



THE SCIENCE OF BEER

PACKAGING QUALITY WORKSHOP

Wednesday, June 4, 2014



AGENDA

- TPO (30 min)
 - Charles Benedict - Hach
 - What is it ? ; What are approaches to analyse ? What are challenges to the methods ?
- Glass Quality (45 min)
 - Robert Shanteau - Verallia
 - Glass manufacturing process step by step from the receipt of raw materials through to outbound shipments along with some discussion of the key inspection devices and quality control points as we go through the process
 - Rob Fraser - SNBCO
 - What can breweries do ?
- Brainstorm packaging quality MOA needs (30 min)
 - Rob Fraser/Rebecca Newman/Shawn Theriot



Brewery Glass Quality Program

1. Starts beyond the brewery

Develop a partnership with your supplier

1. Understand each others business and process capabilities
2. Visit each others facilities and meet key stakeholders
3. Develop a glass specification manual together
4. Set up regular partnership meetings with key stakeholders alternating sites
 - Set up action log
 - Bring supporting information
 - » Breakage rates - Filler / Line
 - » Defect log
5. Set up monthly quality conference calls
 - Create an agenda
 - Set up KPI's - inventory, multiple loads



Brewery Glass Quality Program

3. Glass Specification manual includes :

- The general guidelines for glass bottle containers
- A general description of the Glass Manufacturing requirements
- Bottle Composition / Manufacturing Requirements
- Glass bottle and finish drawings outlined
- Bottle and process requirements
- Glass specifications (AQL's) with defined reactions for critical, major, minor defects
- Bottle performance requirements
- Packing, shipping and handling requirements
- Line performance requirements through the Glass Plant and Brewery processes
- Bottle Manufacturing Qualification Criteria
- Non conformances expectations



Brewery Glass Quality Program

AQL'S - Acceptable Quality Limits

Critical = x % - An imperfection that could result in hazardous or unsafe conditions for consumers.

Major -Reaction Level = x % , Quarantine Level = x % - An imperfection that could cause difficulties or interruptions on the filling lines or jeopardize package integrity. Presents a low safety risk to the consumer. Major Defect can become classified as critical if there is high potential for consumer injury due to the type and location of defects.

Minor -Reaction Level = x % - An imperfection that is primarily cosmetic or aesthetic in nature. Since Minor Defects are not function defects, it is more subjective in regards to reaction. Minor Defects are purely aesthetic defects therefore reaction decision will be based on severity and frequency on an individual basis. Does not contribute to product or package integrity issues.

Reaction Level - Glass supplier will be notified if and when the reaction level is reached. Glass Supplier will investigate and help to determine corrective action. Glass Supplier will review production records and react appropriately to reduce the frequency of the defect.

Quarantine Level - Glass supplier will be notified when the quarantine level is reached. Based on the severity of the defect, determination will be made to isolate and quarantine empty ware and/or finished goods. Glass supplier will investigate and help to determine corrective action. Glass supplier will review production records and react appropriately to reduce the frequency of the defect



Brewery Glass Quality Program

Bottle Performance Requirements

- Based on current process capability of respective glass plants and brewery needs and expectations
 - Should include fill pt , filler, crowner and line breakage reaction and quarantine levels



Brewery Glass Quality Program

- Clearly define definitions of critical, major and minor defects
- Clearly outline corrective actions with roles and responsibilities



