



# Optimal Production Scheduling (OPS) for Brewery Operations

Overview							
File							
<b>Materials:</b>						Mon 01-Jan-2001 06:00	
Ingredient	Tonnes	Empty	Re-Order	Size			
Barley	510	Mon 05-Feb-2001 16:00	Mon 22-Jan-2001 16:00	600			
<b>Brewing:</b>							
Brand	Volume	Ferm	Start	Finish			
Labatt Blue	110	531	Tue 02-Jan-2001 03:00	Tue 02-Jan-2001 03:40			
<b>Fermenters:</b>							
Brand	Tank	Volume	Loss	Start	Cycle	Finish	
Kraeusen	438	150	10	Tue 02-Jan-2001 07:30	4.0	Tue 02-Jan-2001 11:30	
<b>Pumpdown:</b>							
Brand	Ferm	Volume	AT	Volume	Loss	Start	Finish
Labatt Blue	531	1410	618	1400	10	Mon 01-Jan-2001 14:57	Mon 01-Jan-2001 16:21
<b>Aging Tanks:</b>							
Brand	Tank	Volume	Loss	Start	Aging	Finish	
Labatt Blue	618	1400	10	Mon 18-Dec-2000 16:21	332.6	Mon 01-Jan-2001 12:57	
<b>Filtering:</b>							
Brand	AT	Volume	BBT	Volume	Loss	Start	Finish
Labatt Blue	618	1400	59	1500	10	Mon 01-Jan-2001 06:00	Mon 01-Jan-2001 11:21
<b>Bright Beer:</b>							
Tank	First Brand	Start Fill	Finish Fill	Volume	Start Empty	Finish Empty	
59	Labatt Blue	Mon 01-Jan-2001 06:00	Mon 01-Jan-2001 11:21	1500			
<b>Bottling:</b>							
Brand	Tank	Start	End				
Labatt Blue	59	Mon 01-Jan-2001 06:00	Mon 01-Jan-2001 13:30				
<b>Canning:</b>							
Brand	Tank	Start	End				
Kohanee	59	Mon 31-Dec-2001 06:00	Mon 31-Dec-2001 13:00				
<b>Kegging:</b>							
Brand	Tank	Start	End				
<b>Production:</b>							
Brand	Volume	Start	Finish				
Labatt Blue	4000	Mon 01-Jan-2001 06:00	Mon 01-Jan-2001 20:17				
<b>Orders:</b>							
Week Of	Kohanee	Budweiser	Bud Light	Labatt Blue	Classic		
Mon 01-Jan-2001 06:00	3000	10000	3000	1400			

- **Production Scheduling for a Brewery Operation**
- **Optimization of the Capacity of the Brewing Operation**
- **Enterprise-wide Coordination and Optimization of the Supply-Chain**



**The main uses and features of the Optimal Production Scheduling (OPS) Application are,**

**1. Production Scheduling for a Brewery Operation**

- **order-driven scheduling**
- **provides an optimal production schedule for brewing, filtering, packaging**
- **strategically allocates aging tank capacity**
- **maximizes beer production efficiency**
- **rapidly meets seasonal order changes**
- **strategically allocates tank capacity**
- **re-schedules when production plans are not achieved**
- **monitors actual production and updates the brewery operations model**
- **brewing schedule includes brands, yeast, propagator, kraeusen, cips**
- **connects to a realtime data acquisition system and a brewery operations data server**

**2. Optimization of the Capacity of the Brewing Operation**

- **seasonal brand order analysis**
- **fermenter – aging tank capacity analysis and optimization**
- **brewing – filtering – packaging bottleneck analysis and optimization**
- **bright beer tank capacity optimization**

**3. Enterprise-wide Coordination and Optimization of the Supply-Chain**

- **for Enterprise-wide Coordination and Optimization (ECO) of the Supply-Chain**
- **a brewery operations model with OPS for each site in the enterprise**
- **each OPS site provides a forecast of order fulfillment capability and cost to ECO for each order allocation scenario**
- **ECO optimally allocates brand orders to the enterprise sites**

## OPS – Overview

The OPS Overview display is shown below.

The OPS Overview display provides production scheduling personnel with overview information on the status of the brewery operation. The production scheduling events for the week are listed in a display box for the unit operation. Time critical events are highlighted in red. If an event is not completed in time, OPS automatically re-schedules the remaining weekly events for the brewery operation, and updates all user displays with the new production schedule.

The screenshot shows the 'Overview' window with a menu bar (File) and a title bar. The main content area displays several tables for different production stages, all for 'Labatt Blue' on 'Mon 01-Jan-2001 06:00'.

