Contents

Bottles – 45,000 p/hr
Cans – 90,000 p/hr
kegs – 600 pr/hr

1 Purpose

The purpose of this document is to define the line philosophy and running conditions for can line CL1 – AA100 at the West End brewery in Therbaton.

2 Definitions

Term / Acronym	Definition
CPH	Cans per hour
CPM	Cans per minute
MER	Mean Effective Rate
PPM	Packs per minute
PPH	Pallets per hour
SP	Secondary Packer
TP	Tertiary Packer

3 Scope

The scope of this document is to provide:

1. A process overview and operational overview of the line including process map, line layout, functional description, equipment specifications and manning.
2. A description of full line capability
3. The current running state including V-curve, machine settings and accumulation vs theoretical targets.

4 Roles & Responsibilities

RASCI	Document Format	Document Ownership & Update
Responsible	Packaging Technical & Performance Team	Line Engineers
Approve	Packaging Technical & Performance Director	Packaging Managers
Support	Line Engineers	Packaging Technical & Performance Team
Consult	Packaging Managers	Packaging Technical & Performance Director
Inform	Brewery Directors	Brewery Directors

5 Line Overview

CL1 – AA100 is a single asset can line, with all assets separate from any other lines.

5.1 Product / Pack Types and Routing – Full Line Capability

The following table is intended to capture the full capability of the line regardless of the availability of change parts or whether the format has been previously run.

Refer to Lion's Packaging Raw Materials – Aluminium Cans And Ends (LION-0527) for can body and can end specifications and drawings.

Can Body Capability										
Spec.	Volume (mL)	Can Body Dia. (mm)	Height (mm)	Depal	Fill.	Past.	RW	Cluster Packer	Carton Packer	Pall.
BC-C-330 202/211	330	66.5	115.2	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BC-C-355 202/211	355	66.5	122.22	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BC-C-375 202/211	375	66.5	129.5	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BC-C-440 202/211	440	66.5	149.9	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Can End Capability			
Spec.	Description	Outer (Curl) Diameter (mm)	Line Capability
BC-E-CDL-MSC	202 CDL Large Opening End – MSC	59.33	Yes

Secondary Packaging Capability			
Spec.	Configuration	Can Volume Range (mL)	Line Capability
Cluster	2x3, 2x2	330, 355, 375	Yes
Riverwood	2x5	330, 355, 375	Yes
Loose		330, 355, 375	Yes
Hi-cone	2x3	330, 355, 375	Yes
Shrink			No
Basket			No

Tertiary Packaging Capability			
Spec.	Configuration	Can Volume Range (mL)	Line Capability
Carton (Kister)	4xCP6, 6xCP4, 3xRW10	330, 355, 375	Yes
Carton (Riverwood)	2xLS12, 2xLS15, 2xLS18	330, 355, 375	Yes

5.2 Pack Types and Routing – Current Running State

The following table is intended to capture the capability of the line as per its current running state.

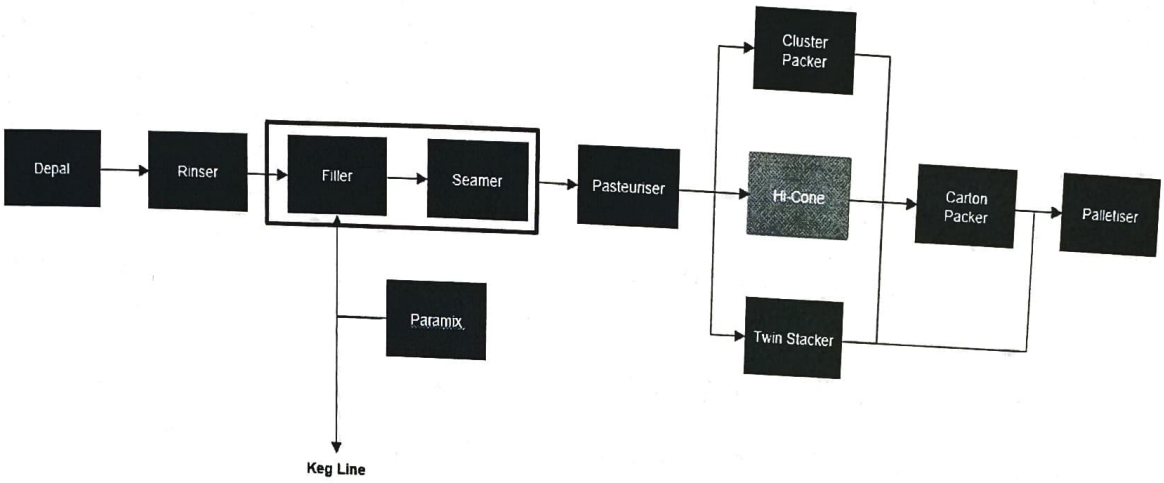
Route	Primary Format (ml)	Can Body Dia. (mm)	Height (mm)	Can End Spec.	Secondary Format	Tertiary Format	Rated capacity (cph)
330ml - C30 (3xRW10)	330	66.5	115.2	202	RW10	C30 (3xRW10)	84,000
330ml - C24 (6xCP4)	330	66.5	115.2	202	CP4	C24 (6xCP4)	60,000
330ml - C24 (4xCP6)	330	66.5	115.2	202	CP6	C24 (4xCP6)	60,000
355ml - C24 (4xCP6)	355	66.5	122.2	202	CP6	C24 (4xCP6)	66,000
375ml - C24 (6xCP4)	375	66.5	129.5	202	CP4	C24 (6xCP4)	60,000
375ml - C24 (4xCP6)	375	66.5	129.5	202	CP6	C24 (4xCP6)	66,000
375ml - C24 (RW2x12)	375	66.5	129.5	202	LS	C24 (RW2x12)	90,000
375ml - C30 (RW2x15)	375	66.5	129.5	202	LS	C30 (RW2x15)	90,000