Area

Brand

Type

Start Date

End Date

<Select One>

<None>

Fill Line 1 120z Btl Cond - Size 12



9/11/2013 2:29 PM

3/27/2014 2:09 PM

Trial Control Limits



UCL

12.06

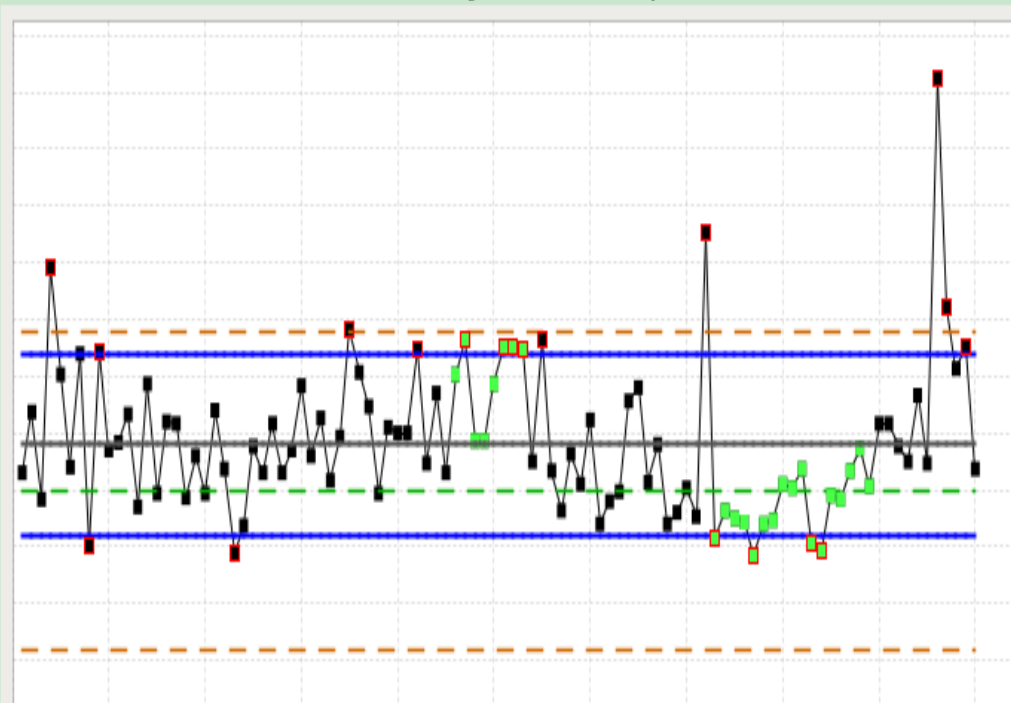
Mean

12.02

LCL

11.98

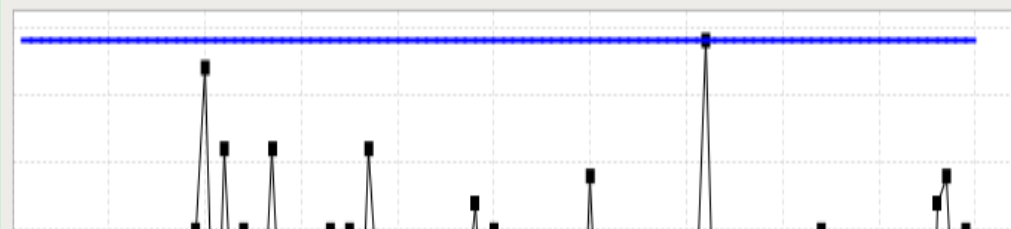
Single click a point on the chart to highlight the corresponding data in the table to the right. Double click a point on the chart to investigate details about the point.



- Outside Control Limits
- Run of 8 or More on One Side of the Mean
- 14 or More Alternating Up and Down
- 6 or More Increasing or Decreasing

UCL

0.27



Double click assignable cause cell to insert/edit information.

