Manufacturing Optimization

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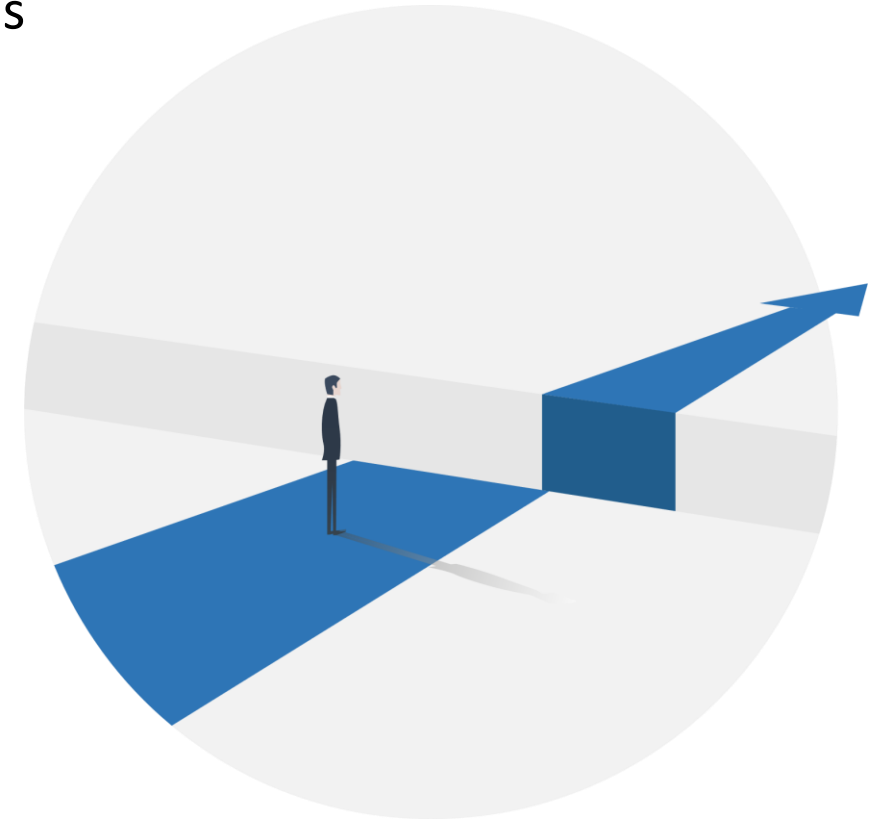
VELOCITY
CONNECT + ACCELERATE + INNOVATE

LOGILITY Halo NGC Demand Solutions®

Manufacturing Business Challenges

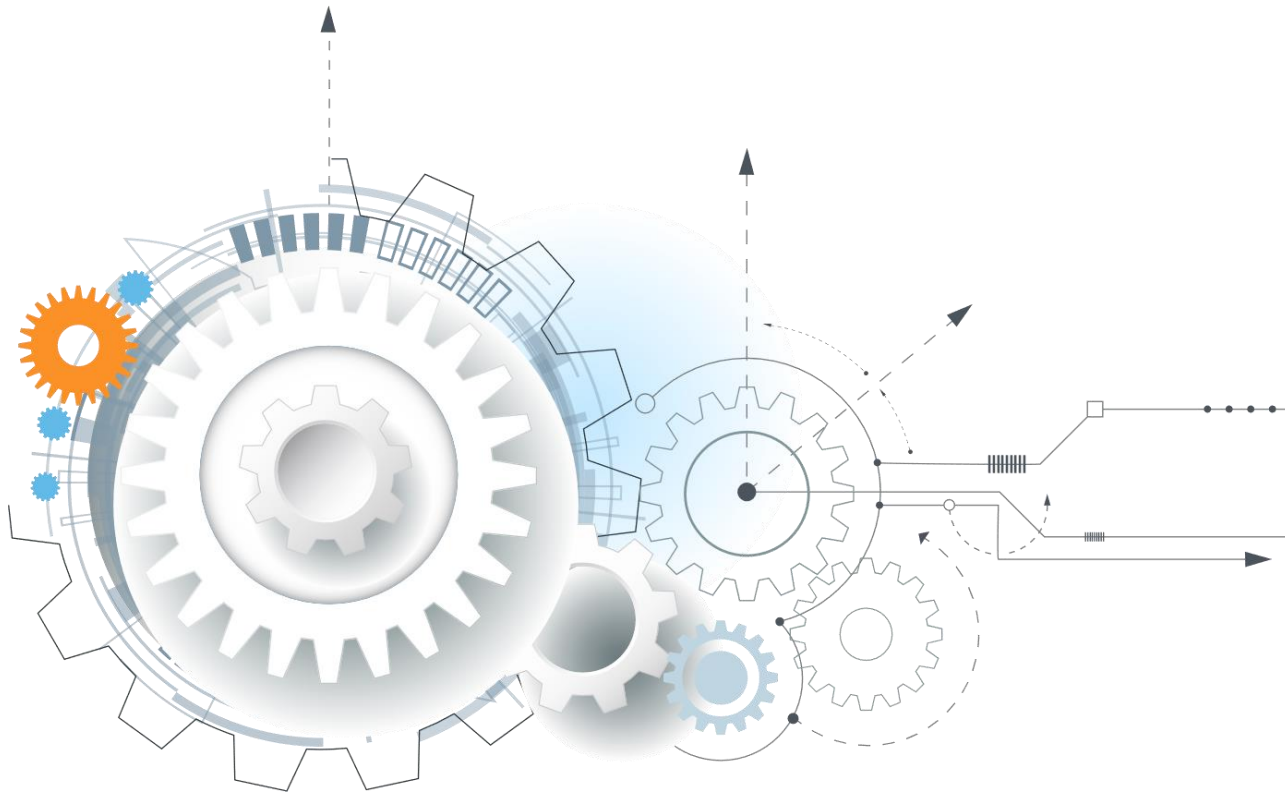
- Managing manufacturing complexity while minimizing planning time
- Re-planning due to demand, supply, or capacity changes
- Lack of quick what-if analysis
- Lost production time due to inefficient sequencing



Impact on the Business

- Low customer satisfaction
- Lost sales opportunities
- Higher production costs
- Higher supply chain costs
- Lower profitability

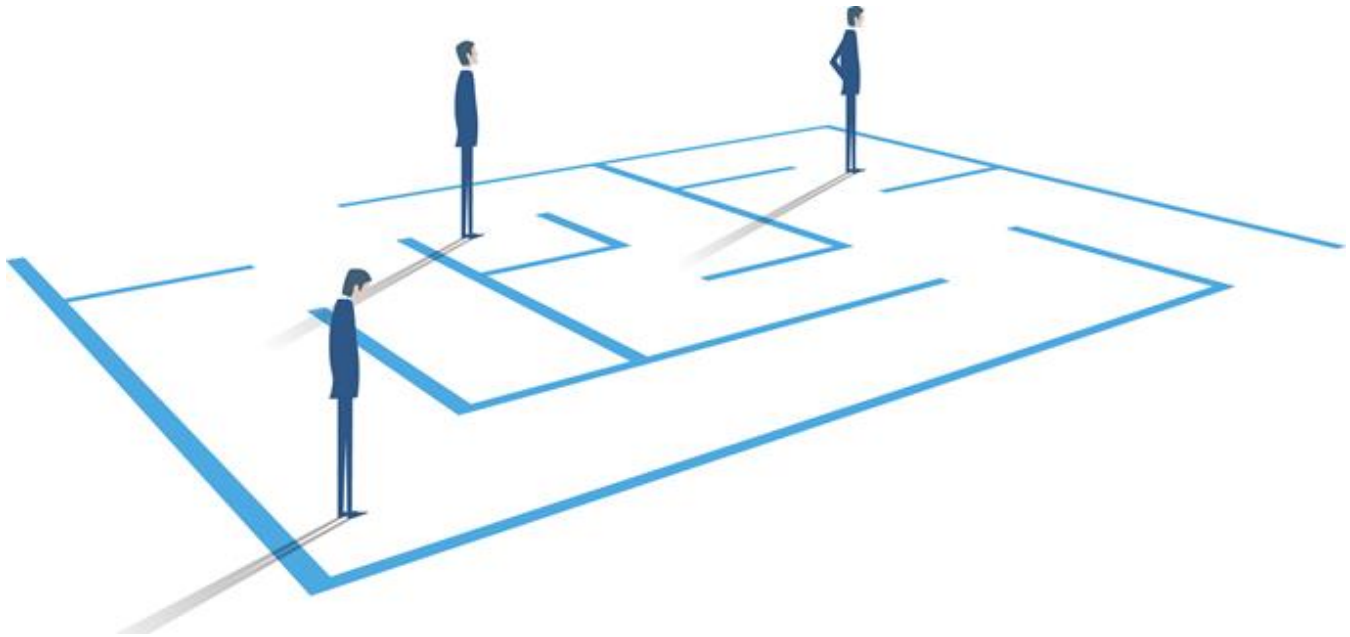
Real World Constraints



- Capacity Constraints
  - Material, Labor & Tooling Constraints
  - Lot/Batch Sizes
- PM/Downtimes
- Sequence Dependent Changeovers
- Multi-Step & Alternate Routings
- Managing Plant Disruptions & Changes
- Capture Tribal Knowledge

