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Fachhochschule Oldenburg Ostfriesland Wilhelmshaven
University of Applied Sciences

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Optimization of Crane Production

Grove Crane GmbH, Wilhelmshaven, Germany
Author: Professor Siegle, University of Applied Science - Wilhelmshaven

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- Founded in 1947 as Grove Crane
- Part of Manitowoc Crane Group
- Products: Mobile Hydraulic Cranes; All-Terrain, Rough Terrain, Truck Mounted and Industrial
- Headquartered in Shady Grove, Pennsylvania
- Manufacturing Facilities in Shady Grove, Pennsylvania and Wilhelmshaven, Germany
- Employees: 4,200

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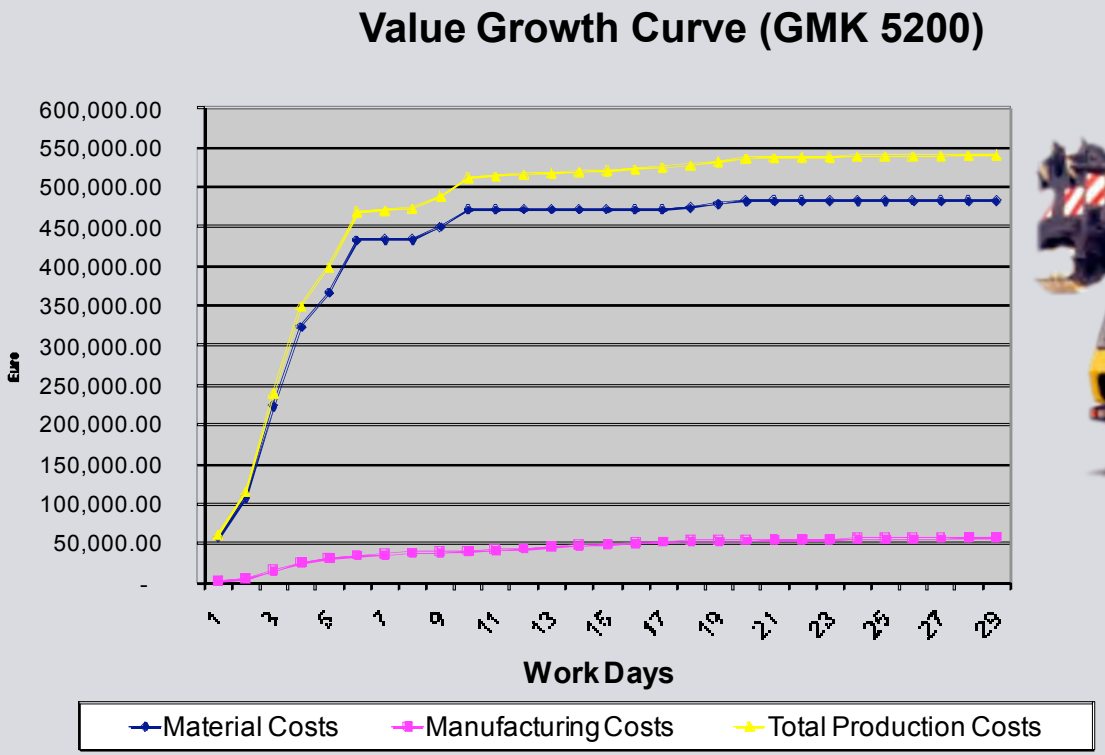
Project Scope