Date	Label	Value	Assignabl
01/17/2014 10:23 AM	G-011714X-PAL	11.991	
01/17/2014 01:23 PM	G-011714X-PAL	11.988	
01/20/2014 10:09 AM	G-012014Y-PAL	11.986	
01/22/2014 09:15 AM	G-012214Y-PAL	11.971	
01/22/2014 02:26 PM	G-012214X-PAL	11.985	
01/23/2014 03:02 PM	G-012314V-PAL	11.987	
01/27/2014 01:24 PM	G-012714X-PAL	12.002	
01/28/2014 01:40 PM	G-012814X-PAL	12.001	
01/28/2014 04:32 PM	G-012814X-PAL	12.009	
01/29/2014 11:43 AM	G-012914X-PAL	11.977	
01/31/2014 09:01 AM	G-013114Y-PAL	11.973	
01/31/2014 01:22 PM	G-013114X-PAL	11.998	
02/03/2014 02:18 PM	G-020314X-PAL	11.996	
02/04/2014 02:33 PM	G-020414X-PAL	12.008	
02/05/2014 02:20 PM	G-020514X-PAL	12.018	108mm vent tubes
02/07/2014 11:13 AM	G-020714Y-PAL	12.002	
02/11/2014 03:35 PM	G-021114X-PAL	12.029	
02/17/2014 11:36 AM	G-021714Y-PAL	12.029	
02/17/2014 07:18 PM	G-021714X-PAL	12.019	
02/19/2014 01:35 PM	G-021914Y-PAL	12.012	
02/19/2014 08:14 PM	G-021914X-PAL	12.042	
02/20/2014 09:54 AM	G-022014Z-PAL	12.012	
02/27/2014 01:33 PM	G-022714X-BFA	12.182	109mm vent tubes
03/04/2014 08:20 PM	G-030414Z-PAL	12.081	110mm vent tubes
03/05/2014 05:33 AM	G-030514Z-PAL	12.053	
03/05/2014 05:35 AM	G-030514Z-PAL	12.062	
03/12/2014 12:41 PM	G-031214X-PTR	12.009	108mm vent tubes

USL

12.07

Target

12.00

LSL

11.93

Area Brand Type:

Packaging <None> Fill Line 1 12Oz Btl Cond - Size 12

Previous 30 Points

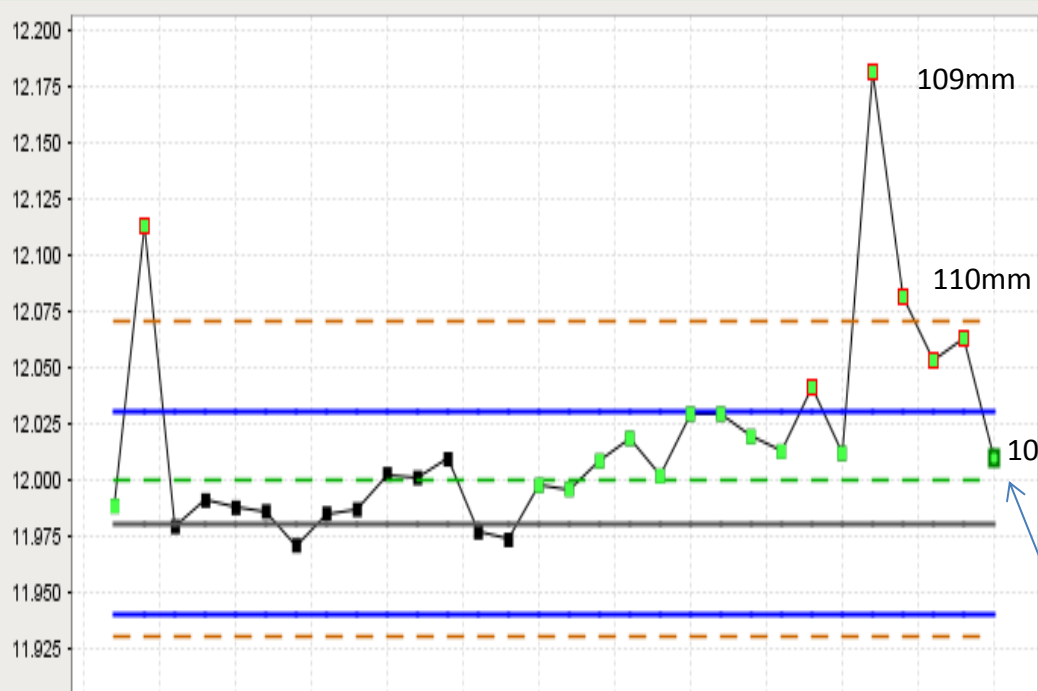
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UCL
12.03