5.3 Crew

Tertiary Format	Depal/ Palletiser	Rinser	Filler	Past.	Cluster	Riverwood	Kister	Relief
330ml - C30 (3xRW10)								

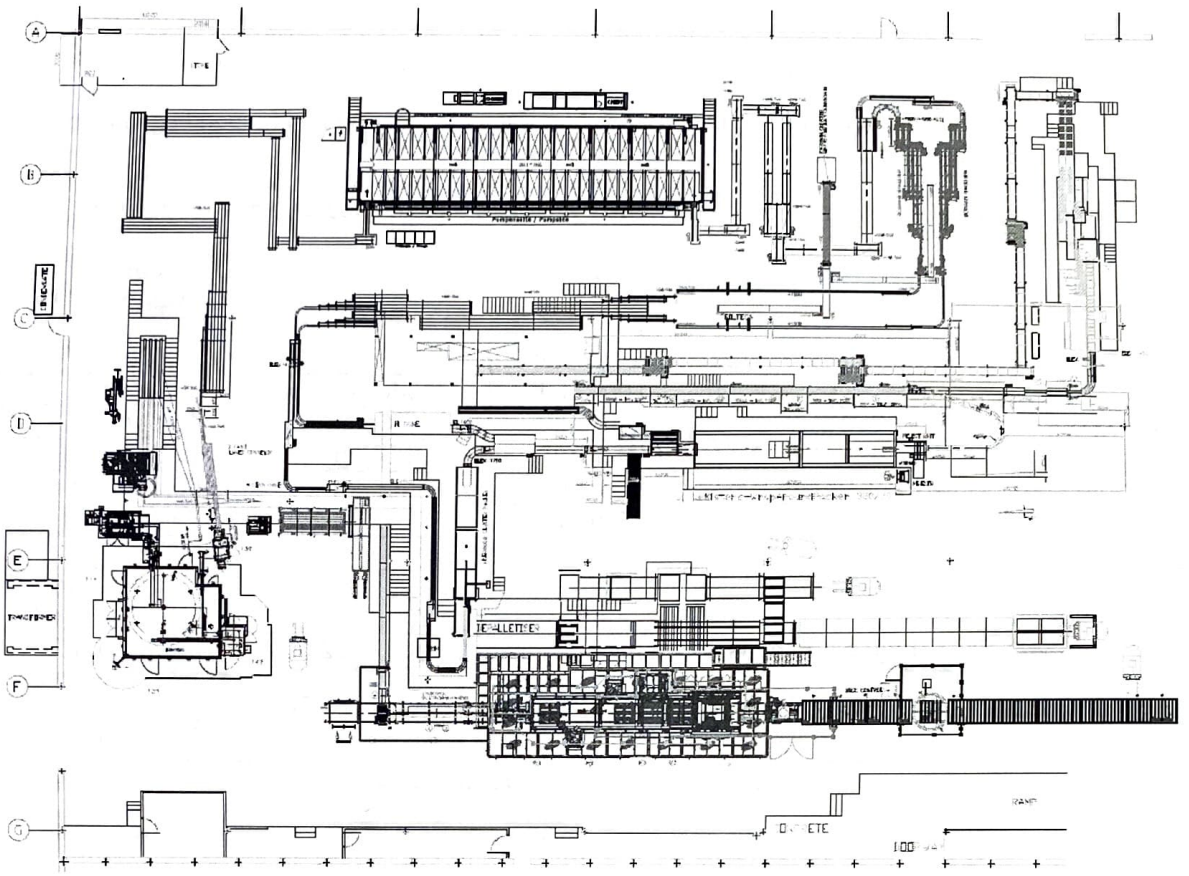
330ml - C24 (6xCP4)								
330ml - C24 (4xCP6)								
355ml - C24 (4xCP6)								
375ml - C24 (6xCP4)								
375ml - C24 (4xCP6)								
375ml - C24 (RW2x12)								
375ml - C30 (RW2x15)								