Impact on the Supply Chain Planning Process

- Unreliable capacity plans and production schedules make it difficult to balance supply and demand
- Other departments miss their targets:
  - Demand Planners
  - Inventory Management
  - Manufacturing
  - Sales and Customer Service



Production Planning and Scheduling

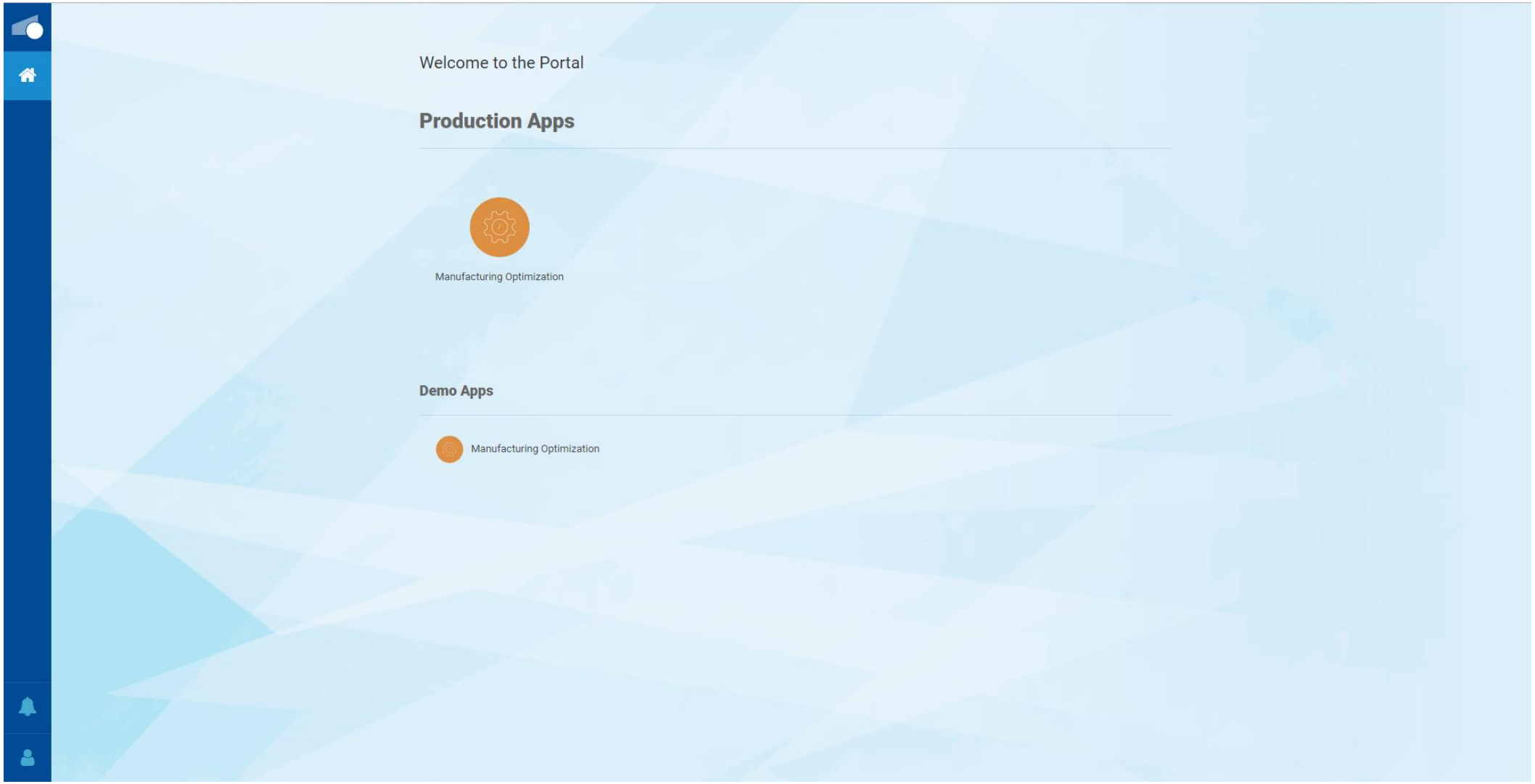
Capacity Planning and Scheduling

Department	Machine Type	Efficiency	Lines Avail							
				Forecasted Hours						
Thermoforming PP	Brown-52	85%	1	266	210	193	225	237	207	191	243
Thermoforming PP	Lyle-52H	85%	2	1,038	909	1,058	888	1,005	974	862	1,080
Thermoforming PP	**Total**	85%	**3**	**1,303**	**1,119**	**1,251**	**1,113**	**1,242**	**1,180**	**1,053**	**1,323**
Department	Machine Type	Efficiency	Lines Avail							
				Forecasted Hours						
Straws	Flex	85%	3	628	439	458	404	421	522	398	529
Straws	Straws	85%	14	4,111	3,520	8,133	7,538	7,581	8,617	7,122	8,206
Straws	**Total**	**85%**	**17**	**4,739**	**3,959**	**8,591**	**7,942**	**8,001**	**9,140**	**7,520**	**8,735**
Department	Machine Type	Efficiency	Lines Avail							
				Forecasted Hours						
DK	JK / Pouch	85%	2	24	24	29	21	24	21	21	32
DK	Dinner Kits 1,2,3	85%	6	3,057	2,886	2,843	2,710	2,762	2,426	2,568	2,656
DK	Dinner Kits 4	85%	2	32	22	28	19	25	35	23	29
DK	O.Wrap / CK	85%	2	9	6	4	4	6	4	4	3
DK	**Total**	85%	12	3,123	2,938	2,903	2,755	2,816	2,486	2,616	2,721

45%	41%	48%	50%	34%	45%	43%	39%	47%	41%	38%	43%
23%	18%	15%	15%	18%	18%	20%	16%	16%	12%	14%	17%
74%	75%	69%	78%	60%	70%	75%	63%	68%	60%	61%	69%
28%	30%	28%	24%	25%	29%	29%	29%	20%	22%	19%	26%
10%	11%	8%	14%	10%	11%	12%	7%	15%	8%	6%	10%
15%	14%	11%	15%	17%	11%	14%	17%	13%	15%	15%	15%
42%	31%	32%	24%	27%	32%	29%	32%	34%	68%	50%	39%
46%	42%	42%	42%	35%	41%	43%	39%	37%	28%	26%	39%
50%	45%	46%	48%	42%	44%	45%	45%	45%	41%	41%	46%
45%	41%	36%	37%	31%	40%	41%	39%	33%	27%	24%	37%
57%	54%	59%	59%	53%	54%	57%	53%	54%	51%	52%	56%
32%	27%	27%	27%	27%	30%	27%	23%	22%	16%	9%	24%
69%	65%	72%	72%	67%	72%	67%	67%	67%	67%	67%	68%
84%	78%	87%	87%	81%	87%	81%	81%	81%	81%	81%	84%
69%	64%	67%	72%	64%	59%	64%	70%	63%	64%	64%	66%
62%	63%	57%	67%	56%	59%	62%	61%	58%	55%	50%	60%
17%	12%	9%	10%	10%	9%	14%	14%	19%	19%	11%	14%
10%	8%	10%	8%	8%	8%	10%	9%	7%	9%	5%	9%
43%	39%	39%	40%	36%	40%	40%	39%	38%	35%	32%	39%