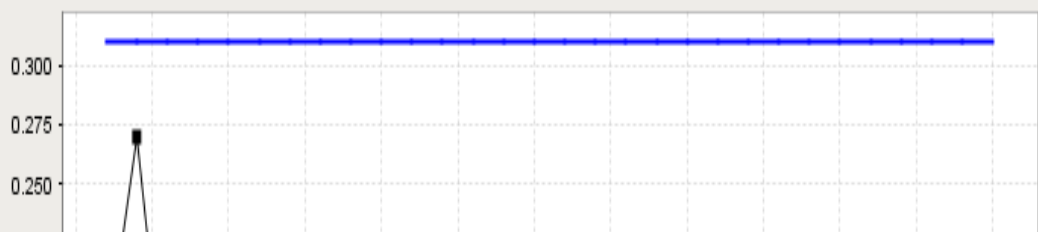
Control Mean
11.98

LCL
11.94



■ Outside Control Limits
 ■ Run of 8 or More on One Side of the Mean
■ 14 or More Alternating Up and Down
 ■ 6 or More Increasing or Decreasing

UCL
0.31



USL
12.07

Target
12.00

LSL
11.93

12oz Avg

24oz Avg

Test Avg
12.02

Date	Label	Value	Assignab
01/17/2014 10:23 AM	G-011714X-PAL	11.991	
01/17/2014 01:23 PM	G-011714X-PAL	11.988	
01/20/2014 10:09 AM	G-012014Y-PAL	11.986	
01/22/2014 09:15 AM	G-012214Y-PAL	11.971	
01/22/2014 02:26 PM	G-012214X-PAL	11.985	
01/23/2014 03:02 PM	G-012314Y-PAL	11.987	
01/27/2014 01:24 PM	G-012714X-PAL	12.002	
01/28/2014 01:40 PM	G-012814X-PAL	12.001	
01/28/2014 04:32 PM	G-012814X-PAL	12.009	
01/29/2014 11:43 AM	G-012914X-PAL	11.977	
01/31/2014 09:01 AM	G-013114Y-PAL	11.973	
01/31/2014 01:22 PM	G-013114X-PAL	11.998	
02/03/2014 02:18 PM	G-020314X-PAL	11.996	
02/04/2014 02:33 PM	G-020414X-PAL	12.008	
02/05/2014 02:20 PM	G-020514X-PAL	12.018	108mm vent tube
02/07/2014 11:13 AM	G-020714Y-PAL	12.002	
02/11/2014 03:35 PM	G-021114X-PAL	12.029	
02/17/2014 11:36 AM	G-021714Y-PAL	12.029	
02/17/2014 07:18 PM	G-021714X-PAL	12.019	
02/19/2014 01:35 PM	G-021914Y-PAL	12.012	
02/19/2014 08:14 PM	G-021914X-PAL	12.042	
02/20/2014 09:54 AM	G-022014Z-PAL	12.012	
02/27/2014 01:33 PM	G-022714X-BFA	12.182	109mm vent tube
03/04/2014 08:20 PM	G-030414Z-PAL	12.081	110mm vent tube
03/05/2014 05:33 AM	G-030514Z-PAL	12.053	
03/05/2014 05:35 AM	G-030514Z-PAL	12.062	
03/12/2014 12:41 PM	G-031214X-PTR	12.009	108mm vent tube

Area

Brand

Type

Start Date

End Date

<Select One>

<None>

Fill Line 1 120z Tank Cond - Size 12

8/27/2013 6:55 AM

3/27/2014 2:09 PM

Trial
Control
Limits

Single click a point on the chart to highlight the corresponding data in the table to the right. Double click a point on the chart to investigate details about the point.

UCL

12.13

Mean

12.09

LCL

12.05



■ Outside Control Limits
 ■ Run of 8 or More on One Side of the Mean
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 ■ 6 or More Increasing or Decreasing

UCL

0.27



Double click assignable cause cell to insert/edit information.

