

Aerosol Micro Leak Detection System Emerson Cascade

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2017 Emerson At-A-Glance

FOUNDED

1890

HEADQUARTERS IN
ST. LOUIS, MO
USA

RECOGNITION

#139

2017
FORTUNE 500
AMERICA'S
LARGEST
CORPORATIONS
BY REVENUE

Top 50 Employers
WOMEN ENGINEERS
MAGAZINE

**America's Best
Employers**
FORBES MAGAZINE

TWO BUSINESS PLATFORMS



EMERSON AUTOMATION SOLUTIONS



EMERSON COMMERCIAL & RESIDENTIAL SOLUTIONS

WORLDWIDE

76,500
EMPLOYEES

200
MANUFACTURING
LOCATIONS

INNOVATION

EMERSON EMPLOYEES WERE AWARDED MORE THAN

2,100 PATENTS WORLDWIDE IN 2017

\$15.3
BILLION

IN GLOBAL SALES
FISCAL YEAR 2017

61
YEARS

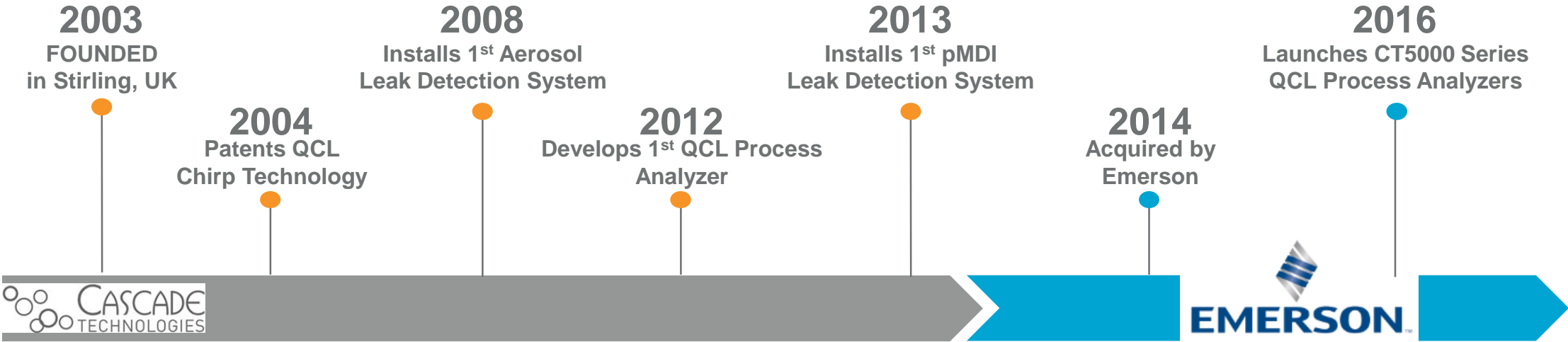
CONSECUTIVE
YEARS OF
INCREASED
DIVIDENDS

NYSE:
EMR



CASCADE™ at-a-Glance

MILESTONES



LEADING TECHNOLOGY

- MAP** Food Leak Detection
- pMDI** Leak Detection
- Aerosol** Leak Detection
- Process Gas** Analysis