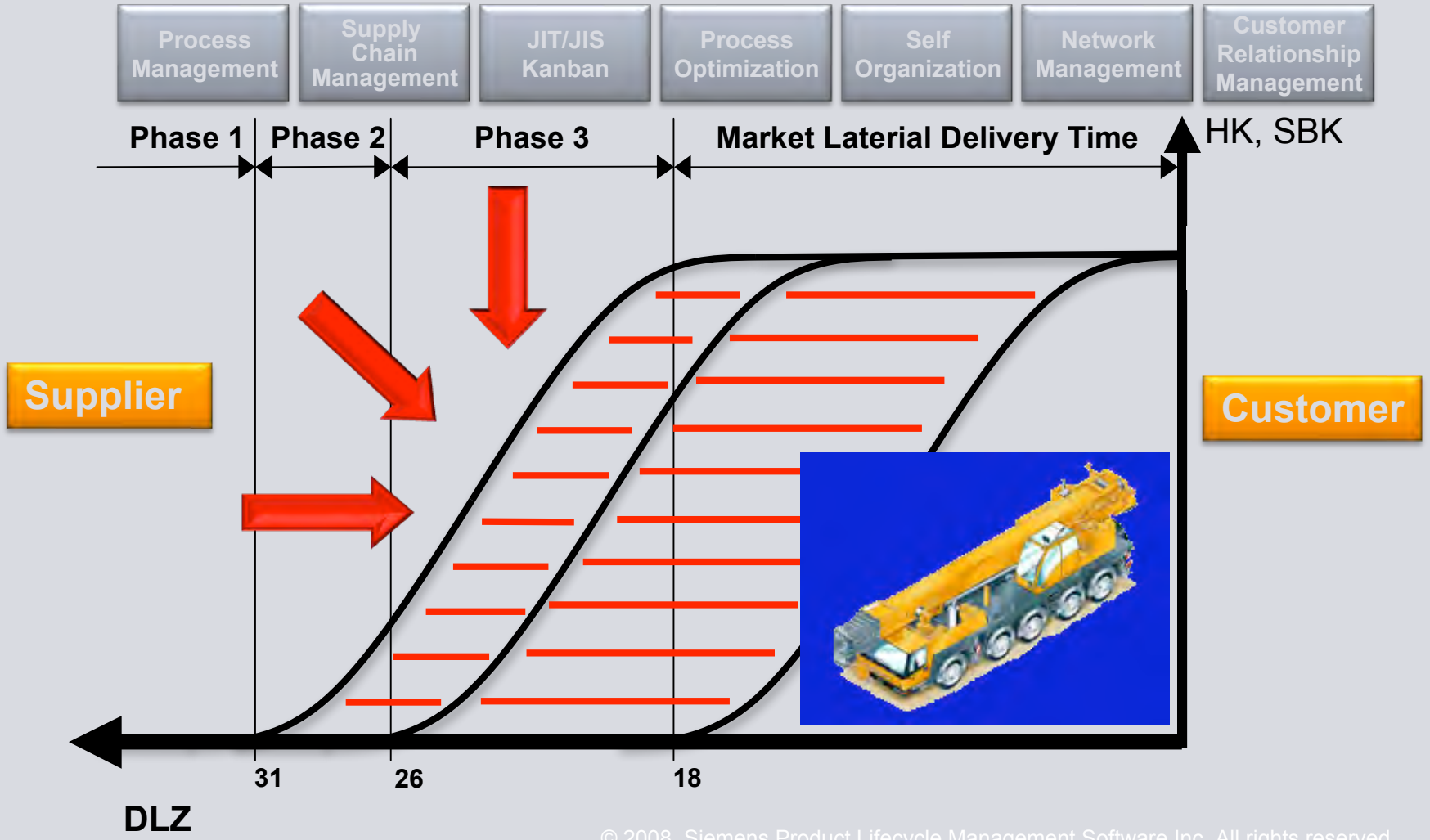
- Holistic View of Internal Supply Chain
- Support for Planning and Controlling the Assembly Process
- Logistic Compression of the Value Growth Curve so as to Reduce Capital Investment

Logistics Compression of the Value Growth Curve

Conditions Prior to Optimization with Plant Simulation



Logistics Compression



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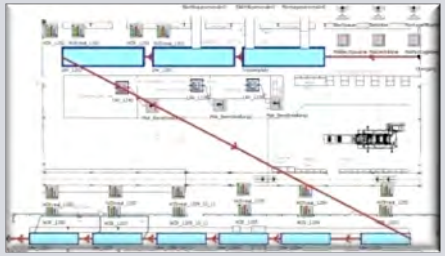
Results of Logistics Compression

- Avoidence and Elimination of Bottlenecks
- Re-Organization of Time-Dependent Processes
- Overall Reduction in Cost, Inventory and Turn-Around Times
- Improved Planning Quality and Accuracy
- Optimization of Customer Requested Changes
- Optimization of Production Sequence Planning
- Minimize Disruptions to Production Sequencing
- Interface with existing Planning and Control Processes from other systems like ERP and Data Logging from Machines on the Line
- Insight into Planning and Control Processes through Simulation of the Virtual Factory