5.4 Process Map



West End Packaging Line PFD.ppt

5.5 Plan View of Line



6 Machine Specification

6.1 Machine Specifications

Machine	No.	Supplier	Model	Serial	Year	Manual Location	OEM Rated Speed
Depalletiser	1	Foodmach	N/A	1930	2018	Main Workshop	14pallets/hr
Paramix	1	KHS	CMX DOX 35/T25-3	30 3384	2002	Main Workshop	-
Rinser	1	Continental	N/A	N/A	1989	Main Workshop	-
Filler	1	Krones	K 229 172	N/A	2013	Main Workshop	90,000 cph
Seamer	1	Ferrum	F812-2	C10-817600	2013	Main Workshop	90,000 cph
Pasteuriser	1	Krones	K 574 429	N/A	2013	Main Workshop	90,000 cph
Hi-Cone	1	Hi-Cone	293 Series	IN 867	N/A	Main Workshop	185 ppm
Cluster Packer	1	Riverwood	M 1600	MM 1609	N/A	Main Workshop	230 ppm
Carton Packer	1	Kister	300/70	95-1813	1995	Main Workshop	54 ppm
Twinstack	1	Riverwood	TS-1013	N/A	2003	Main Workshop	65 ppm
Palletiser	1	Foodmach	High Level Robomatrix	9952	2016	Main Workshop	30 pallets/hr

6.2 Throughput Settings

The following table specifies the throughput set point for each machine and corresponding settings for minimum speed, nominal speed and overspeed.

Where throughput settings change based on format, a separate table should be provided below.

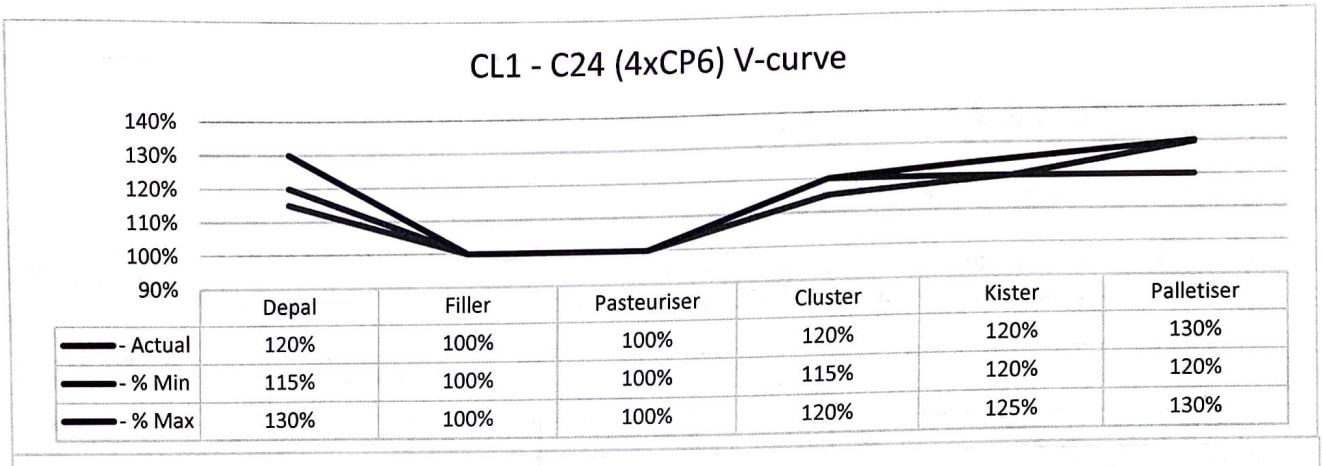
Machine	Machine Settings			Actual Setting	Deviation Reference
	Over Speed	Nominal Speed	Minimum Speed		
Depalletiser	X	106,000 cph	X	106,000cph	
Filler	X	90,000 cph	18,000cph	90,000cph	1
Cluster Packer	220 ppm	200 ppm	170ppm	200 ppm	2
Riverwood	65 ppm	60 ppm	50ppm	60 ppm	
Carton Packer	54ppm	50ppm	46ppm	50ppm	
Palletiser	X	65 ppm	X	70ppm	

