific locations shorter than a rail segment, next cycle grinds will be more uniform and have a greater impact on achieving desired profile and surface condition.
 - Currently grind plans developed by a track segment
 - Track segment = 1 mile, 1 curve, or any portion broken by a boundary (division, subdivision, prefix, milepost)



What's Next – Impact on Rail Quality

- Cycle 1



- Cycle 2 when Cycle 1 without SRG



- Cycle 2 when Cycle 1 with SRG



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Questions or comments