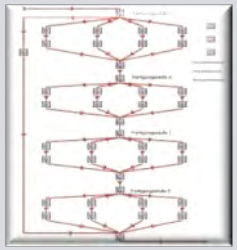
Digital Model

Lower Body Assembly



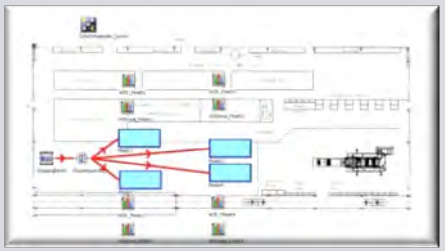
Upper Body Assembly

Production Flow

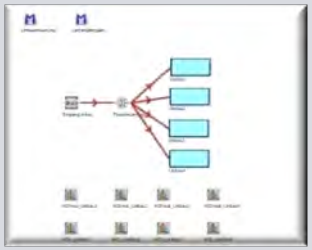


Completion

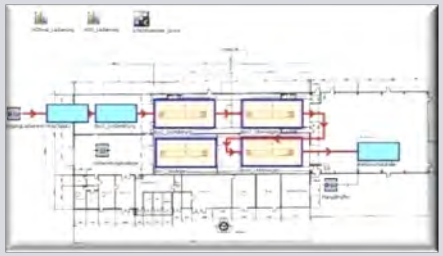
Dispatch Assembly



Change



Paint Shop



Inspection Station

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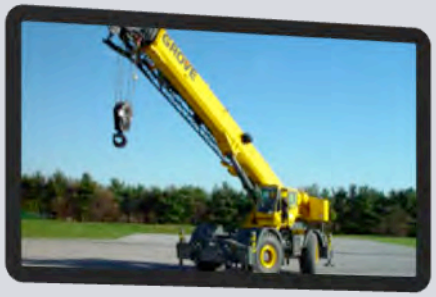
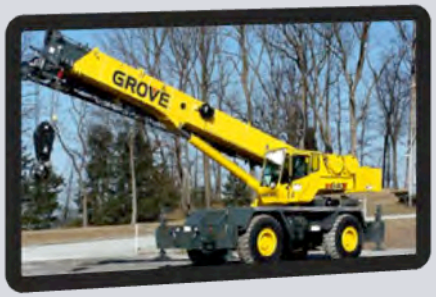
Optimization Results for all Product Ranges





- Flexible Work Schedule Models
- Elimination of Planning Buffers
- Production Planning based upon Qualified Sales Funnel
- Optimization of Production Sequence Planning
- Re-Allocation of Worker Operations
- Multiple Work Sections can Operate in Parallel
- Operational Planning of Personnel
- Personnel Planning based upon Worker Qualifications
- Improved Product Construction Planning