Deviation Reference	Reason for Deviation	Date Comment Made
1	For 375mL matte cans, this runs at a nominal speed of 72,000 cph due to COF of cans – improvement underway	15/04/20
2	Cluster packer when running 4 packs runs 15% slower (cph)	01/05/20
3		

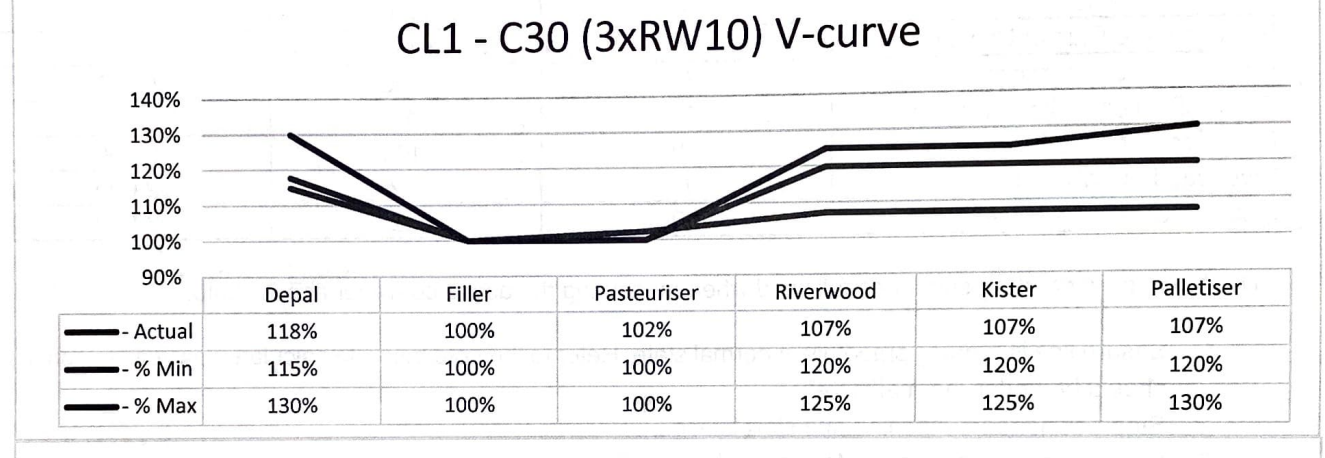
6.3 V-Curve

The chart below shows the theoretical minimum and maximum V-curves for a can line based on Lion's V-Curve and Accumulation Standard (BSW-1528). The general philosophy to follow is the filler and pasteuriser should be at the bottom of the V-Curve and the upstream and downstream machines should operate at higher speeds to

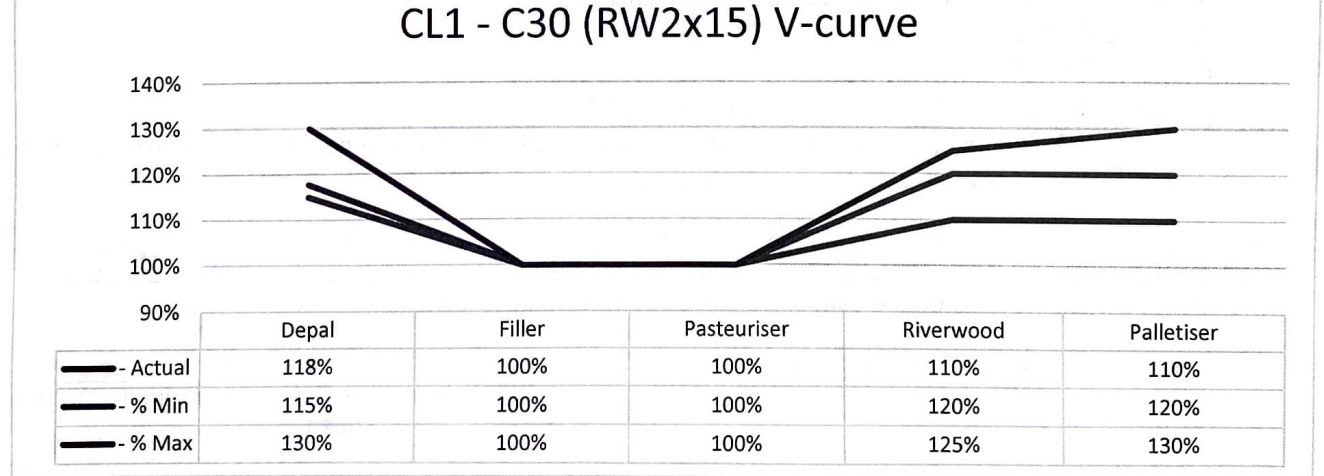
prevent starvation of the filler and pasteuriser. This theoretical V-curve is compared against the actual V-curve of the line below.