**Materials:**

Ingredient	Tonnes	Empty	Re-Order	Size
Barley	510	Mon 05-Feb-2001 16:00	Mon 22-Jan-2001 16:00	600

**Brewing:**

Brand	Volume	Ferm	Start	Finish
Labatt Blue	110	531	Tue 02-Jan-2001 03:00	Tue 02-Jan-2001 03:40

**Fermenters:**

Brand	Tank	Volume	Loss	Start	Cycle	Finish
Kraeusen	438	150	10	Tue 02-Jan-2001 07:30	4.0	Tue 02-Jan-2001 11:30

**Pumpdown:**

Brand	Ferm	Volume	AT	Volume	Loss	Start	Finish
Labatt Blue	531	1410	618	1400	10	Mon 01-Jan-2001 14:57	Mon 01-Jan-2001 16:21

**Aging Tanks:**

Brand	Tank	Volume	Loss	Start	Aging	Finish
Labatt Blue	618	1400	10	Mon 18-Dec-2000 16:21	332.6	Mon 01-Jan-2001 12:57

**Filtering:**

Brand	AT	Volume	BBT	Volume	Loss	Start	Finish
Labatt Blue	618	1400	59	1500	10	Mon 01-Jan-2001 06:00	Mon 01-Jan-2001 11:21

**Bright Beer:**

Tank	First: Brand	Start Fill	Finish Fill	Volume	Start Empty	Finish Empty
59	Labatt Blue	Mon 01-Jan-2001 06:00	Mon 01-Jan-2001 11:21	1500		

**Bottling:**

Brand	Tank	Start	End
Labatt Blue	59	Mon 01-Jan-2001 06:00	Mon 01-Jan-2001 13:30

**Canning:**

Brand	Tank	Start	End
Kohanee	59	Mon 31-Dec-2001 06:00	Mon 31-Dec-2001 13:00

**Kegging:**

Brand	Tank	Start	End

**Production:**

Brand	Volume	Start	Finish
Labatt Blue	4000	Mon 01-Jan-2001 06:00	Mon 01-Jan-2001 20:17

**Orders:**

Week Of	Kohanee	Budweiser	Bud Light	Labatt Blue	Classic
Mon 01-Jan-2001 06:00	3000	10000	3000	1400	

By clicking on the name for a unit operation, the user can proceed to a display with more detailed information.

## Orders

The orders display is shown below.

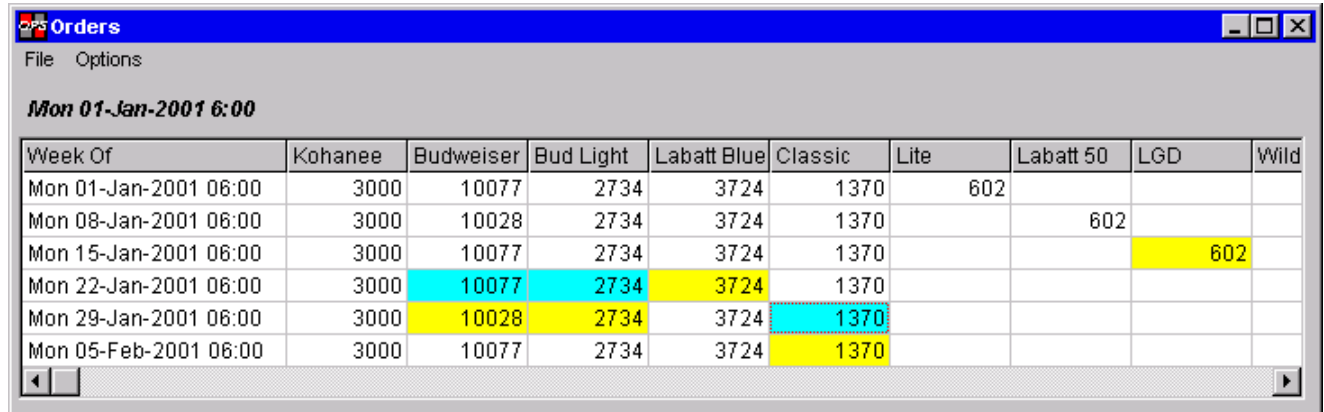
The current week is shown at the top of the display.

The brand orders which will be brewed for the current week are highlighted in yellow.

The Kraeusen brewing requirements are highlighted in cyan.

OPS determines the number of brews for each brand, based on the future available aging tanks.

OPS allocates these aging tanks on a best fit – least unused space basis.