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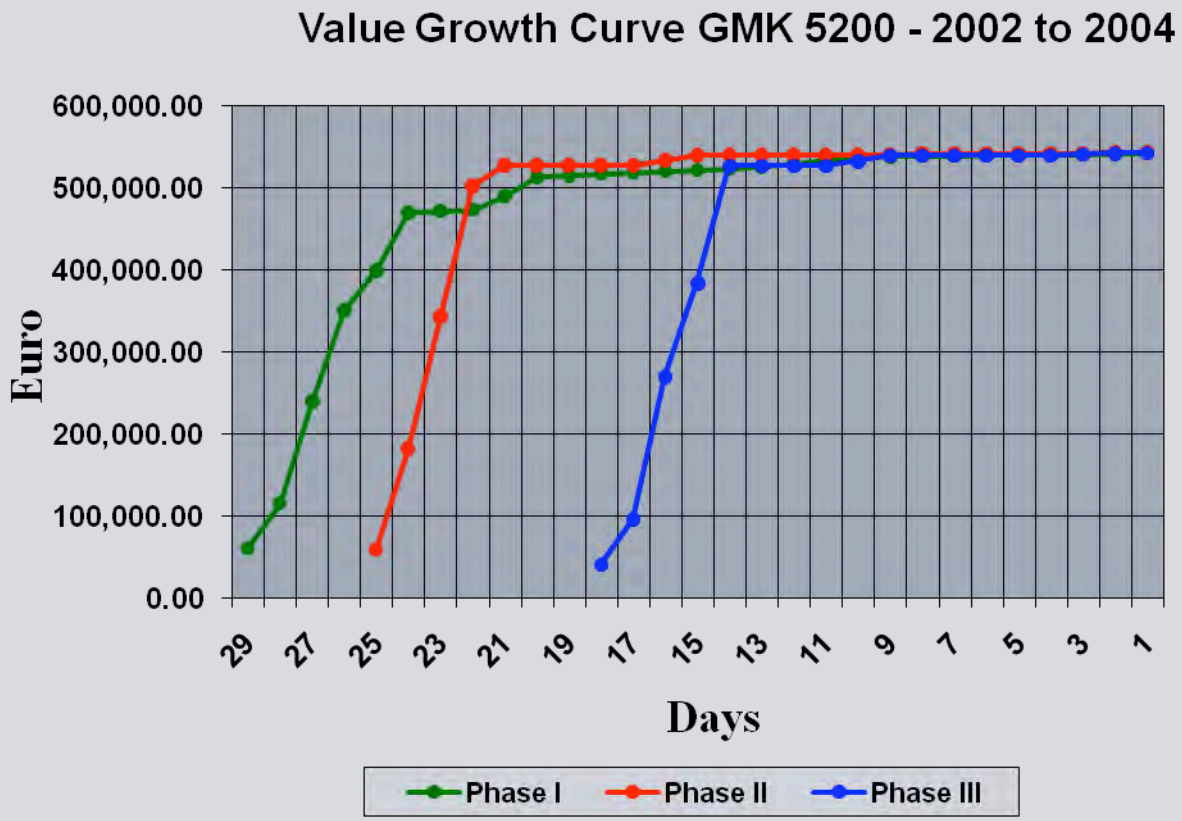
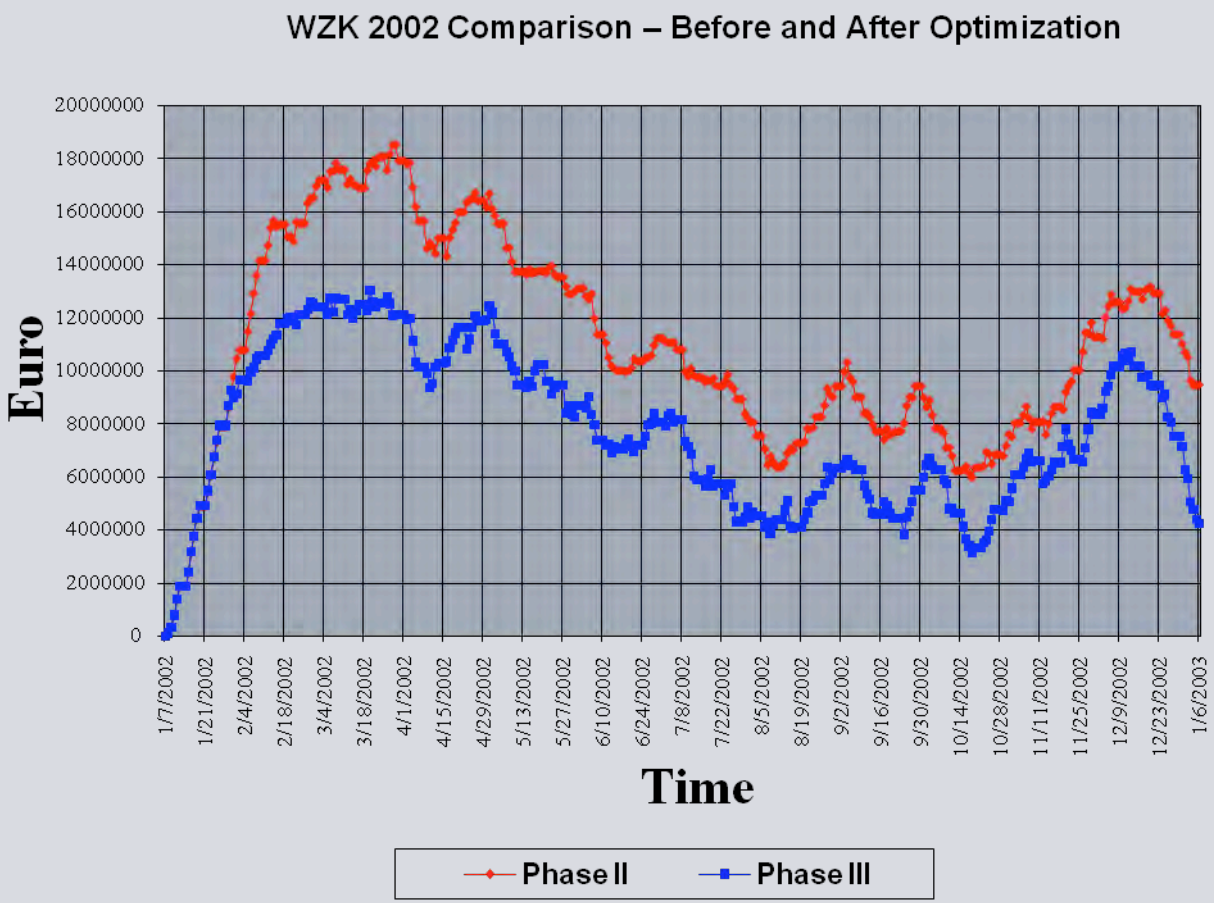
Increase in Value Growth Curve