AWARDS & RECOGNITIONS

BAMA
BRITISH AEROSOL MANUFACTURERS' ASSOCIATION

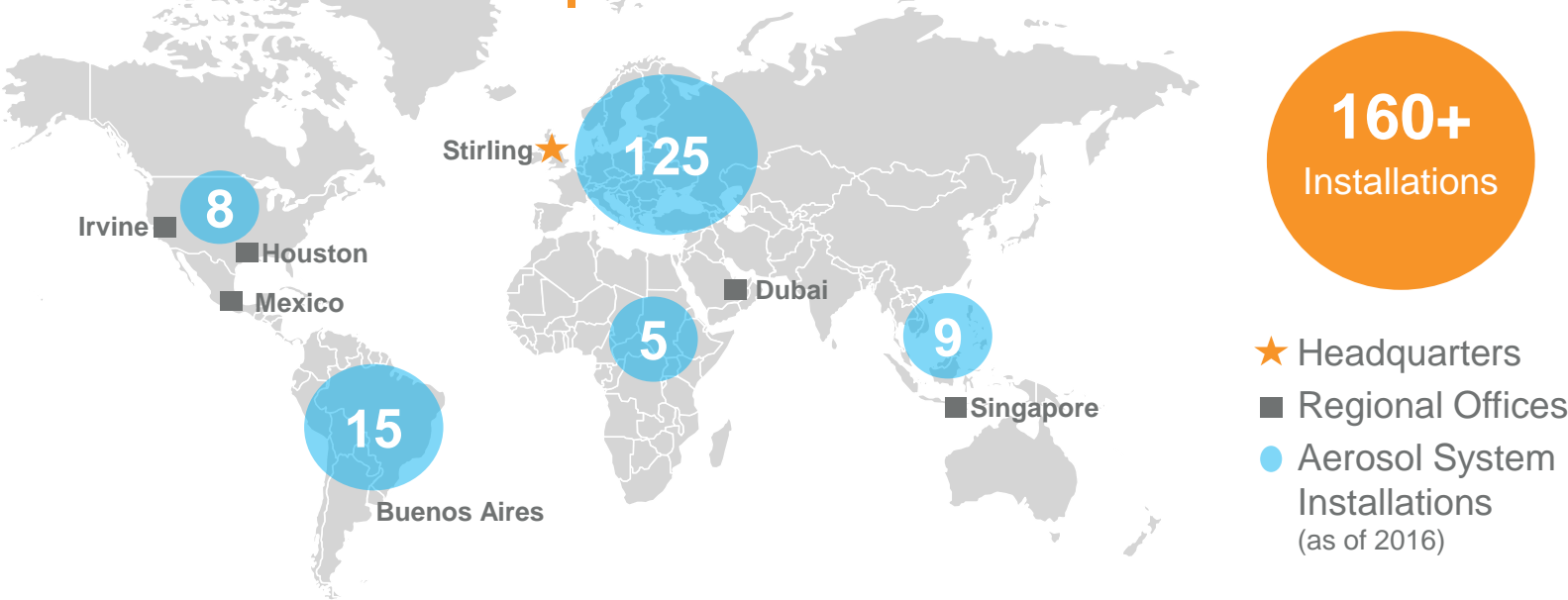
"Aerosol Packaging Award"
2010*, 2011, 2012 and 2014
* Joint Cascade Unilever Award

FROST & SULLIVAN
"New Product Innovation 2016"

ISA

Analysis Division
"Innovative Product of the Year 2014"