							Jan	Feb	Mar	Apr	May	Jun	Jul	FY
Department	Tool	Machine Type	Prod Line	Efficiency	Tools Avail		Forecasted Hours							
Injection Molding	F1	KM450	F1	80%	2		340	412	386	428	456	309	332	4,769
Injection Molding	F2	KM450	F2	80%	1		248	303	308	279	338	294	275	3,652
Injection Molding	F3	KM450	F3	80%	1		129	121	146	113	114	88	103	1,471
Injection Molding	H1	KM450	H1	80%	1		435	471	539	457	493	433	441	5,842
Injection Molding	H3	KM450	H3	80%	1		178	195	208	208	145	156	136	2,233
Injection Molding	H4	KM450	H4	80%	1		75	77	86	53	106	60	45	862
Injection Molding	K3	KM450	K3	80%	1		124	74	103	121	97	111	107	1,257
Injection Molding	C7	KM450	C7	80%	1		195	217	210	231	244	488	361	3,314
Injection Molding	P1/C1	KM450	P1/C1	80%	3		758	836	934	850	791	605	563	10,005
Injection Molding	P2/C2	KM450	P2/C2	80%	2		608	595	653	641	652	592	585	7,781
Injection Molding	P3/C3	KM450	P3/C3	80%	3		674	810	883	840	711	583	511	9,366
Injection Molding	P4/C4	KM450	P4/C4	80%	1		383	363	408	382	389	364	373	4,750
Injection Molding	P5/C5	KM450	P5/C5	80%	3		578	596	582	502	474	344	186	6,242
Injection Molding	PL2	KM450	PL2	80%	1		481	481	481	481	481	481	481	5,775
Injection Molding	PL3	KM450	PL3	80%	1		583	583	583	583	583	583	583	7,192
Injection Molding	S1	KM450	S1	80%	2		914	795	925	1,005	902	929	917	11,225
Injection Molding	S2/H2	KM450	S2/H2	80%	1		406	396	449	439	415	394	361	5,111
Injection Molding	S3	KM450	S3	80%	1		74	59	98	103	135	136	80	1,163
Injection Molding	S4	KM450	S4	80%	1		61	54	74	62	53	65	39	747
Injection Molding	**Total**			80%	**28**		**7,246**	**7,438**	**8,057**	**7,777**	**7,579**	**7,014**	**6,480**	**92,756**

Manufacturing Optimization (MO)



Master Production Scheduling

From Wikipedia, the free encyclopedia

- A master production schedule (MPS) is a **plan** for individual commodities to be produced in each time period…This plan quantifies significant processes and resources in order to optimize production, to identify bottlenecks, and to anticipate needs …Typical MPSs are created by software with user tweaking.
- Master Production Schedules do not include every aspect of production, but only key elements that have proven their control effectivity…The choice of what to model varies among companies and factories.
- The MPS translates the customer demand (sales orders, PIR's), into a build plan using planned orders…Using MPS helps avoid shortages, costly expediting, last minute scheduling, and inefficient allocation of resources…
- A MPS is not a Final Shop Schedule … calculating scheduling and execution details after MRP

Capacity Planning with MO

Monthly, Weekly, Daily

- Constrained Master Production Schedule
  - Multiple scenario comparisons – unconstrained vs. constrained
  - Handle multiple plants and contract manufacturers
  - Take demand, fill in capacity model and
    - Leave things in an overload situation to show
      - Exactly how over utilized key resources are
      - Exactly which products and/or customers are at risk
    - And …
    - Perform “build ahead” level loading
      - Show how soon to start production to avoid the overloads and satisfy demand

Planning Process Flow

- Model any production process:
  - Batch process – Food, pharma, beverage, paint, CPG, chemical, etc.
  - Discrete Fab/Assembly – Automotive, aerospace, job shop, etc.
  - Make to Order, Make to Stock
- Model any calendar:
  - By plant, department or individual work station
  - Operators as well as equipment
- Model any secondary constraint:
  - Tooling, operators, critical BOM items, etc.
- Model set up/changeover/cleanup segments accurately:
  - Set up/clean up segments calculated dynamically and sequence-dependent