The screenshot shows a window titled "Orders" with a menu bar containing "File" and "Options". Below the menu bar, the text "Mon 01-Jan-2001 6:00" is displayed. The main area contains a table with the following data:

Week Of	Kohanee	Budweiser	Bud Light	Labatt Blue	Classic	Lite	Labatt 50	LGD	Wild
Mon 01-Jan-2001 06:00	3000	10077	2734	3724	1370	602			
Mon 08-Jan-2001 06:00	3000	10028	2734	3724	1370		602		
Mon 15-Jan-2001 06:00	3000	10077	2734	3724	1370			602	
Mon 22-Jan-2001 06:00	3000	10077	2734	3724	1370				
Mon 29-Jan-2001 06:00	3000	10028	2734	3724	1370				
Mon 05-Feb-2001 06:00	3000	10077	2734	3724	1370				

## Brewing Schedule

The display for the brewing schedule is shown below.

OPS determines the brewing schedule based on the brand orders, the kraeusen requirements, the pitching and cropping of yeast, and the age of the yeast, and the cips.

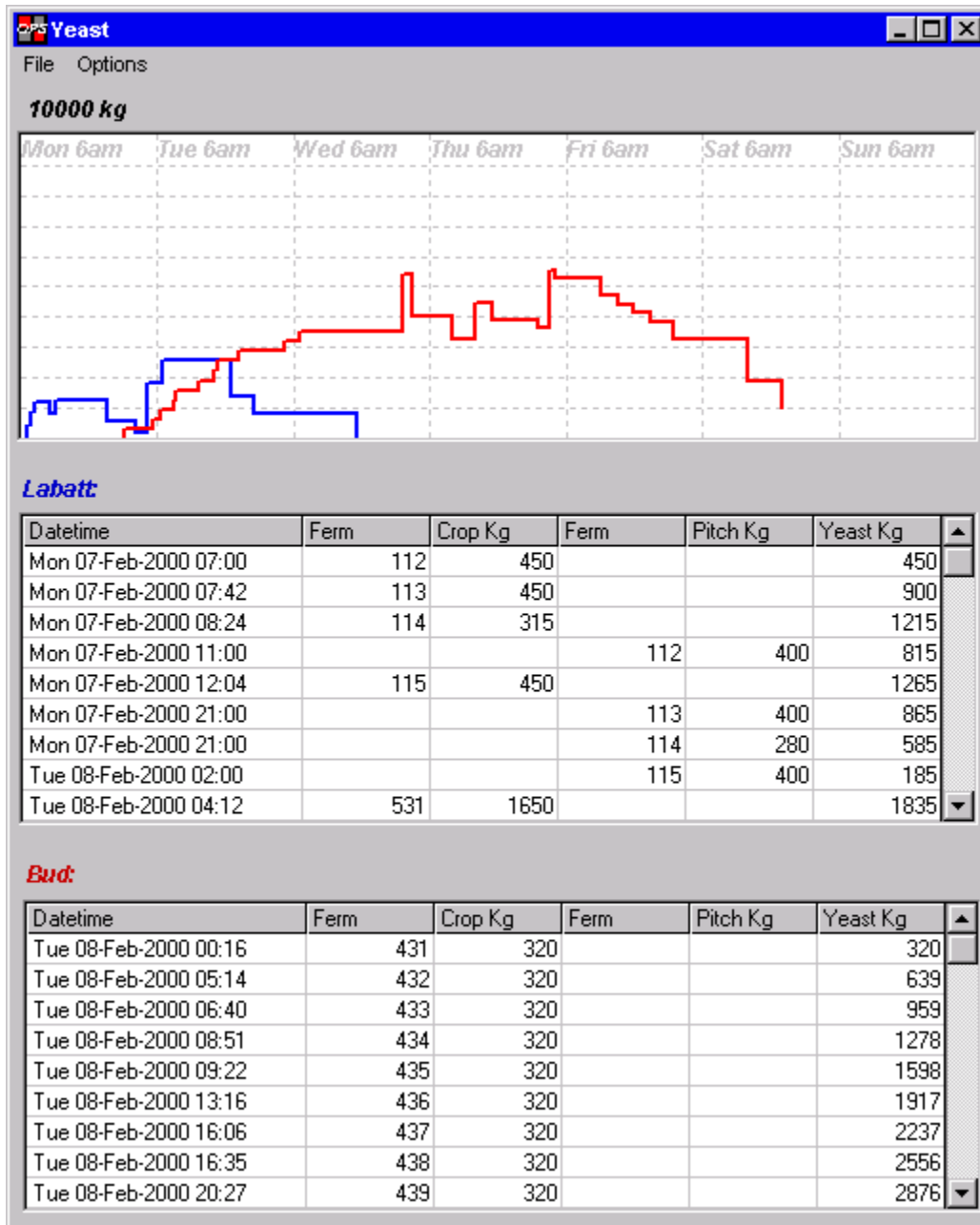
Brewing Schedule							
File Options							
Mon 07-Feb-2000 06:00							
Brand	Start	Time	Finish	Ferm	Volume	Fermenter Fill Finish	Pitch
Labatt 50	Mon 07-Feb-2000 06:00	5.0	Mon 07-Feb-2000 11:00	112	450	Mon 07-Feb-2000 11:40	400
Labatt 50	Mon 07-Feb-2000 11:00	5.0	Mon 07-Feb-2000 16:00	112	500	Mon 07-Feb-2000 16:04	
				113	400	Mon 07-Feb-2000 16:40	
Labatt 50	Mon 07-Feb-2000 16:00	5.0	Mon 07-Feb-2000 21:00	113	500	Mon 07-Feb-2000 21:09	400
				114	350	Mon 07-Feb-2000 21:40	280
CIP	Mon 07-Feb-2000 21:00	1.0	Mon 07-Feb-2000 22:00				
Labatt Blue	Mon 07-Feb-2000 22:00	4.0	Tue 08-Feb-2000 02:00	115	450	Tue 08-Feb-2000 02:40	400
Labatt Blue	Tue 08-Feb-2000 02:00	4.0	Tue 08-Feb-2000 06:00	115	500	Tue 08-Feb-2000 06:04	
				531	400	Tue 08-Feb-2000 06:40	
Labatt Blue	Tue 08-Feb-2000 06:00	4.0	Tue 08-Feb-2000 10:00	531	850	Tue 08-Feb-2000 10:40	
Labatt Blue	Tue 08-Feb-2000 10:00	4.0	Tue 08-Feb-2000 14:00	531	1300	Tue 08-Feb-2000 14:40	
CIP	Tue 08-Feb-2000 14:00	1.0	Tue 08-Feb-2000 15:00				
Labatt Blue	Tue 08-Feb-2000 15:00	4.0	Tue 08-Feb-2000 19:00	531	1500	Tue 08-Feb-2000 21:12	1200