Total Increase in Value Growth Curves



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Turn-Around Time

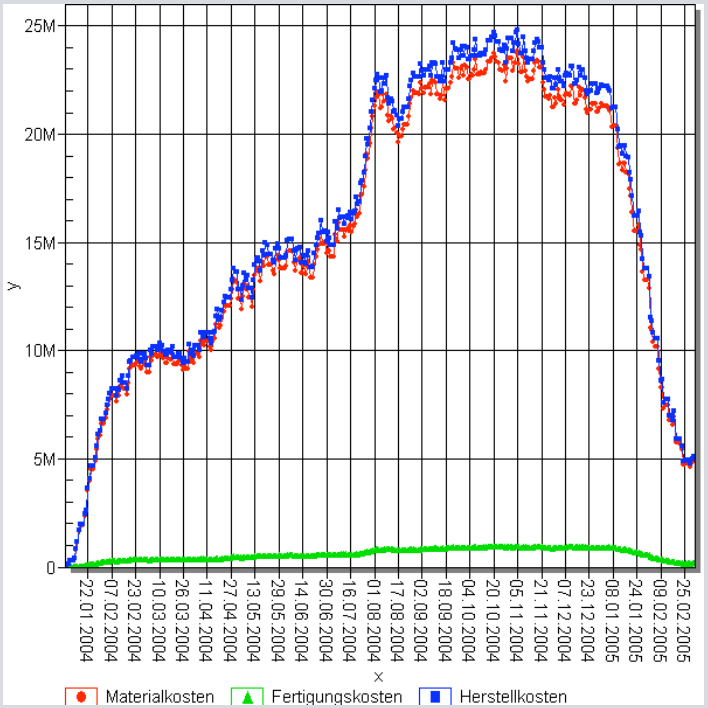
Turn-Around Time before Simulation: 31 days

Work Section	Phase II	Phase III
Assembly	5	4
Completion	2	1,5
Configuration Changes	2	0
Washing / Painting	4	3
Outer Assembly	1	0,5
Completion (Inspection Station)	1	1
LMB	4	3
Dispatch Assembly	2	2
Test drive	1	0,5
Final Inspection	1	0,5
Defect Removal	2	2
Sum	**25**	**18**

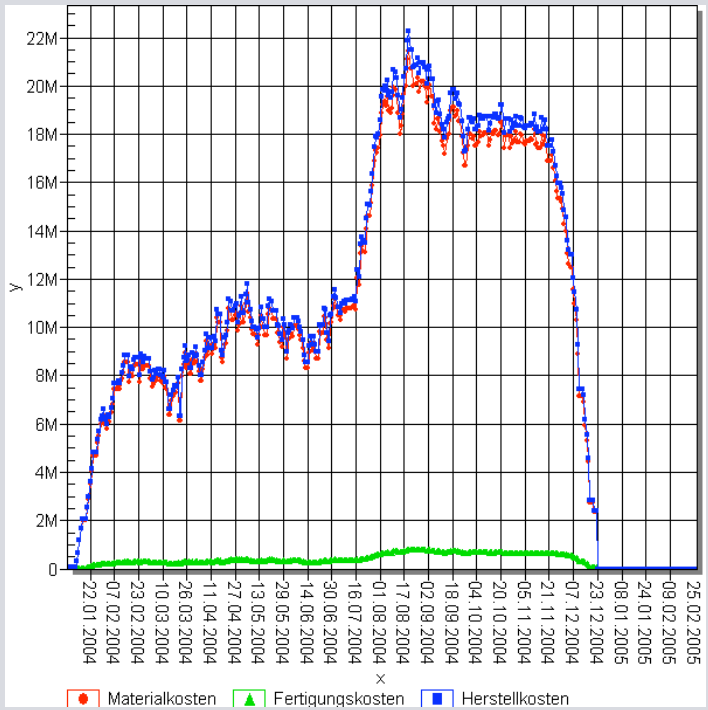
43% Reduction in Turn-Around Time - from 31 days to 18 days!