Planning Process Flow

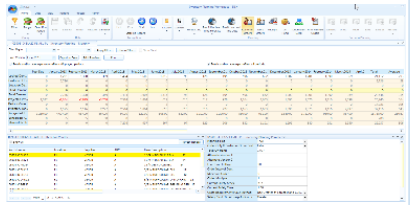
Time Horizon

12 – 18 Months

Long Term Sales Plan

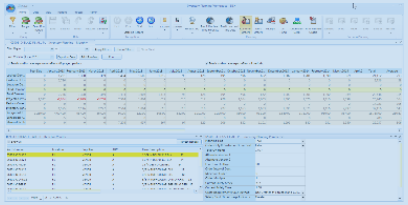
3 – 6 Months

Parts Ordering



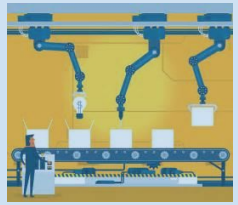
Weeks / Days

Master Schedule



Days / Hours

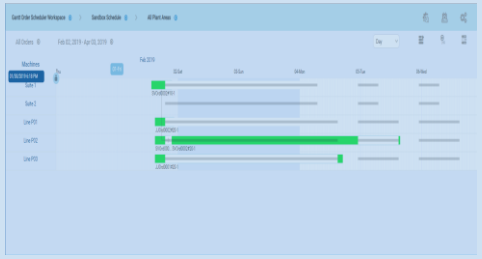
Assembly Schedule