				532	250	Tue 08-Feb-2000 21:34	
Labatt Blue	Tue 08-Feb-2000 19:00	4.0	Tue 08-Feb-2000 23:00	532	700	Tue 08-Feb-2000 23:40	560
CIP	Tue 08-Feb-2000 23:00	1.0	Wed 09-Feb-2000 00:00				
John Labatt Classic	Wed 09-Feb-2000 00:00	4.0	Wed 09-Feb-2000 04:00	533	450	Wed 09-Feb-2000 04:40	
CIP	Wed 09-Feb-2000 04:00	1.0	Wed 09-Feb-2000 05:00				
Kraeusen	Wed 09-Feb-2000 05:00	3.0	Wed 09-Feb-2000 08:00	111	450	Wed 09-Feb-2000 08:40	
CIP	Wed 09-Feb-2000 08:00	1.0	Wed 09-Feb-2000 09:00				
John Labatt Classic	Wed 09-Feb-2000 09:00	4.0	Wed 09-Feb-2000 13:00	533	900	Wed 09-Feb-2000 14:19	
John Labatt Classic	Wed 09-Feb-2000 13:00	4.0	Wed 09-Feb-2000 17:00	533	1350	Wed 09-Feb-2000 17:40	1080
CIP	Wed 09-Feb-2000 17:00	1.0	Wed 09-Feb-2000 18:00				
Bud Light	Wed 09-Feb-2000 18:00	3.0	Wed 09-Feb-2000 21:00	731	450	Wed 09-Feb-2000 21:40	
Bud Light	Wed 09-Feb-2000 21:00	3.0	Thu 10-Feb-2000 00:00	731	900	Thu 10-Feb-2000 00:40	
Bud Light	Thu 10-Feb-2000 00:00	3.0	Thu 10-Feb-2000 03:00	731	1350	Thu 10-Feb-2000 03:40	1400
Bud Light	Thu 10-Feb-2000 03:00	3.0	Thu 10-Feb-2000 06:00	731	1750	Thu 10-Feb-2000 06:35	
				732	50	Thu 10-Feb-2000 06:40	
CIP	Thu 10-Feb-2000 06:00	1.0	Thu 10-Feb-2000 07:00				
Bud Light	Thu 10-Feb-2000 07:00	3.0	Thu 10-Feb-2000 10:00	732	500	Thu 10-Feb-2000 10:44	760
Bud Light	Thu 10-Feb-2000 10:00	3.0	Thu 10-Feb-2000 13:00	732	950	Thu 10-Feb-2000 13:40	
CIP	Thu 10-Feb-2000 13:00	1.0	Thu 10-Feb-2000 14:00				
Budweiser	Thu 10-Feb-2000 14:00	3.0	Thu 10-Feb-2000 17:00	431	355	Thu 10-Feb-2000 17:31	284
				432	95	Thu 10-Feb-2000 17:40	284
CIP	Thu 10-Feb-2000 17:00	1.0	Thu 10-Feb-2000 18:00				
Kraeusen	Thu 10-Feb-2000 18:00	3.0	Thu 10-Feb-2000 21:00	111	450	Thu 10-Feb-2000 21:40	
CIP	Thu 10-Feb-2000 21:00	1.0	Thu 10-Feb-2000 22:00				
Budweiser	Thu 10-Feb-2000 22:00	3.0	Fri 11-Feb-2000 01:00	432	355	Fri 11-Feb-2000 01:31	
				433	190	Fri 11-Feb-2000 01:48	284
Budweiser	Fri 11-Feb-2000 01:00	3.0	Fri 11-Feb-2000 04:00	433	355	Fri 11-Feb-2000 04:15	