Date	Label	Value	Assignabl
02/14/2014 12:48 PM	G-021414Y-RYE	12.089	
02/14/2014 06:02 PM	G-021414Y-RYE	12.093	
02/18/2014 10:16 AM	G-021814Z-TOR	12.094	
02/18/2014 03:32 PM	G-021814Y-TOR	12.094	
02/20/2014 06:01 PM	G-022014W-BLI	12.083	
02/21/2014 03:13 PM	G-022114W-TOR	12.093	
02/24/2014 03:57 PM	G-022414Z-TOR	12.083	
02/25/2014 10:42 AM	G-022514Z-TOR	12.09	
02/25/2014 07:14 PM	G-022514Y-TOR	12.105	
02/26/2014 04:10 PM	G-022614W-KWS	12.188	C1 glass, still 108
02/27/2014 06:26 PM	G-022714W-TOR	12.158	109mm vent tubes
02/27/2014 08:47 PM	G-022714V-TOR	12.151	
02/28/2014 07:31 AM	G-022814Y-TOR	12.175	
03/06/2014 09:36 AM	G-030614Y-SFB	12.128	
03/10/2014 12:35 PM	G-031014Y-TOR	12.092	110mm vent tubes
03/10/2014 12:50 PM	G-031014Y-TOR	12.123	108mm vent tubes
03/10/2014 12:59 PM	G-031014Y-TOR	12.005	
03/13/2014 06:56 PM	G-031314X-OCB	12.103	
03/13/2014 06:58 PM	G-031314X-OCB	12.068	
03/13/2014 07:47 PM	G-031314X-OCB	12.086	
03/14/2014 12:17 PM	G-031414Y-TOR	12.11	
03/17/2014 10:07 AM	G-031714Z-TOR	12.087	
03/18/2014 06:46 PM	G-031814V-OCB	12.123	
03/19/2014 10:38 AM	G-031914Y-TOR	12.092	
03/20/2014 02:31 PM	G-032014W-SFB	12.101	
03/25/2014 06:50 AM	G-032514Z-TOR	12.093	
03/25/2014 11:56 AM	G-032514Y-TOR	12.11	

USL

12.07

Target

12.00

LSL

11.93

Brewery Glass Quality Program

2. At the brewery

- Incorporate traceability documentation at receipt and storage of bulk glass - Julian date/time check sheet
- Create inventory control mechanisms - WMS

- Breakage
 - Perform glass handling risk assessment
 - Install necessary guarding
 - Install empty glass inspection equipment
 - Omnivision / Hueft
 - » Monitor reject rates per parameter
 - Validates glass suppliers inspection equipment
 - Utilize IT or manual documentation date/time of glass burst
 - Install fragment flush system on filler/crowner
 - Develop monitoring and corrective action SOP's
 - Develop verification and validation SOP's
 - Purchase stereoscope to enable glass breakage analysis
 - Train your employees on glass breakage analysis
 - AGR (American Glass Research institute)