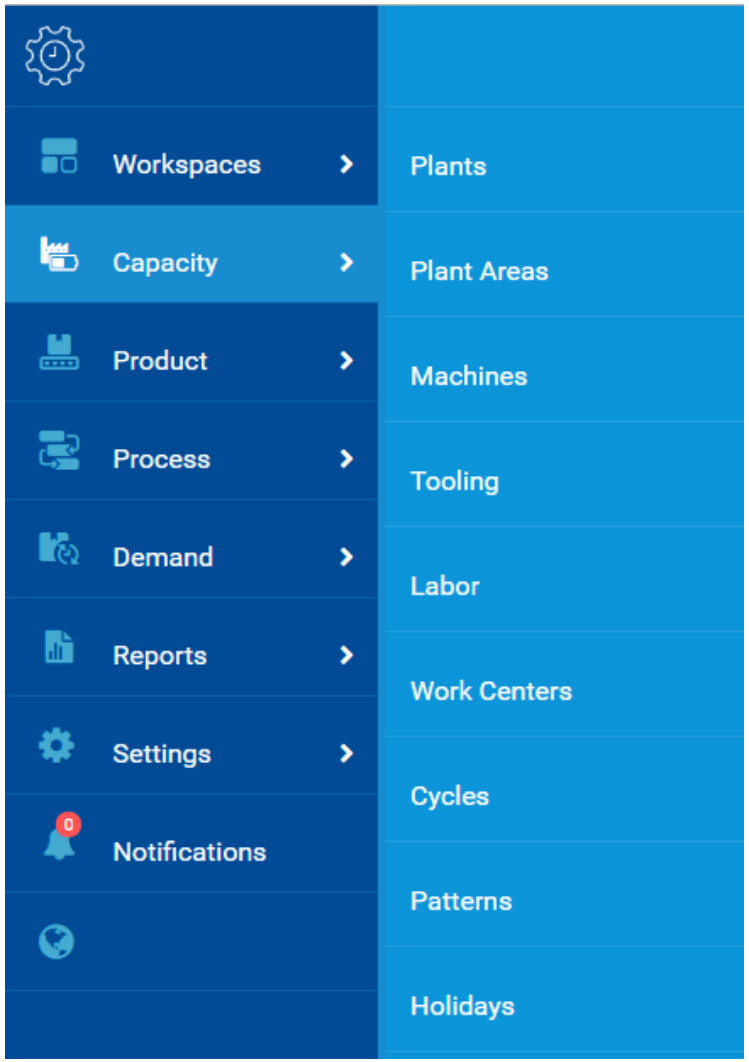
Machining Schedule

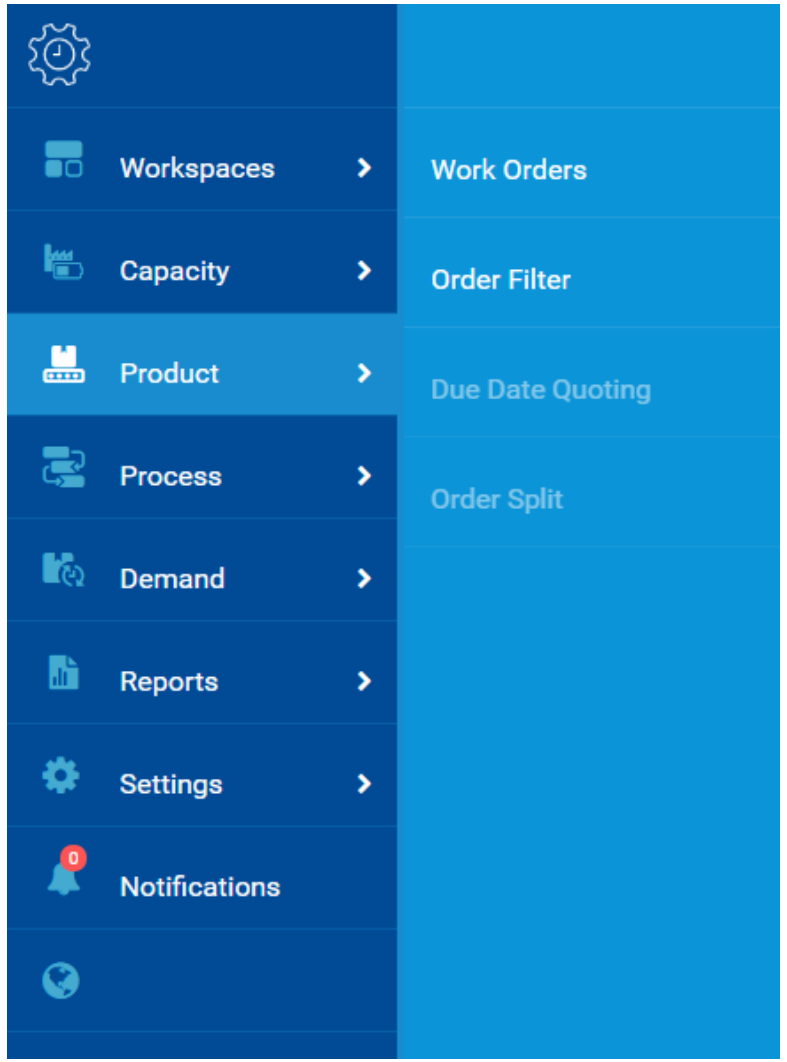
Die Cast Schedule

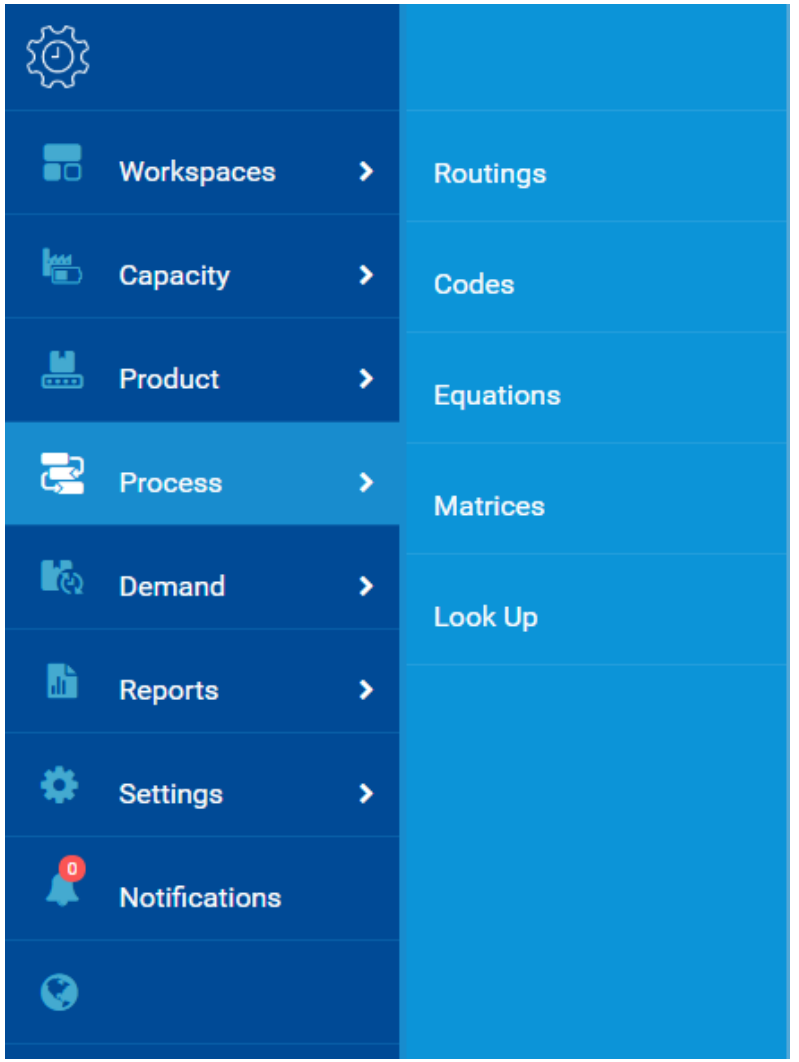
Long Term Capacity Plan



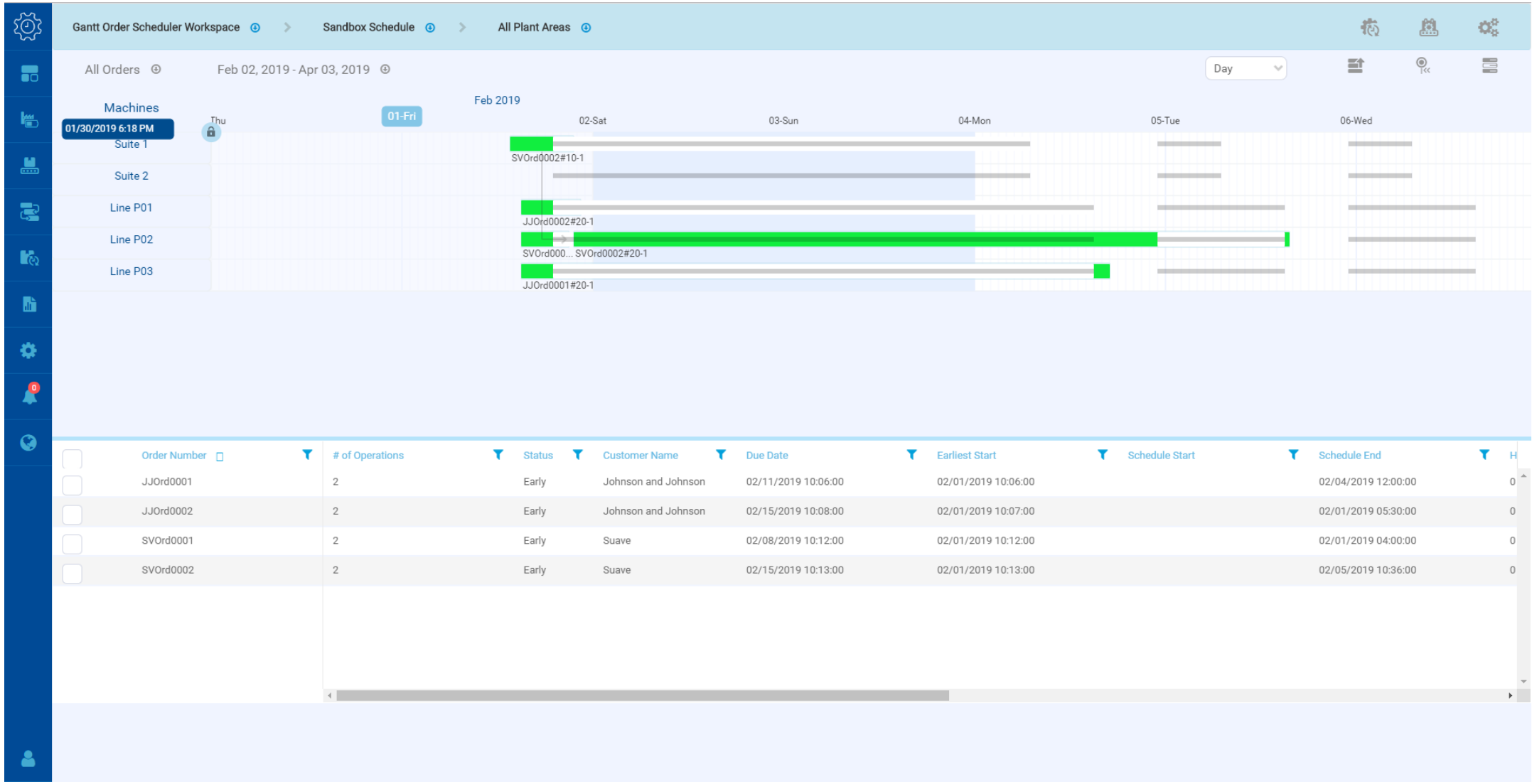
MO Progressive Disclosure Menu





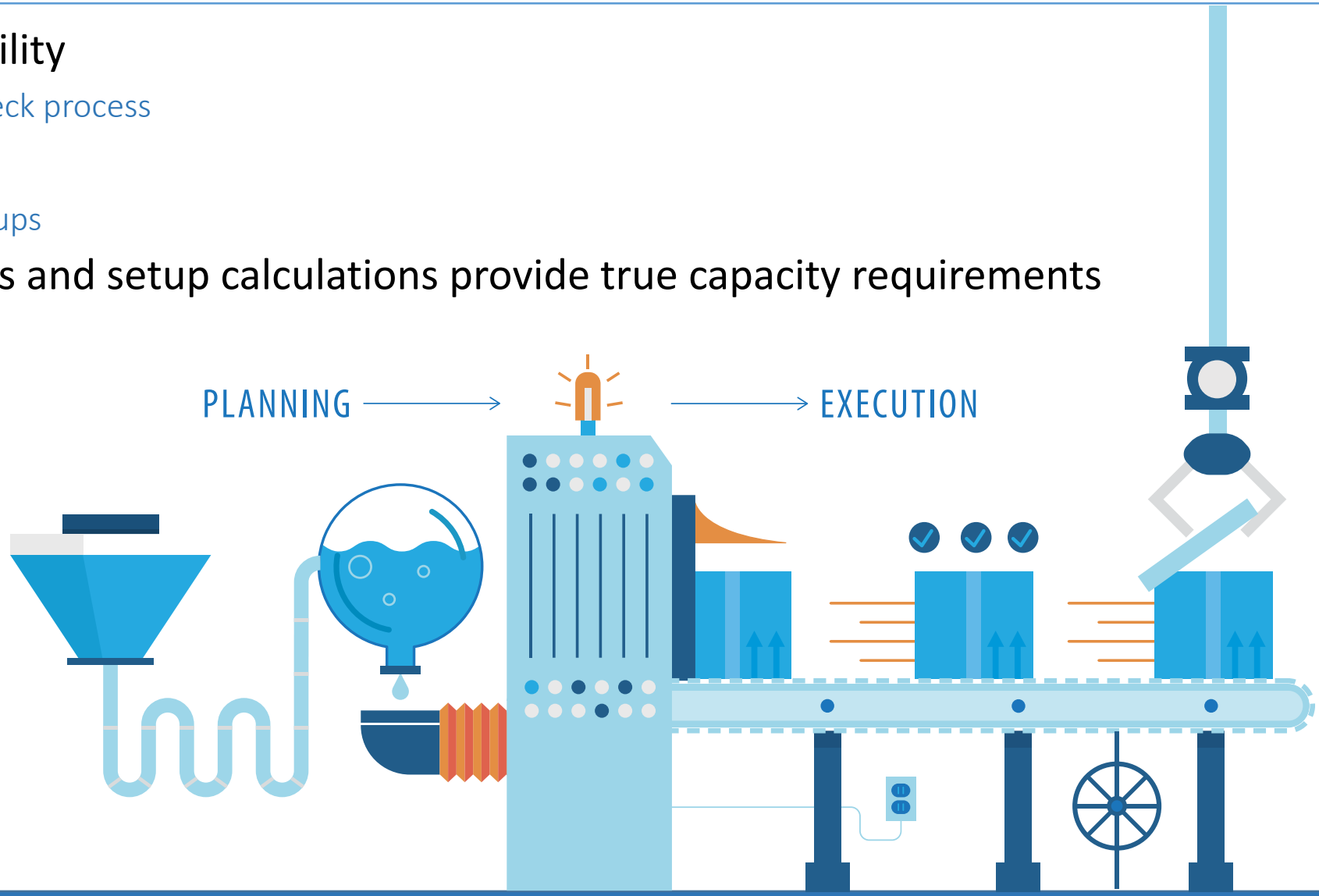


MO Tailored Workspaces