## Yeast

The OPS application determines the yeast inventory for the week based on the pitching requirements and the cropping capacity of the fermenters.

Multiple yeast inventories are possible. An iterative calculation is performed. This calculation is the most complex and critical in the OPS production scheduling algorithm.

A trend-forecast of the weekly yeast inventory is shown below for two yeasts.



# Performance

The OPS monitors and displays key performance indicators for the brewery operation.

Week Of:	Production (HI) 0 - 30000	Bud (HI) 0 - 30000	Labatts (HI) 0 - 30000	Shrink (HI) 0 - 3000	Labour-Reg (\$) 0 - 100000	Labour-OT (\$) 0 - 100000	\$/HI (\$/HI) 0 - 3.00
Mon 01-Jan-2001 06:00	20330	13225	7105	1118	39000	5232	2.18
Mon 08-Jan-2001 06:00	20557	13376	7182	1048	39000	4797	2.13
Mon 15-Jan-2001 06:00	19149	13320	5829	1070	39000	2888	2.19
Mon 22-Jan-2001 06:00	19592	13346	6246	1030	39000	4808	2.24
Mon 29-Jan-2001 06:00	20566	13272	7294	1094	39000	4047	2.09
Mon 05-Feb-2001 06:00	19157	12912	6245	1017	39000	2260	2.15
Mon 12-Feb-2001 06:00	19615	13148	6467	1027	39000	4951	2.24
Mon 19-Feb-2001 06:00	19059	12608	6451	1069	39000	2943	2.20
Mon 26-Feb-2001 06:00	19759	13087	6672	1068	39000	4578	2.21
Mon 05-Mar-2001 06:00	20000	12990	7010	1079	39000	2628	2.08
Mon 12-Mar-2001 06:00	20780	13138	7642	1216	39000	3556	2.05
Mon 19-Mar-2001 06:00	20214	12654	7560	1136	39000	5483	2.20
Mon 26-Mar-2001 06:00	19425	13251	6175	1099	39000	5017	2.27
Mon 02-Apr-2001 06:00	20273	12823	7449	1133	39000	4247	2.13
Mon 09-Apr-2001 06:00	18896	12987	5909	947	39000	4878	2.32
Mon 16-Apr-2001 06:00	20645	13237	7408	1137	39000	2835	2.03
Mon 23-Apr-2001 06:00	20449	12995	7454	1094	39000	2378	2.02
Mon 30-Apr-2001 06:00	20775	12691	8084	1051	39000	3035	2.02
Mon 07-May-2001 06:00	18820	12712	6108	985	39000	2182	2.19
Mon 14-May-2001 06:00	18960	13135	5825	1065	39000	3144	2.22
Mon 21-May-2001 06:00	20479	12631	7848	1065	39000	4539	2.13
Mon 28-May-2001 06:00	20349	12936	7412	1143	39000	2460	2.04
Mon 04-Jun-2001 06:00	18896	12906	5990	1007	39000	3008	2.22
Mon 11-Jun-2001 06:00	18860	12810	6050	986	39000	2734	2.21
Mon 18-Jun-2001 06:00	19267	13266	6001	1021	39000	3324	2.20
Mon 25-Jun-2001 06:00	19163	12901	6261	1114	39000	3533	2.22
Mon 02-Jul-2001 06:00	28406	17671	10735	1551	54000	6498	2.13
Mon 09-Jul-2001 06:00	28594	18047	10546	1684	54000	7999	2.17
Mon 16-Jul-2001 06:00	28817	18040	10777	1669	54000	2737	1.97
Mon 23-Jul-2001 06:00	29303	18182	11121	1527	54000	6146	2.05
Mon 30-Jul-2001 06:00	27707	17674	10033	1539	54000	5287	2.14
Mon 06-Aug-2001 06:00	27633	18148	9484	1609	54000	7721	2.23
Mon 13-Aug-2001 06:00	28155	18193	9962	1572	54000	3171	2.03
Mon 20-Aug-2001 06:00	27643	18298	9345	1607	54000	7366	2.22
Mon 27-Aug-2001 06:00	28103	17902	10201	1559	54000	6742	2.16
Mon 03-Sep-2001 06:00	28517	17982	10536	1510	54000	8078	2.18
Mon 10-Sep-2001 06:00	20344	13188	7156	1109	39000	4006	2.11
Mon 17-Sep-2001 06:00	20350	13148	7202	1179	39000	4679	2.15
Mon 24-Sep-2001 06:00	19310	12848	6462	1010	39000	4303	2.24
Mon 01-Oct-2001 06:00	20452	12605	7847	1097	39000	5621	2.18
Mon 08-Oct-2001 06:00	19401	12663	6738	1147	39000	4136	2.22
Mon 15-Oct-2001 06:00	19254	13358	5894	1074	39000	4774	2.27
Mon 22-Oct-2001 06:00	20575	12617	7958	1112	39000	3110	2.05
Mon 29-Oct-2001 06:00	19735	12751	6984	1104	39000	2654	2.11
Mon 05-Nov-2001 06:00	20407	13225	7182	1211	39000	4674	2.14
Mon 12-Nov-2001 06:00	20271	12993	7279	1053	39000	4265	2.13
Mon 19-Nov-2001 06:00	19194	12837	6356	1070	39000	4560	2.27
Mon 26-Nov-2001 06:00	20558	13321	7237	1120	39000	4955	2.14
Mon 03-Dec-2001 06:00	19402	12668	6734	1093	39000	2346	2.13
Mon 10-Dec-2001 06:00	27821	17887	9935	1422	54000	7897	2.22
Mon 17-Dec-2001 06:00	28493	17922	10571	1698	54000	4666	2.06
Mon 24-Dec-2001 06:00	28785	18107	10678	1654	54000	6243	2.09