100 Bursts = Reg + LATE BRK

ROUND	1	2	BURST	4	5
1	0	1		2	0
2	0	0	7	0	0
3	0	0	3	0	0
4	0	0	0	0	0

84 Regular Bursts

#Bottles audited= 1596

ROUND	1	2	BURST	4	5
1	0	1		2	0
2	0	0	3	0	0
3	0	0	0	0	0
4	0	0	0	0	0

16 Late Break Bottle Burst

#Bottles audited= 336

ROUND	1	2	BURST	4	5
1	0	0	0	0	0
2	0	0	4	0	0
3	0	0	3	0	0
4	0	0	0	0	0

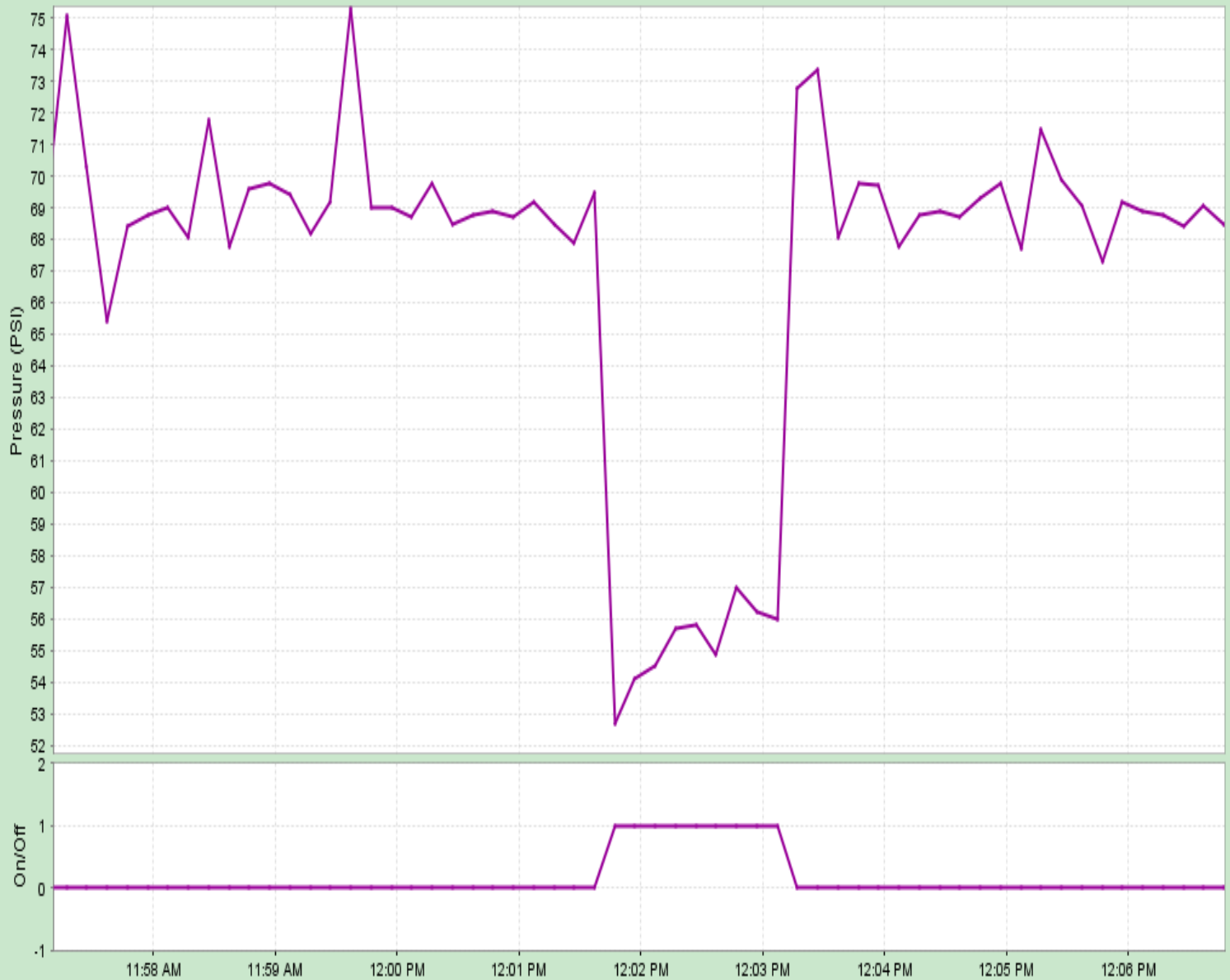
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Line 1 Filler