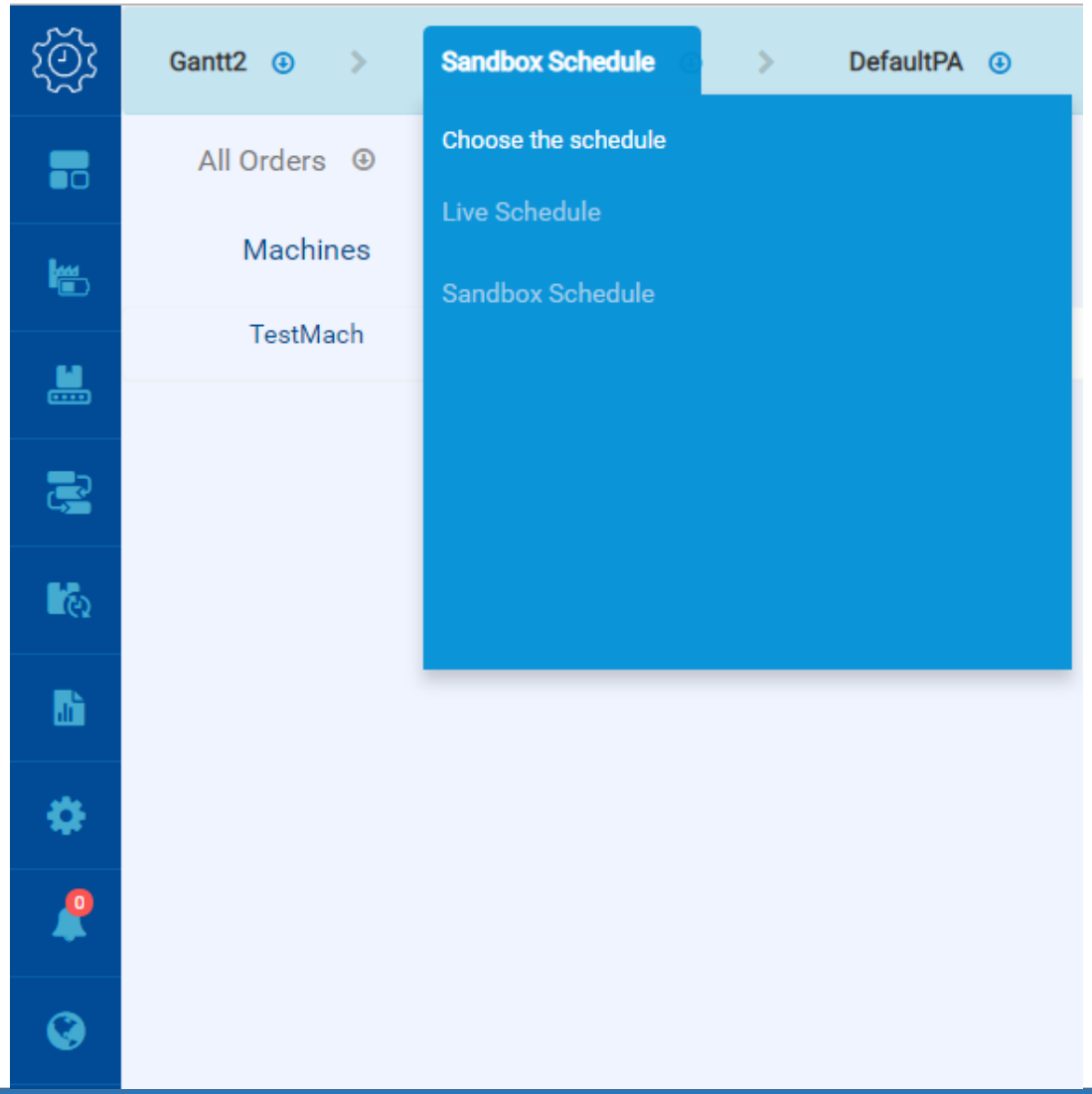


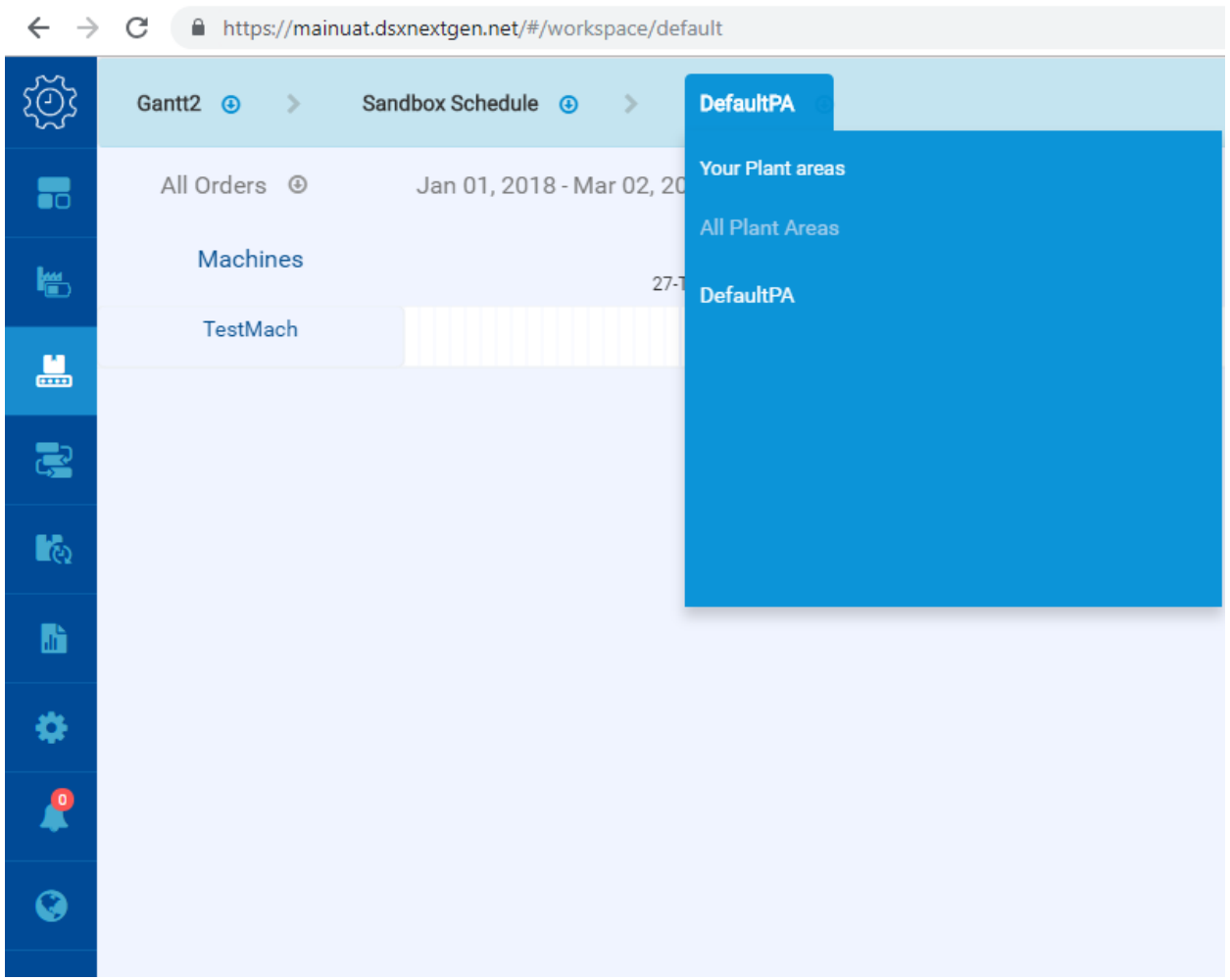
Capacity Planning Model

- Increase schedule visibility
  - Can be driven by bottleneck process
- Production schedule
  - Sequence dependent setups
- Detailed shop calendars and setup calculations provide true capacity requirements