# Manufacturing Operations Model

The OPS application determines the production schedule based the future brand orders and a manufacturing operations model for the brewery operation. The manufacturing operations model is configured for each site. The parameters for the model are static and dynamic. The dynamic parameters are updated using a realtime interface to the site's DCS and/or PLC.

The parameters for the manufacturing operations model are shown below. The dynamic parameters are highlighted in yellow.

Brands:							
Brand	Barley (kg/l)	Wheat (kg/l)	Hops (kg/l)	Yeast (kg/l)	Com (kg/l)	Rice (kg/l)	Syrup (kg/l)
Labatt Blue	0.100	0.000	0.050	0.000	0.000	0.040	0.050
Labatt Lite	0.100	0.000	0.050	0.000	0.000	0.040	0.050
John Labatt Classic	0.100	0.000	0.050	0.000	0.000	0.040	0.050
Labatt 50	0.100	0.000	0.050	0.000	0.000	0.040	0.050
Budweiser	0.100	0.000	0.050	1.000	0.000	0.040	0.050
Bud Light	0.100	0.000	0.050	1.000	0.000	0.040	0.050
Labatt Genuine Draft	0.100	0.000	0.050	0.000	0.000	0.040	0.050
Wildcat	0.000	0.100	0.050	0.000	0.030	0.000	0.050
Wildcat Strong	0.000	0.100	0.050	0.000	0.030	0.000	0.050

Production:												
Brand	Brewing Cycle (h)	Pitching Rate (kg/H)	Pitch Mode	Minimum Pitch Volume	Fermenting Time (h)	Fermenting Cooldown (h)	Pumpdown Rate (H/H)	Kraeusen (%)	Aging Time (h)	Secondary Aging Time (h)	Filtering Rate(H/H)	Aged/F Alcc
Labatt Blue	4.00	0.80	0	100	128.0	24.0	600	0.00	336	0	200	
Labatt Lite	4.00	0.80	0	100	128.0	24.0	600	0.00	168	0	200	
John Labatt Classic	4.00	0.80	0	100	128.0	24.0	600	0.10	336	336	200	
Labatt 50	5.00	0.80	0	100	128.0	24.0	600	0.00	168	0	200	
Budweiser	3.00	0.80	1	100	102.0	24.0	600	0.10	504	0	200	
Bud Light	3.00	0.80	1	100	102.0	24.0	600	0.10	504	0	200	
Labatt Genuine Draft	4.00	0.80	0	100	128.0	24.0	600	0.00	168	0	200	
Wildcat	4.00	0.80	0	100	128.0	24.0	600	0.00	168	0	200	
Wildcat Strong	4.00	0.80	0	100	128.0	24.0	600	0.00	168	0	200	

