



Enhanced Visualization of Production Systems Concepts and Simulation Data for the Smart/Digital Factory



technical poster

James Ong¹, Anand Paul², Daniel Tuohy³, Feraidoon Zahiri⁴, Gregory Sutton⁵ Annual conference of the Prognostics and Health Management Society

^{1,3}Stottler Henke Associates, Inc., ²University of Florida, Gainesville,

^{4,5}Warner-Robins Air Logistics Complex, Robins AFB, GA

ong@stottlerhenke.com, anand.paul@warrington.ufl.edu, dtuohy@stottlerhenke.com,

feraidoon.zahiri@us.af.mil, gregory.sutton@us.af.mil

Data Challenge Approach

We used visualization to enhance understanding of production system analyses and OR principles.

WIP Flow Planning Tool simulates and displays effects of production disruptions, mitigations for what-if analysis.

Diagnostic Tree (D-tree) shows a hierarchy of possible process improvement goals to make operations research findings more accessible to practitioners.

Technical Details

The WIP Flow Planning Tool graph arrays show simulation-based forecasts of setting buffer sizes, induction rates, outages, and capacity adjustments on input and output WIP, part processing rates, and part transfer rates for each process step and day.

Some D-tree nodes have Estimators which estimate the value of the objective variable from user-specified values of the node's sub-objectives (lower right).

Results and Discussion

Visualization Approaches

WIP flow graph arrays with highlighting show values of 10 intermediate and final variables vs. time for each process step for tracing and cross-checks (upper left).

Animated bar graphs, one bar per process step, with play/pause /step buttons, enable exploration of how inter-related variables change over time (lower left).