Value Curve Comparison, Production Year 2004

Before Optimization



After Optimization



Value Growth Curve
Overlay, Production Year 2004

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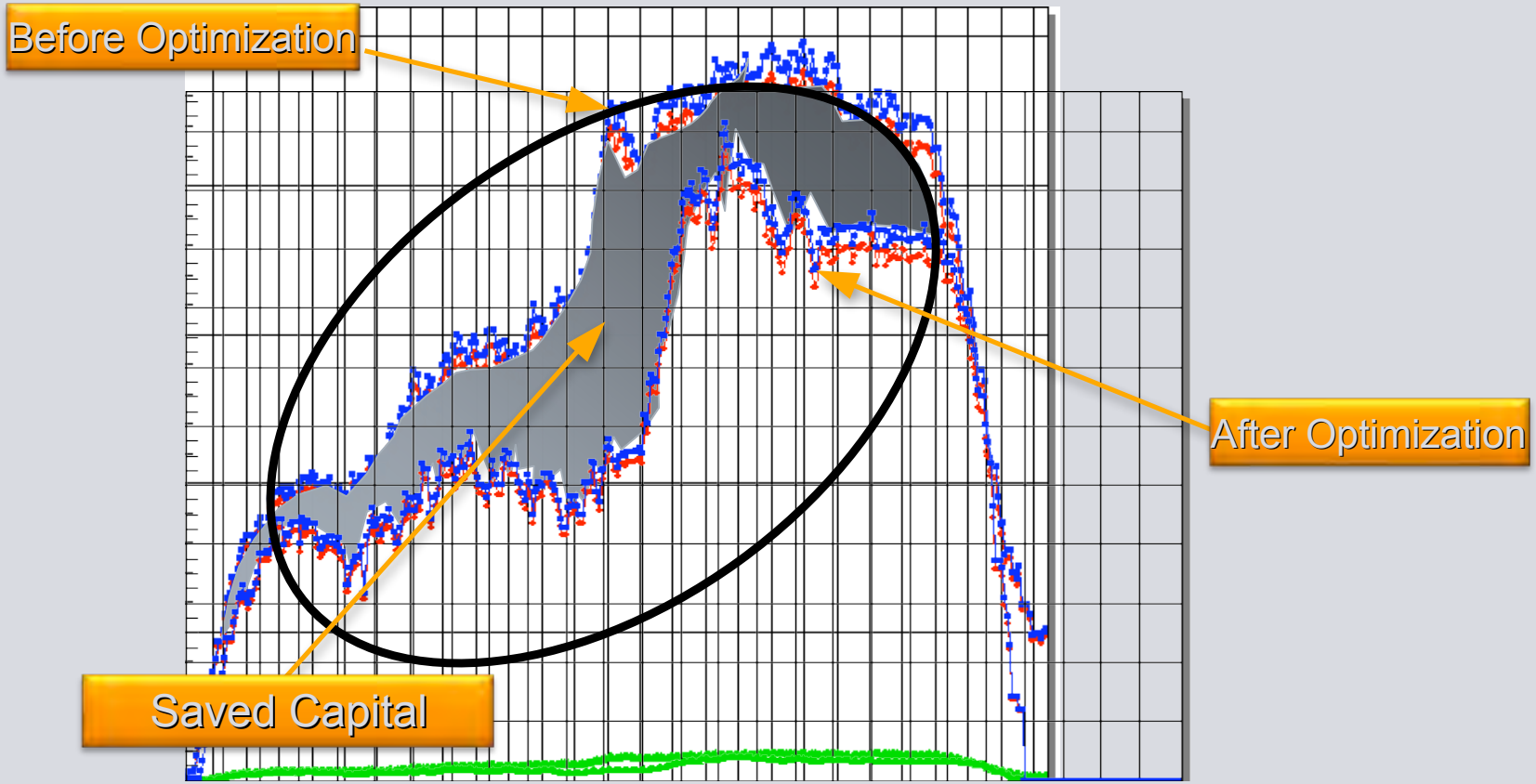

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Crane Backlog by Work Section

Work Section	Before	After
Lower Body Assy.	36	1
Upper Body Assy.	36	9
Paint Shop	13	4
LMB-Inspection	2	2
UW-Acceptance	2	2
Dispatch Assembly	22	32
Change	1	1
Sum	**112**	**51**

54% Reduction in Crane Backlog!

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"The Plant Simulation throughput simulation of the Crane production at Grove resulted in a 43% reduction in turn-around time (31 days to 18 days) and an inventory reduction in Crane backlog of around 54%!" – Professor Manfred Siegle of the University of Applied Sciences, Wilhelmshaven, Germany