Fermenters:					Aging Tanks:				Bright Beer Tanks:			
Name	Size (H)	Loss (H)	Cropping Volume (H)	Cropping Time (h)	Cropping Rate (kg/H)	Name	Size (H)	Loss (H)	CIP hours (h)	Name	Size (H)	CIP hours (h)
111	500	30	50.0	1.0	0.9	211	525	30	2.00	59	1500	2.00
112	500	30	50.0	1.0	0.9	212	525	30	2.00	60	1500	2.00
113	500	30	50.0	1.0	0.9	213	525	30	2.00	61	1500	2.00
114	500	30	50.0	1.0	0.9	214	525	30	2.00	64	1500	2.00
115	500	30	50.0	1.0	0.9	215	525	30	2.00	65	1500	2.00
431	355	30	35.0	0.8	0.9	216	525	30	2.00	66	1500	2.00
432	355	30	35.0	0.8	0.9	217	525	30	2.00	331	620	2.00
433	355	30	35.0	0.8	0.9	218	525	30	2.00	332	620	2.00
434	355	30	35.0	0.8	0.9	221	525	30	2.00	333	620	2.00

Materials:					Generat		
Name	Storage Size (kg)	Order Time (d)	Order Size (kg)	Shelf Life (d)	Description	Units	Value
Barley	1000	14	1000	28	Milling Time	h	0.5
Wheat	1000	14	1000	28	Mashing Time	h	1
Hops	1000	14	1000	28	Lauter Tun Time	h	0.5
					Brewing Volume	HI	500
					Brewing Shrinkage	HI	50

Most of the dynamic parameters require further analysis before they are used for production scheduling purposes. The parameters for the manufacturing operations model are related to brands and tanks.



## ***Manufacturing Operations Model - Dynamic parameters***

The dynamic parameters for the manufacturing operations model include,

- Brewing Cycle Time for the Brand
- Brewing Volume Loss
- Brewing CIP Time
  
- Pitching Rate for the Brand
- Yeast Age
- Fermenting Time for the Brand
- Cooldown Time for the Brand
- Fermenter Cropping Volume
- Fermenter Cropping Time
- Fermenter Cropping Rate
- Fermenter Pumpdown Rate
- Fermenter Volume Loss
- Fermenter CIP Time
  
- Kraeusen Requirements for the Brand
- Aging Time for the Brand
- Aging Tank % Alcohol for the Brand
- Aging Tank Volume Loss
- Aging Tank CIP Time
  
- Filtering Rate for the Brand
- Filter Cleaning Volume for the Brand
- Filtering CIP Time
  
- Bright Beer Tank Volume Loss
- Bright Beer Tank CIP Time
  
- Bottling Rate for the Brand
- Bottling Setup Time for the Brand
- Canning Rate for the Brand
- Canning Setup Time for the Brand
- Kegging Rate for the Brand
- Kegging Setup Time for the Brand

## Brewing Volume Loss

Microsoft Excel - Optimal Production Scheduling (OPS) for Brewery Operations

File Edit View Insert Format Tools Data Window Help

C33 =

	A	B	C	D	E	F
1	<i>Datetime</i>	<i>Brand</i>	<i>Brew Volume</i>	<i>Fermenter</i>	<i>Fermenter Volume</i>	<i>Shrinkage</i>
2	1/2/01 11:56	Labatt Blue	500	531	464	45
3	1/3/01 2:56	Labatt Blue	500	531	929	36
4	1/3/01 5:56	Labatt Blue	500	531	1379	49
5	1/3/01 9:53	Labatt Blue	500	532	455	45
6	1/3/01 12:53	Labatt Blue	500	532	917	38
7	1/3/01 15:53	Labatt Blue	500	532	1382	35
8	1/3/01 22:14	Bud Light	500	731	463	37
9	1/4/01 1:14	Bud Light	500	731	918	46
10	1/4/01 3:48	Bud Light	500	731	1379	39
11	1/4/01 6:17	John Labatt Classic	500	111	468	32
12	1/4/01 9:17	John Labatt Classic	500	112	457	43
13	1/4/01 10:50	Budweiser	500	711	462	38
14	1/4/01 13:50	Budweiser	500	711	928	34
15	1/4/01 16:50	Budweiser	500	711	1381	47
16	1/4/01 18:23	Budweiser	500	712	458	42
17	1/4/01 21:23	Budweiser	500	712	910	48
18	1/5/01 0:23	Budweiser	500	712	1370	40
19	1/5/01 3:35	Budweiser	500	721	460	40
20	1/5/01 6:35	Budweiser	500	721	914	47
21	1/5/01 9:35	Budweiser	500	721	1380	33
22	1/5/01 13:42	Budweiser	500	722	465	35
23	1/5/01 16:42	Budweiser	500	722	920	45
24	1/5/01 19:42	Budweiser	500	722	1370	50
25						
26					<b>Average:</b>	<b>41</b>

Allocation Metadata Maximum Metadata Shrinkage Analysis

Ready

# Realtime Interface

The realtime interface acquires data from the DCS and/or PLC at the site. This data includes the time that certain events occur. This data is used to determine if the OPS application needs to re-schedule production.