MO Environment





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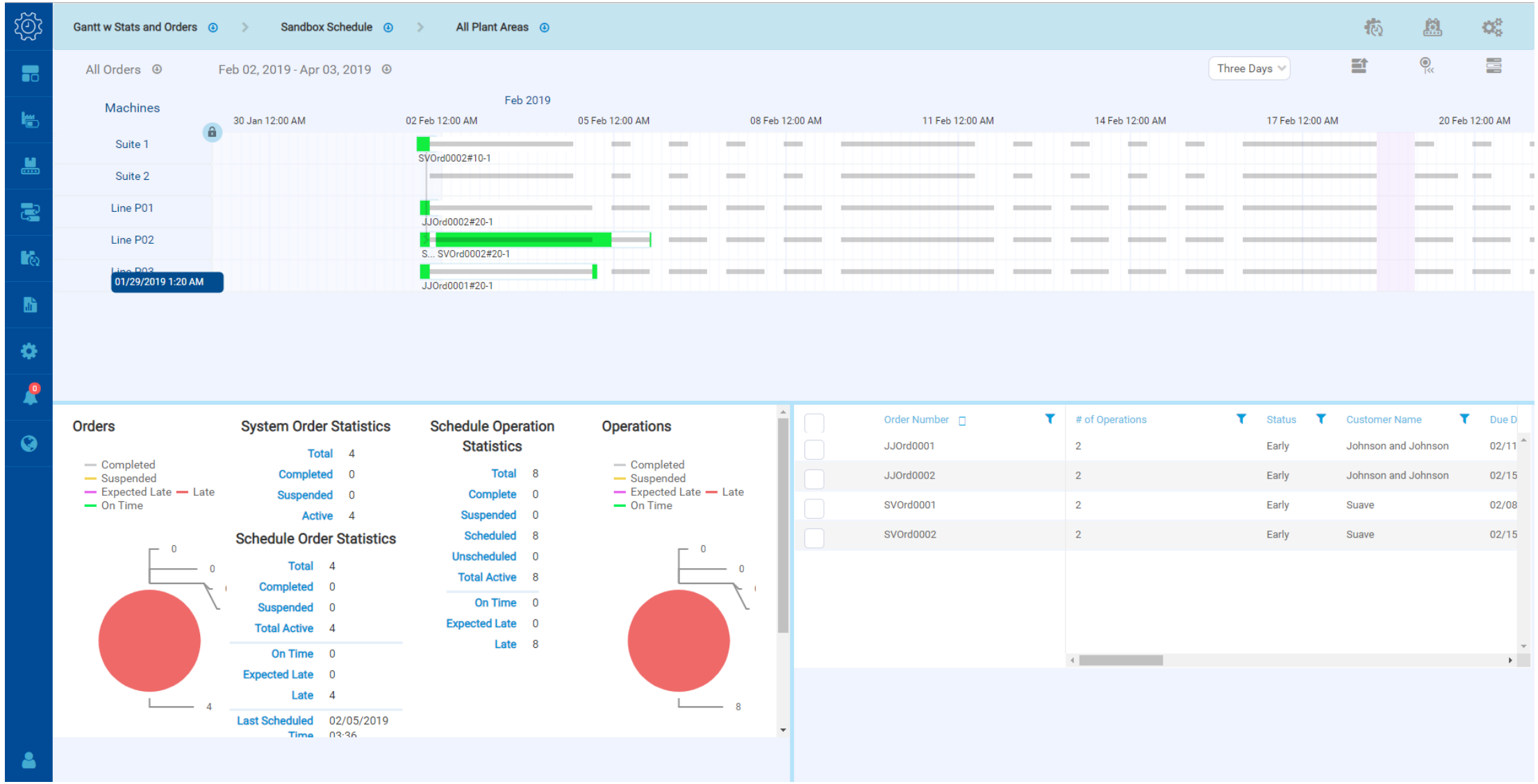
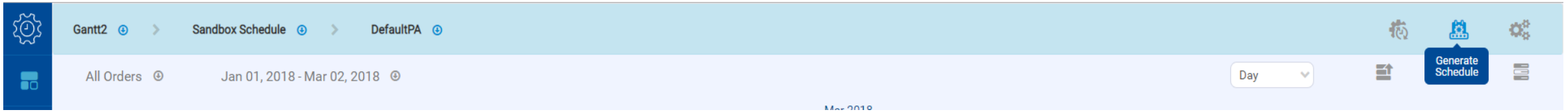
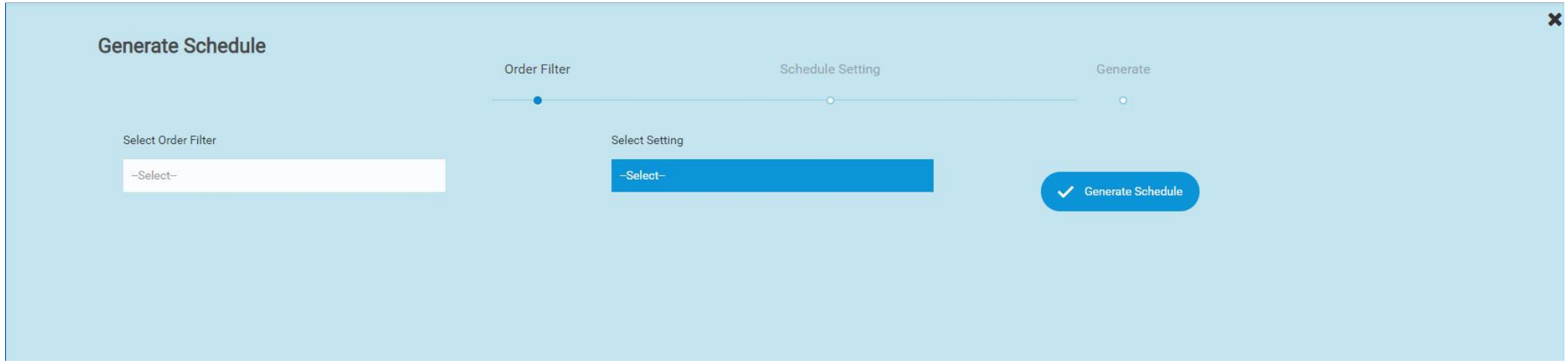


MO Scheduling and Capacity Planning Settings





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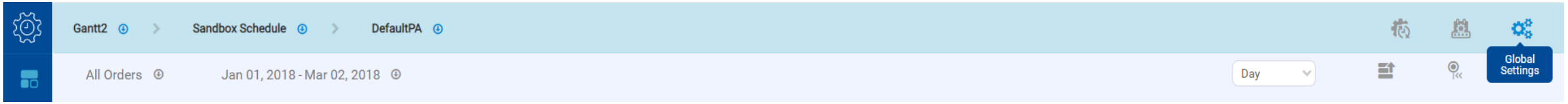
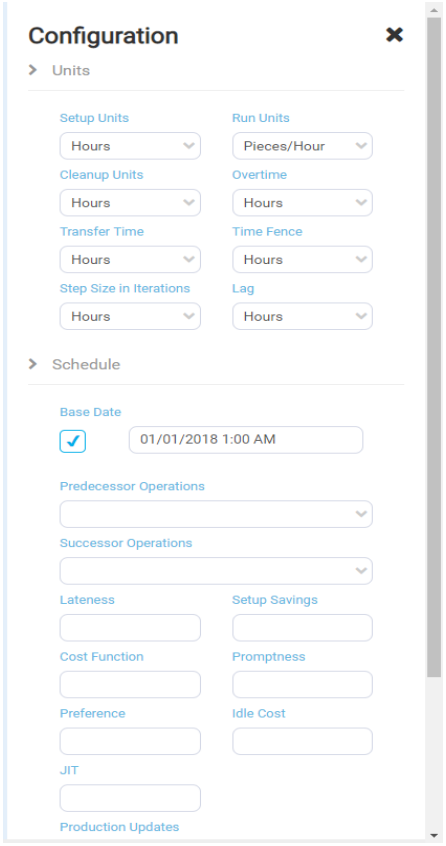
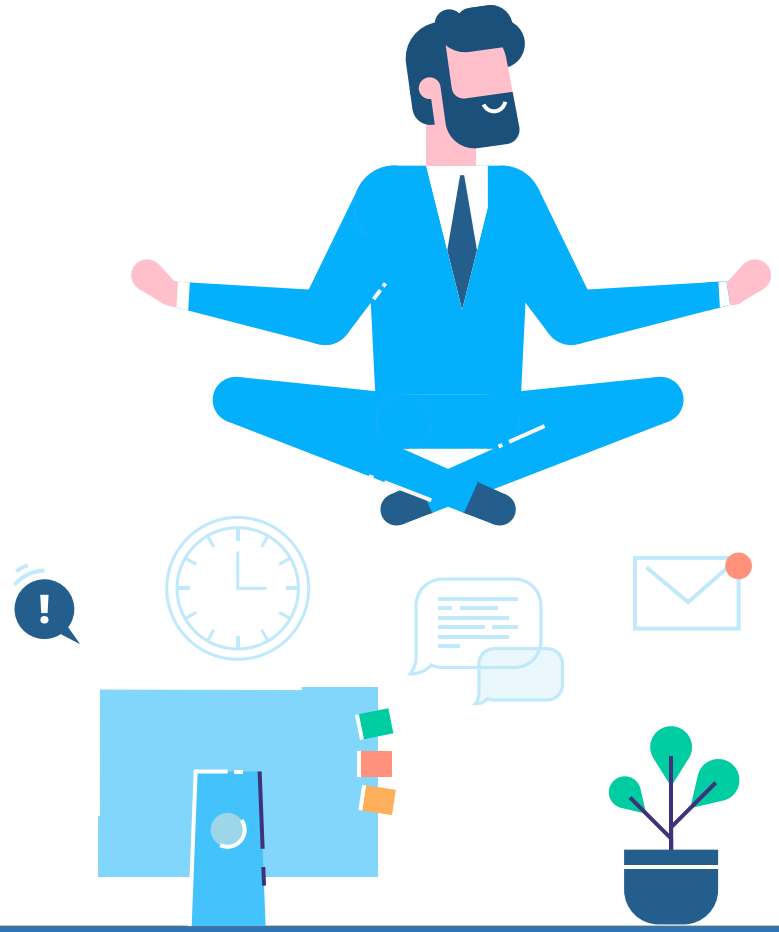