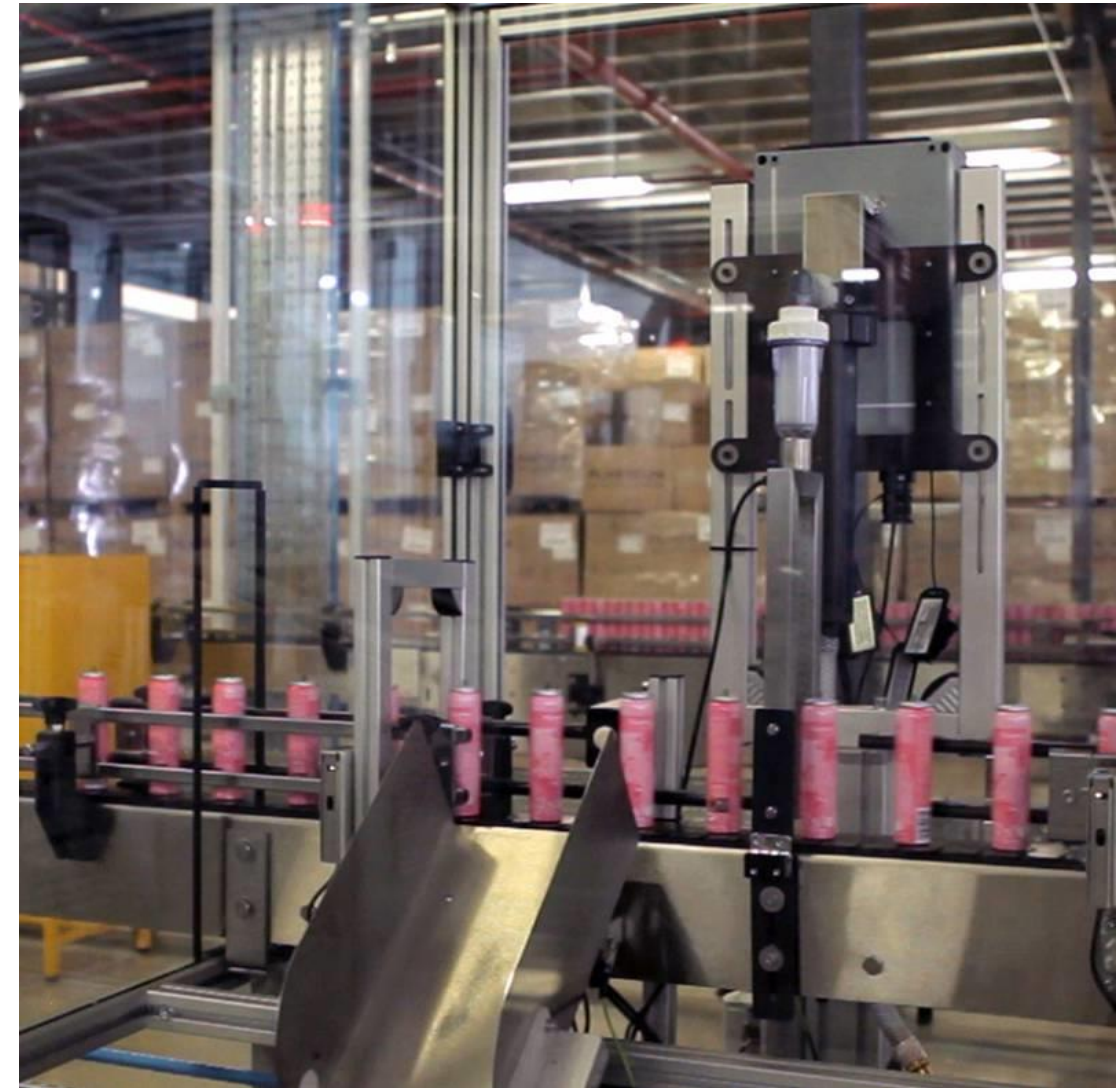
LOCAL SUPPORT | GLOBAL REACH



Cascade™ Aerosol Micro Leak Detection Technology – 150+ installations



Benchtop, for leak detection development and diagnostics



Continuous, filling line leak detection

What if you could...



Remove the risk associated with leaking cans leading to fires?

Detect leaking cans on line, in real time and reject the faulty can instantaneously?

Receive statistical information about can rejection rates and patterns to trouble shoot line performance?

Future proof your filling lines for brand owner & legislative demands?

Challenge #1: Ensure Safety of Personnel and Property



Failure to detect a faulty can after filling could become a serious safety hazard.

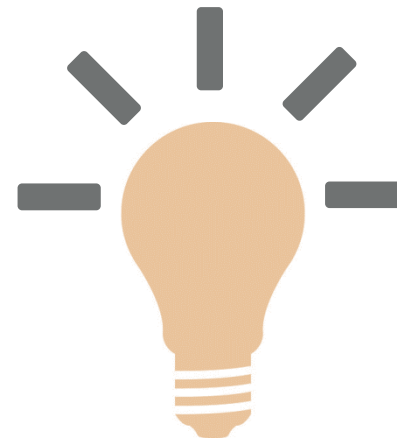


Removing the risk associated with leaking cans that can lead to fires.

