The Challenge:

How can keg line Packaging Managers, Maintenance Engineers, Production Managers and Operators, QA and QC Managers, Warehouse and Cellar Workers all work together to achieve the ultimate goal…

Customer Satisfaction?

Knowledge of Best Practices is key
Proactive maintenance is critical
Training and adherence to SOPs is essential
Participation of every team member is necessary
### Spears Around the World

<table>
<thead>
<tr>
<th>Flat</th>
<th>Well</th>
<th>Combi</th>
<th>Soft</th>
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<tbody>
<tr>
<td>A-System</td>
<td>S-System</td>
<td>U-System</td>
<td>L-System</td>
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<td>G-System</td>
<td>D-System</td>
<td>M-System</td>
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* A-System = Alumasc  
* G-System = Grundy  
* S-System = Sankey  
* D-System = Draft System  
* U-System = Universal Equipment Company  
* M-System = Micro Matic  
* L-System = Soft Drink (Limonade)
Three Keg Neck Styles

• Two-eared Drop-in Neck
• 14 tpi Threaded Neck
• SOS/Euro Style Neck
Two Varieties of D System Valve

Ball Beer Valve

Poppet Beer Valve

*Note that almost all internal components are unique to their valve type. Ball style beer valves are the most common. Poppets can be most easily recognized by the flat spot on the top of the “button”
Identification of Parts

Full assembly: keg “spear”

Body
CO2 Valve
O-ring
Beer Valve (Ball or Poppet)
CO2 Spring
Beer Spring
Retainer Disc
Down Tube
D System Spear Safety Features

- Drop-in spears: Squared “ears” on body fit in the Z-slots in keg neck
- Drop-in spears: Double Circlip, safe until tampered-with or reused
- Threaded spears: Safety Clip
- Pressure Relief Safety Feature: both poppet-type and certain ball-type for untapped kegs
Spear Length, Critical to Function
Filling and Dispensing
Spear Length, Critical to Function

Cleaning

too long

too short
Determining Correct Spear Length

- Drop-in, SOS Type Necks: \( H3 + 12\text{mm} = L \)
- 14tpi Threaded Necks: \( H3 + 15\text{mm} = L \)
How Do Valves Fail?

- Beer Leaker
- CO2 Leaker
- Foamer
- Delamination of CO2 Valve
- Neck Leak
Causes for Valve Failure:

*Damage due to abuse!*

- Keg Coupler (aka Tavern Head)
- Washer/Filling Line Interface
- Steam Temperature, Chemical Solution Strength or UV Light Exposure
- Overfilling
Keg Coupler Damage

- Damaged - Probes with burrs
- Careless operator - Forced on, wrong position
Washer/Filler Interface

- Damaged probe
- Keg neck “bent”
- Keg neck poorly centered
- Foreign object

Check diameter of Centering Cones. Replace at >64.4mm
Washer/Filler Interface, cont’d

- Poor design of probe
Steam, Chemical Solution, UV Light

• Micro Matic Recommendations
  • Follow Product Warranty guidelines!
  • Avoid prolonged exposure to sunlight (UV)

• Micro Matic Product Warranty
  • Function, 2 years; Rubber parts, 2 years; Metal parts, 5 years
  • Following guidelines:
    1. Steam:
      a. Maximum temperature 135°C (275°F),
      b. Maximum exposure, 2 minutes
    2. Caustic/alkali and/or Phosphoric, Citric, Nitric/Phos blend acids:
      a. Maximum solution strength =/<3% solution
      b. Maximum temperature 80°C (176°F)
      c. Maximum exposure, 10 minutes
Over-filling

- Thermal Expansion of Liquid = hydraulic pressure
  
  Leave head space! Your kegs are designed to hold full specified volume of beer plus head space.

- **Best method**: fill by metered volume or by weight

- **Second best method**: fill upright to overflow through coupler with keg propped on an angle

  Fill to here!
  (the angle will need to be calculated for different kegs to get the correct volume fill)

  Head space:
  
  - 20L = .4L
  - 30L = .6L
  - 50L = .8L
  - ½ bbl = 1.0L

  1.5% x 2,000 bbls = 30bbl
  (60 kegs of beer)

- **Worst method**: fill upright, flat on the floor (valve end up) to overflow from coupler resulting in keg that is 100% filled with beer – over-filled
Damage to Valves

Over-pressurization, likely from freezing or thermal expansion caused by temperature changes and a lack of proper headspace in the keg
Damage to Valves

Over-pressurization, due to over-filling and extreme pressure of hydraulic force
Damage to Valves

Early stage and late stages, delamination of CO₂ Valve
Damage to Valves

Impact damage to CO₂ Valve. Likely beer leaker and foamer. UV Damage, cracking of rubber due to exposure to sunlight

And no circlip installed!!! Critical hazard
How to Avoid Valve Damage

1. Well-designed and maintained keg washer probes

Centering Cone
Diameter new 63.8 mm ±0.1
Replace when > 64.2 mm
How to Avoid Valve Damage, cont’d

2. Maintain Your Keg Valves

• Pull spears for inspection on a regular basis
• Rebuild spears after about 7-8 years of service, possibly sooner if your valves are abused!
• Replace both rubber parts and both springs
  (~$6.20 for parts, 3-5 minutes of your time)
• ALWAYS use a new double circlip (never reuse these)
• ALWAYS use proper tools and technique and OEM parts
• Work safely! Work on ONE KEG AT A TIME! No shortcuts!
• Send spears out for 3rd party refurbishment, MM Certified Valve Refurbisher (or) rebuild in-house
• Let us help you
How to Avoid Valve Damage, cont’d

3. Inspect Kegs Returned to the Brewery
   • Check for bent necks, foreign objects, damaged CO2 valves (foamer kegs)

4. Repair Every “Bad” Keg
   • What does “bad” mean? Sensory problem, flat beer, foamer, beer leaker, neck leaker, bent neck, leaking weld, crushed chime, freeze damage, etc
   • Kegs returned as “bad” should be quarantined, sorted and logged, rebuild every one!

5. Follow MM Product Warranty Guidelines

6. Don’t Overfill
Age Determination of Keg CO2 Valves
(non-color-coded)

• MM Ball-style

(first hash mark = 2002)

• MM Poppet-style

(first hash mark = 1993)
Age Determination of MM Keg Valves (color-coded)

- 2017: RAL: 6032
- 2018: RAL: 8001
- 2019: RAL: 1016
Use Proper Tools – Safely!
Best Practices - Safety

• Establish and maintain strict SOPs for personnel and conduct formal in-house certification-level training
• No one works on kegs who isn’t fully trained
• Always double-check that keg is depressurized, yourself and handle every keg as if it is under pressure
• Work on one keg at a time – start to finish
• Use the correct tools and parts matching original manufacturer

**Never reuse circlips**, train everyone to identify damaged, tampered-with, missing circlips
• Follow tool/valve manufacturers’ guidelines
Best Practices - QA / QC

In addition to standard QC sampling methods and practice:

• Quarantine and log every “bad” keg – look for trends; what does “bad” mean? Search for the source of the problem

• Inspect every keg coming back into your brewery

• Repair every “bad” keg - 5 minutes, <$10 parts

• Pull and inspect spears regularly

• Check keg washer performance and condition regularly

• Proactive, routine refurbishment of keg valves

• Check fill levels regularly
What is the end result?

A multi-level program of QC / QA and Safety Assurance to achieve the ultimate goal: **Customer Satisfaction** for your Draft Packaged Beer
Thank you for your interest and attention!

For additional information, please contact me:

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