The Virtues of Clean Planning

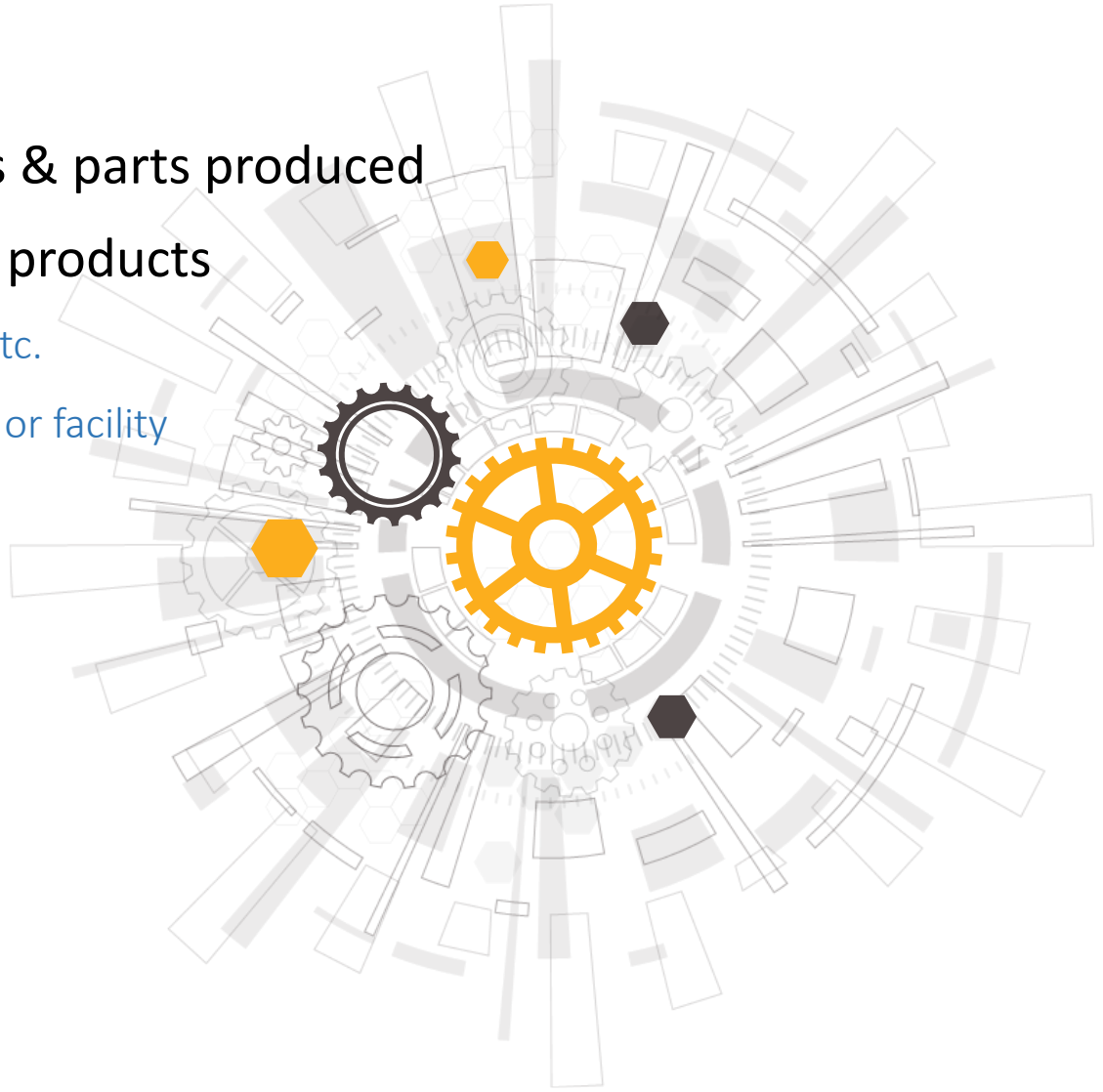
- Feasible plans
  - Lead to achievable schedules
  - Difficult to do in complex environments
- Achievable schedules
  - Start with feasible plans
  - Lead to predictable production
- Predictable production
  - A “Lean” principle
  - Symptom of good planning



MO Master Production Schedule

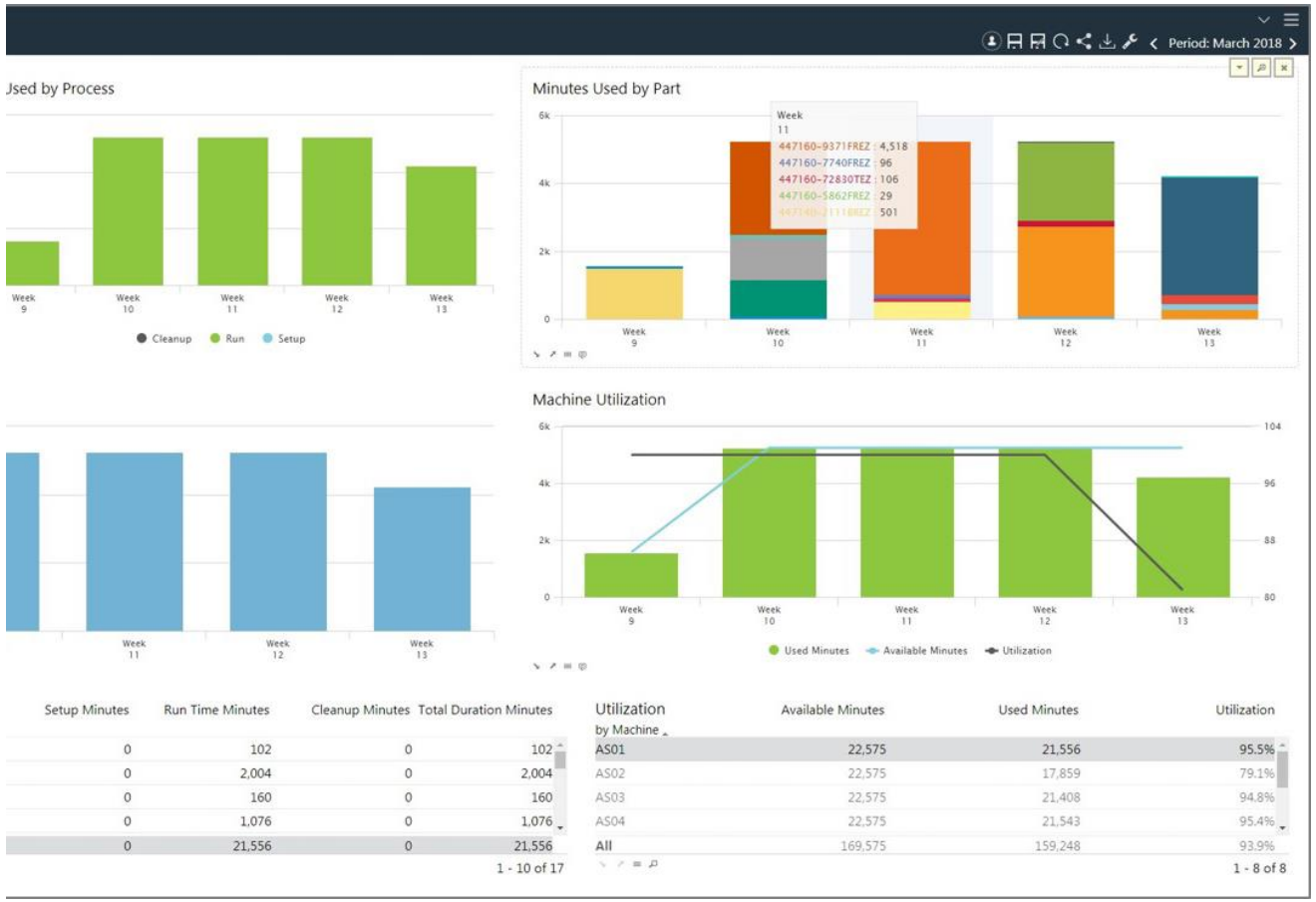
Monthly, Weekly, Daily

- Evaluating a production plan: Utilization of machines & parts produced
- Review resource utilization and allocation of time to products
  - Allocation of production lines to products by family, customer, etc.
  - Utilization summaries by production line and / or location and / or facility
  - Total time spent on each machine
  - Overall utilization of the machines



Capacity and Utilization

- Minutes used by Setup, Run, and Cleanup processes over time
- Minutes utilized by part by time
- Total minutes used by machine over time
- Utilization of machine over time




QUESTIONS?


THANK YOU