Challenge #2: Eliminate Product Recalls



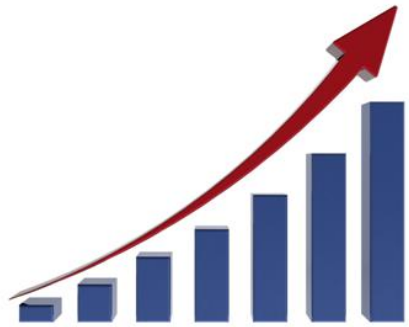
Product recalls are costly and can have a lasting damaging effect to the brand.



Brand Protection

Removing the risk of recall by detecting and reject leaking cans on line quickly.

Challenge #3: Maximize Production Capacity



Aerosol Manufacturers are challenged to maximize their line speeds to compete in today's market.



Line speeds are increasing. Inline leak detection enables **every aerosol can** on the manufacturing line to be properly tested.

Challenge #4: Meet Customer and Regulatory Requirements



Industry required specifications from Brand Owners and Legislation



The need to future proof filling lines for brand owner & legislative demands for leak detection.

Factors Affecting Aerosol Filling

Parts

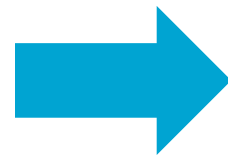
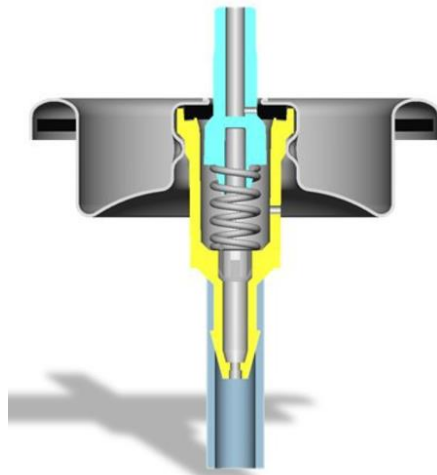


Can Quality

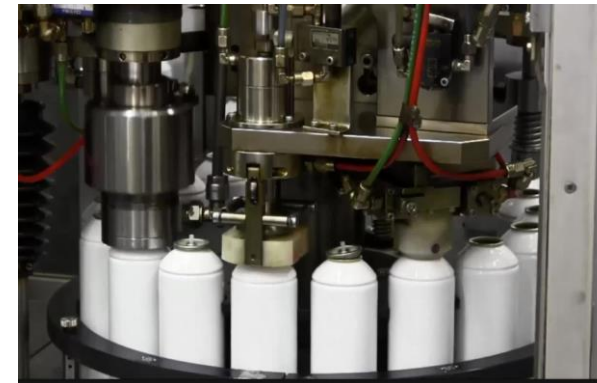


Valve Quality

Processes



Crimp Parameters



Filling Process

The Water Bath – Original Solution



Introduced in 1940's to test for deformation and bursting of cans

Line-speeds effectively of 60 cpm

Labor costs – Highly manual

Limited range of propellants



Challenges of the Modern Production Line



Operating at speeds up to 600 cpm, making visual inspection ineffective

Cans not always fully immersed.

Manual removal of defective cans impacts productivity and operator wellbeing

Maintaining water clarity to aid visual inspection is expensive & wasteful

Operational Excellence



Leak detection as part of process control
– with or without a waterbath

Replace the need for operators to
manually inspect cans

Get alerts to systemic issues online –
investigate and rectify before a whole
batch is impacted

Improve safety throughout supply chain

Emerson Cascade™ Aerosol Micro Leak Detection Systems

Single Laser



Single Laser
Leak Detector

- **Multi-Propellant Capability**
 - LPG blends, Propane, Isobutane, R134a, 152a, 227, 1234ze, CO₂, N₂O, DME
- **Up to 4 lasers in one unit**