	Depal	Filler	Pasteuriser	Cluster	Kister	Palletiser
- Actual	120%	100%	100%	120%	120%	130%
- % Min	115%	100%	100%	115%	120%	120%
- % Max	130%	100%	100%	120%	125%	130%



	Depal	Filler	Pasteuriser	Riverwood	Kister	Palletiser
- Actual	118%	100%	102%	107%	107%	107%
- % Min	115%	100%	100%	120%	120%	120%
- % Max	130%	100%	100%	125%	125%	130%



	Depal	Filler	Pasteuriser	Riverwood	Palletiser
- Actual	118%	100%	100%	110%	110%
- % Min	115%	100%	100%	120%	120%
- % Max	130%	100%	100%	125%	130%

Reasons for the actual V-curve deviating from the theoretical V-curves are outlined below:

Deviation Reference	Reason for Deviation	Date Comment Made
1	On 10 pack Riverwood, the Kister Packer can only run to a maximum of 107% of the filler speed (lower than the 120-125% standard). Machines upstream and downstream are also run on lower overspeeds	09/06/2020

2	On 30 pack Riverwood, the Riverwood Packer can only run to a maximum of 110% of the filler speed (lower than the 120-125% standard).	09/06/2020
3		
4		

7 Buffers & Accumulation

7.1 Target and Actual Accumulation

The table below shows the ideal minimum conveyor accumulation standard for a can line based on Lion's V-Curve and Accumulation Standard (BSW-1528), in comparison the line's actual accumulation time.

Buffer	Target Accumulation Time (secs)	Actual Accumulation Time (secs)	Actual Accumulation Quantity (cans)
Depal to Filler	60	60	6,000
Filler to Pasteuriser	120	120	3,000
Pasteuriser to Cluster Packer	150	200	4,000
Pasteuriser to Riverwood	150	200	5,000
Cluster Packer to Kister Packer	30	12	240
Riverwood to Kister Packer	30	100	2,000
Riverwood to Palletiser	90	92	2,000
Kister Packer to Palletiser	90	92	2,000

The following procedure should be followed when measuring the actual conveyor accumulation:

1. Ensure line is running smoothly in normal state. Refer to the note below to calculate how full the conveyor should be under "normal state".
2. Stop downstream machine and start timing.
3. Wait for upstream machine to stop and stop timing.
4. Record time.
5. Start Downstream machine and start timing.
6. Record time taken for upstream machine to restart.
7. Record time taken for conveyer to return to normal state. Refer to the note below regarding calculating how full the conveyor should be under "normal state".

Note: During "normal state" mentioned above, the conveyors should be run as lean as possible however this will depend on the conveyor speeds. To calculate how full the conveyors should be in "normal state", the number of containers wide on the conveyors can be calculated as follows:

$$\#\ \text{Containers Wide on Conveyor} = \frac{\text{Line Rate}}{\text{Cans per metre x Conveyor maximum running speed}}$$

Where:

- Line Rate = Filler rate (cpm) x overspeed of lead machine (%)
- Cans per metre = 1000 mm ÷ can diameter (mm)
- Conveyor maximum running speed in metres / minute for cans (e.g. 40 m/min)

Reasons for the actual accumulation time deviating from the target accumulation time are outlined below:

Deviation Reference	Reason for Deviation	Date Comment Made
1	Pasteuriser to Cluster and Pasteuriser to Riverwood: conveyor leading to packers requires speed up	09/06/2020
2	Cluster Packer to Kister Packer: short conveyor doesn't allow for higher accumulation	09/06/2020
3	Riverwood to Kister Packer: longer conveyor allows for higher accumulation	09/06/2020
4		
5		

8 Line Functional Description

8.1 Overview

The following sections provide a functional description of the line including:

- Speed controls for each machine including infeeds and outfeeds.
- Unique line conditions e.g. mass flow accumulation tables, can density for vacuum transfers, singuliser rail position widths and speed references, closed coupled secondary & tertiary packers, diverting tables, special spacing required into spiral conveyors.
- Control blocks functional description.

8.2 Functional Description

Upcoming.

9 References

- Packaging Raw Materials – Aluminium Cans and Ends (LION-0527)
- V-Curve and Accumulation Standard (BSW-1528)

End of Document