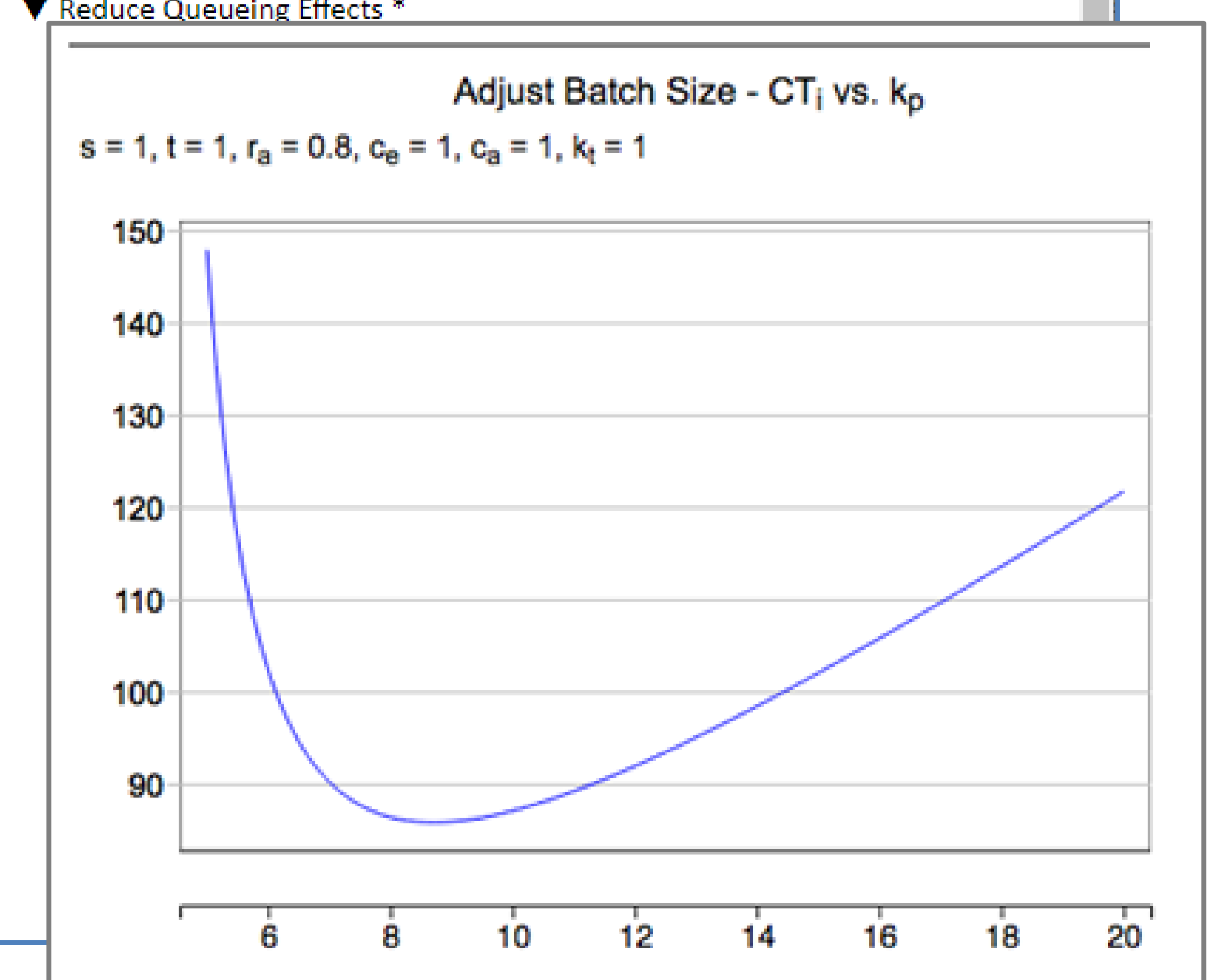
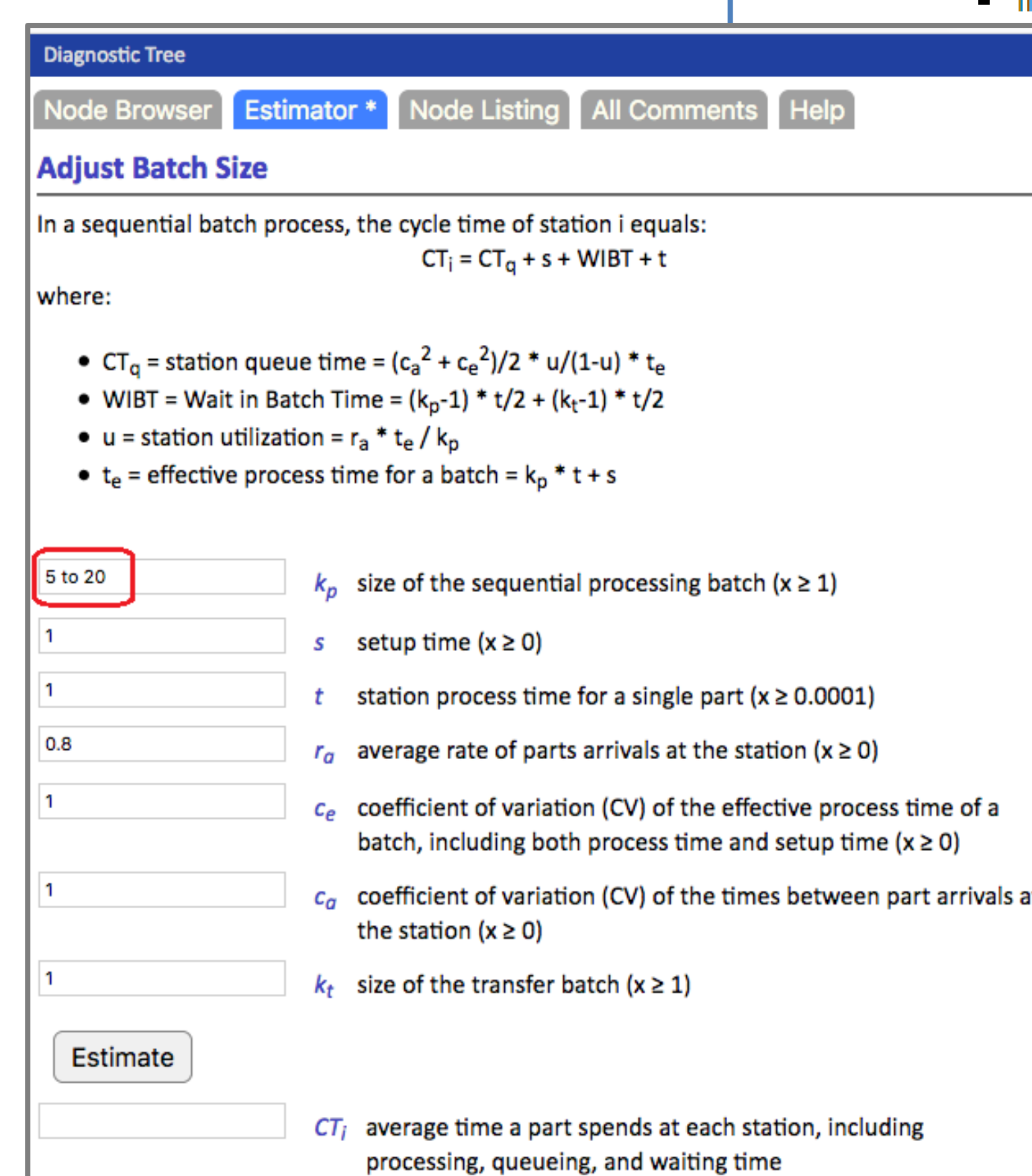
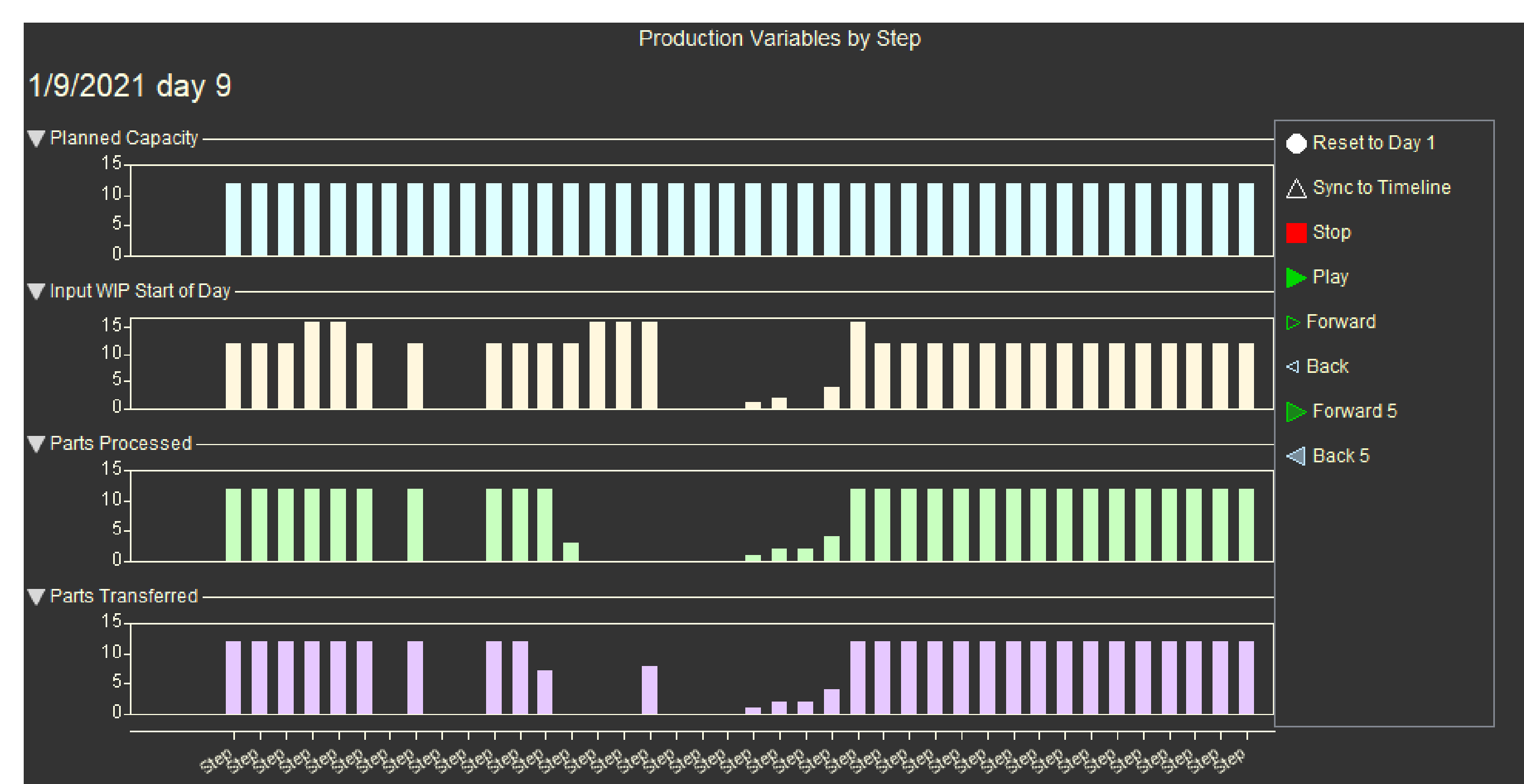
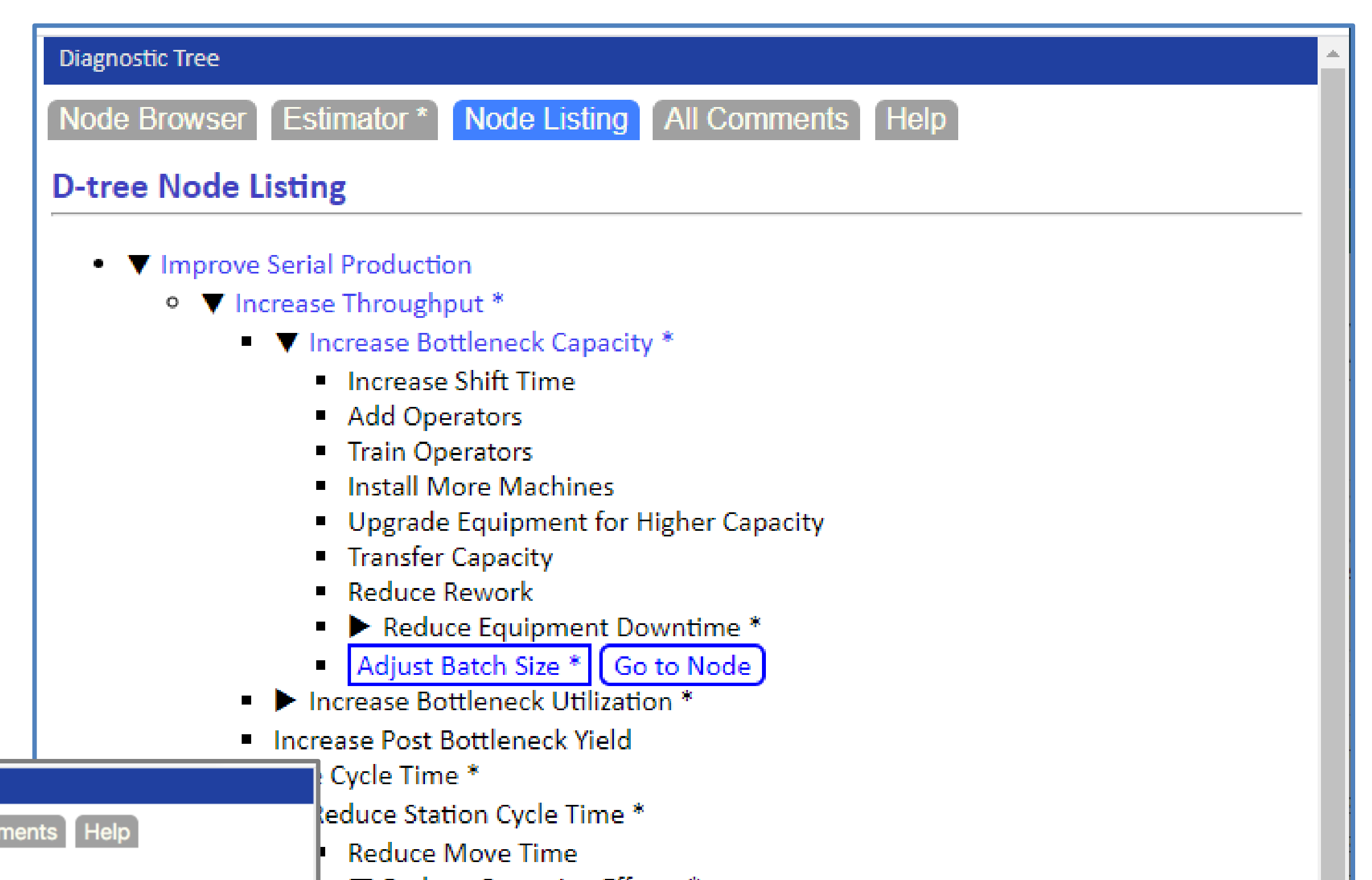
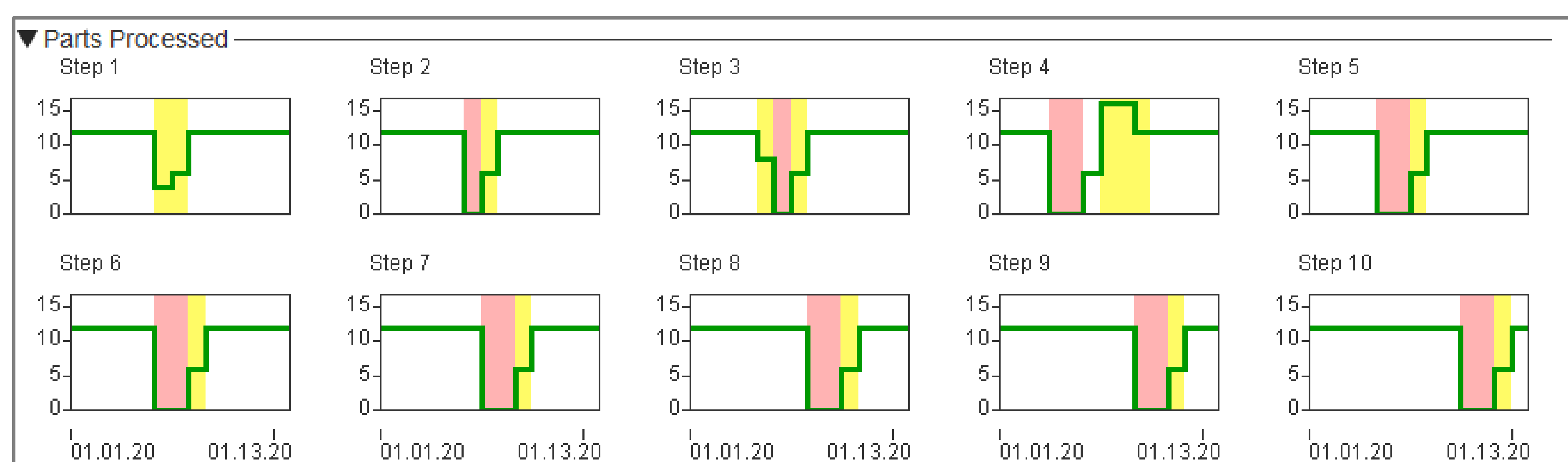
Each node in the D-tree describes a production improvement objective and relates it to sub-objectives, based on Factory Physics, Hopp and Spearman (2011).

The Node Listing shows nodes hierarchically (upper right), linked to each node's description.

Users can navigate from node to linked sub-nodes that describe sub-objectives

Potential Improvements

Integrate the tools with current production and equipment maintenance data.



Acknowledgments and References

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Hopp, W.J., & Spearman, M.L. (2011). *Factory Physics (3rd edition)*. Long Grove, IL: Waveland Press Inc.