Realtime Interface
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File

**Fermenters:**

Name	Brand	Volume	Start Datetime	Cooldown Start Datetime	Cropping Start Datetime	Pumpdown Start Volume	Pumpdown Start Datetime	Pumpdown Finish Volume
111	John Labatt Classic	450	Wed 02-Feb-2000 10:40			0		0
112	John Labatt Classic	400	Wed 02-Feb-2000 14:40			0		0
113								
114	Labatt Lite	450	Mon 31-Jan-2000 10:40			0		0
115	Labatt Lite	400	Mon 31-Jan-2000 14:40			0		0

**Agging Tanks:**

Name	Brand	Initial Filled Volume	Initial Filled Start Datetime	Final Filled Volume	Final Filled Start Datetime	Pumpdown Start Datetime	Pumpdown Finish Volume	Pumpdown Finish Datetime
211								
212								
213	Budweiser	210.5	Fri 28-Jan-2000 02:29	0			0	
214								
215								

**Bright Beer Tanks:**

Name	Brand	Volume	CIP Start Datetime	CIP Finish Datetime
59	Labatt Blue	0		0
60	Labatt Blue	0		0
61	Labatt Blue	0		0
64	Labatt Blue	0		0

**Materials:**

Name	Usage	Kg
Barley	0	0
Wheat	0	0
Hops	0	0
Yeast	0	0

**Yeast Tanks:**

Name	Kg	Age (h)
Bud Yeast	0	0
Labatt Yeast	0	0

**Others:**

Description	Units	Value
Brewing Brand		0
Brewing Start Datetime	dt	0
Brewing Finish Datetime	dt	0
Brewing - Fermenter		0
Brewing CIP Start Datetime	dt	0
Brewing CIP Finish Datetime	dt	0
Pumpdown Flow Rate	HL/h	0
Pumpdown Fermenter		0
Pumpdown Aging Tank		0
Pumpdown CIP Start Datetime	dt	0
Pumpdown CIP Finish Datetime	dt	0

## Reports - Excel

The OPS application can use Microsoft Excel, and/or Text files, and/or any ODBC compliant data base to management the data for the applications. Reports can be easily written which are based on these data sources.

	A	B	C	D	E	F	G	H	I	J
1		<b>Aging Tank</b>	<b>Size</b>		<b>Budweiser</b>	<b>Bud Light</b>	<b>Budweiser</b>	<b>Bud Light</b>	<b>Budweiser</b>	<b>Bud Light</b>
2					<b>week 1</b>	<b>week 1</b>	<b>week 2</b>	<b>week 2</b>	<b>week 3</b>	<b>week 3</b>
3	0	"211"	525		525					
4	1	"212"	525		525					
5	2	"213"	525		525					
6	3	"214"	525			525				
7	4	"215"	525			525				
8	5	"216"	525				525			
9	6	"217"	525				525			
10	7	"218"	525				525			
11	8	"221"	525					525		
12	9	"222"	525					525		
13	10	"224"	525						525	
14	11	"225"	525						525	
15	12	"227"	525							525
16	13	"228"	525							525
17	14	"411"	620		620					
18	15	"412"	620		620					
19	16	"413"	620			620				
20	17	"414"	620				620			
21	18	"415"	620				620			
22	19	"416"	1250		1250					
23	20	"417"	1250				1250			
24	21	"421"	620					620		
25	22	"422"	620							620
26	23	"423"	620						620	
27	24	"424"	620						620	
28	25	"425"	620						620	
29	26	"426"	1250						1250	
30	27	"427"	1250						1250	
31	28	"511"	1400			1400				
32	29	"512"	1400			1400				
33	30	"513"	1400					1400		
34	31	"521"	1400					1400		
35	32	"522"	1400							1400
36	33	"523"	1400							1400
37	47	"631"	1520		1520					
38	48	"632"	1520		1520					
39	49	"633"	1520		1520					
40	50	"634"	1520				1520			
41	51	"635"	1520				1520			
42	52	"636"	1520				1520			
43	53	"637"	1520						1520	
44	54	"638"	1520						1520	
45										
46			39110		8625	4470	8625	4470	8450	4470
47		aging weeks			3	3	3	3	3	3