- Frag Flush (On/Off)
- Frag Flush Pressure

Line 2 Filler

- Frag Flush (On/Off)
- Frag Flush Pressure

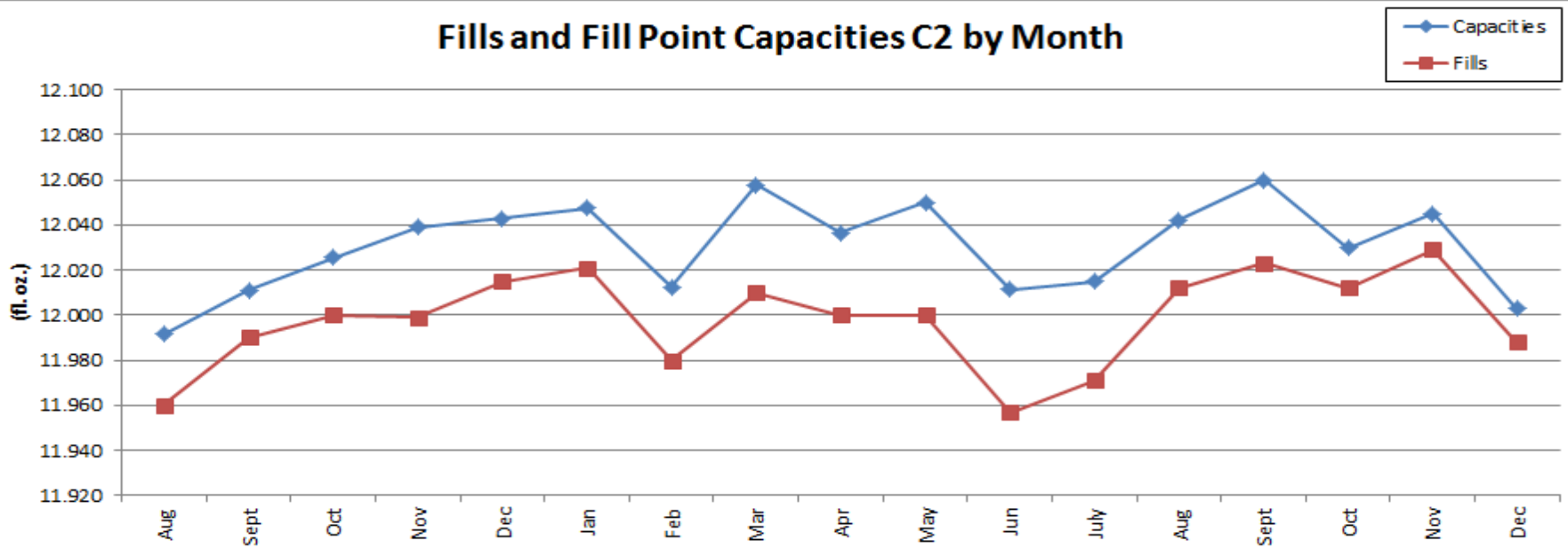


Brewery Glass Quality Program

- Capacities
 - Request monthly bottle capacity report from glass supplier
 - Correlate to fill levels
 - Monitor and change our vent tubes when necessary
 - » Save beer
 - Stock rotation of glass critical



Fills and Fill Point Capacities C2 by Month



Year	OI Production Month	Capacities	Fills	Comments
		Fill Point Capacities (C2) Reported by OI	PAL fills from ware produced in that month	
2012	Aug	11.992	11.960	
2012	Sept	12.011	11.990	
2012	Oct	12.025	12.000	
2012	Nov	12.039	11.999	
2012	Dec	12.043	12.015	
2013	Jan	12.047	12.021	
2013	Feb	12.012	11.980	New molds
2013	Mar	12.058	12.010	Back on High capacity "Windsor" molds
2013	Apr	12.037	12.000	
2013	May	12.050	12.000	
2013	Jun	12.011	11.957	
2013	July	12.015	11.971	
2013	Aug	12.042	12.012	
2013	Sept	12.060	12.023	
2013	Oct	12.030	12.012	109mm vent tubes
2013	Nov	12.045	12.029	109mm vent tubes
2013	Dec	12.003	11.988	109mm vent tubes, transitioning to new molds (LA-5)

MOA

- www.asbcnnet.org/MOA

Packages and Packaging Materials Method

Introduction

[VIEW INTRODUCTION](#)

Bottles

Bottles 1. Dimensions 1999

[VIEW SUMMARY](#) | [VIEW METHOD](#)

- A. Height [Release date 1999]
- B. Outside Diameter [Release date 1999]
- C. Out-of-Perpendicular [Release date 1999]
- D. Identification Marks [Release date 1999]
- E. Glass Distribution [Release date 1999]
- F. Weight 1999 [Release date 1963]
- G. Locking Ring "A" Diameter [Release date 1999]
- H. Reinforcing Ring "B" Diameter [Release date 1999]
- I. Width of Locking Ring [Release date 1999]
- J. Throat "T" Diameter [Release date 1999]
- K. Finish [Release date 1999]

Bottles 2. Defects [Release date 1999]

[VIEW SUMMARY](#) | [VIEW METHOD](#)

Bottles 3. Color

[VIEW SUMMARY](#) | [VIEW METHOD](#)

- A. Amber Color [Release date 1999]
- B. Redness Ratio [Release date 1999]

Bottles 4. Capacity

[VIEW SUMMARY](#) | [VIEW METHOD](#)

- A. Overflow [Release date 1999]
- B. Fill Point [Release date 1999]

Bottles 5. Surface Protective Coatings

[VIEW SUMMARY](#) | [VIEW METHOD](#)

Bottle Closures

Bottle Closures 1. Defects Glossary and Classification [Release date 1999]

[VIEW SUMMARY](#) | [VIEW METHOD](#)

Bottle Closures 2. Test Pressure

[VIEW SUMMARY](#) | [VIEW METHOD](#)

- A. Internal Pressure Test for Crowns [Release date 1995]
- B. Internal Pressure Test for 28-mm Topside Pilferproof Closures [Release date 1995]
- C. Internal Pressure Test for Plastic-Lined Convenience Two-Way Crown Applied to GPI 500 Series Finishes [Release date 1995]
- D. Secure Seal Tester (SST) Internal Pressure Test [Release date 1995]

Bottle Closures 3. Gas Retention Capability of Crowns [Release date 1968]

[VIEW SUMMARY](#) | [VIEW METHOD](#)

Bottle Closures 4. Lithography Resistance to Pasteurization Conditions for Steel Crowns and Roll-On Pilferproof Aluminum Closures [Release date 1999]

[VIEW SUMMARY](#) | [VIEW METHOD](#)

Bottle Closures 5. Removal Torque Procedure

[VIEW SUMMARY](#) | [VIEW METHOD](#)

- A. For Aluminum Closures [Release date 1993]
- B. For Crowns [Release date 1993]

Bottle Closures 6. Crimp Determination Test -- Crowns [Release date 1994]

[VIEW SUMMARY](#) | [VIEW METHOD](#)



MOA

Cans

Cans 1. Defects Classification and Glossary for Seamless Two-Piece Cans

[VIEW SUMMARY](#) | [VIEW METHOD](#)

- A. Can and End Defects Classification [Release date 2004]
- B. Can Defects [Release date 1999]
- C. End Defects [Release date 1999]

Cans 2. Evaluation of Rusting Tendency of Beer Cans* [Release date 1970]

Cans 3. Dimensions

[VIEW SUMMARY](#) | [VIEW METHOD](#)

- A. Metal Gauge Thickness [Release date 2004]
- B. Flange Width [Release date 2004]
- C. Filled Can Countersink Depth [Release date 2004]

Cans 4. Ends

[VIEW SUMMARY](#) | [VIEW METHOD](#)

- A. Curl Opening [Release date 2004]
- B. Seaming Chuck Fit [Release date 2004]
- C. Ring-Pull-End Pop and Pull Test [Release date 2004]

Cans 5. Capacity

[VIEW SUMMARY](#) | [VIEW METHOD](#)

- A. Overflow [Release date 2004]
- B. Headspace [Release date 2004]

Cans 6. Enamel Rater for Evaluating Metal Exposure [Release date 2004]

[VIEW SUMMARY](#) | [VIEW METHOD](#)

Cans 7. Beverage Can Terminology [Release date 2009]

[VIEW SUMMARY](#) | [VIEW METHOD](#)

Cans 8. Copper Sulfate Test [Release date 2009]

[VIEW SUMMARY](#) | [VIEW METHOD](#)

Fills

Fills 1. Total Contents of Bottles and Cans by Calculation from Measured Net Weight [Release date 1991]

[VIEW SUMMARY](#) | [VIEW METHOD](#)

Fills 2. Total Contents of Cans of Known Tare Weight [Release date 1991]

[VIEW SUMMARY](#) | [VIEW METHOD](#)



MOA

- Supplier packaging raw materials
 - Incoming raw material analysis - ie/ how do you assess labels, cartons, glass, cans before they are put on the line - there are many checks and approaches to this
 - Raw material defects - this is a course on its own and main quality problems we face - again there are many methods out there for this that can be shared
- Analytical quality - TPO, CO₂, headspace O₂, fills, residual water in bottles
- Micro quality - best practices on sanitation, methods for analyzing chemical usage, methods for assessing hygiene
- Label quality - many different quality problems here and methods for assessing quality
- Carton “box” checks ie when bottles are put in boxes there are many different approaches to assess quality here
- Coding