- Single Propellant

— Optimized archway for complete can sampling – non-contact

— Rejects the leaking can in real time from the production line

— Modular & Field Upgradeable

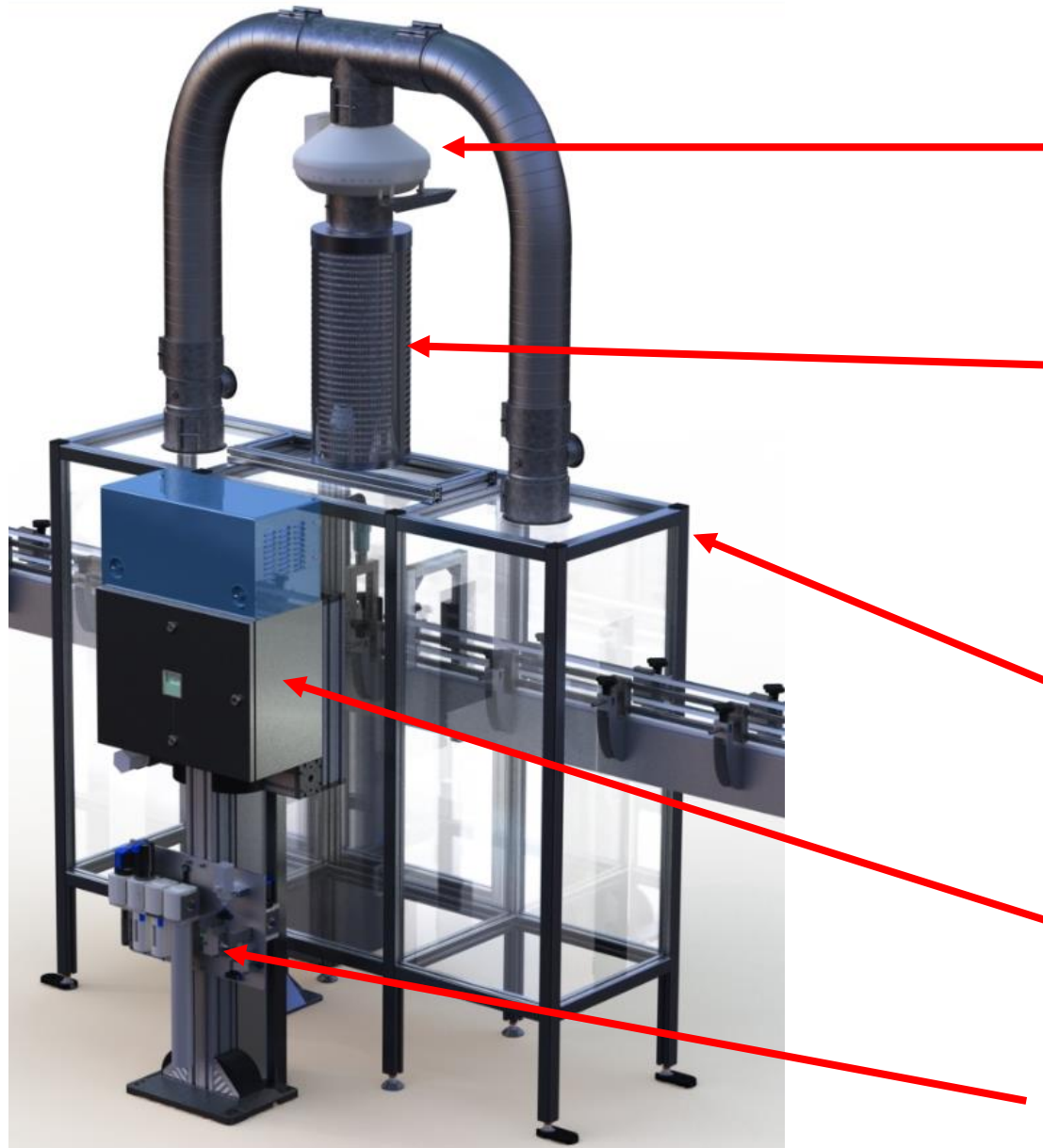
— ATEX Certified enclosure

Multi-Laser



Multicomponent
Leak Detector

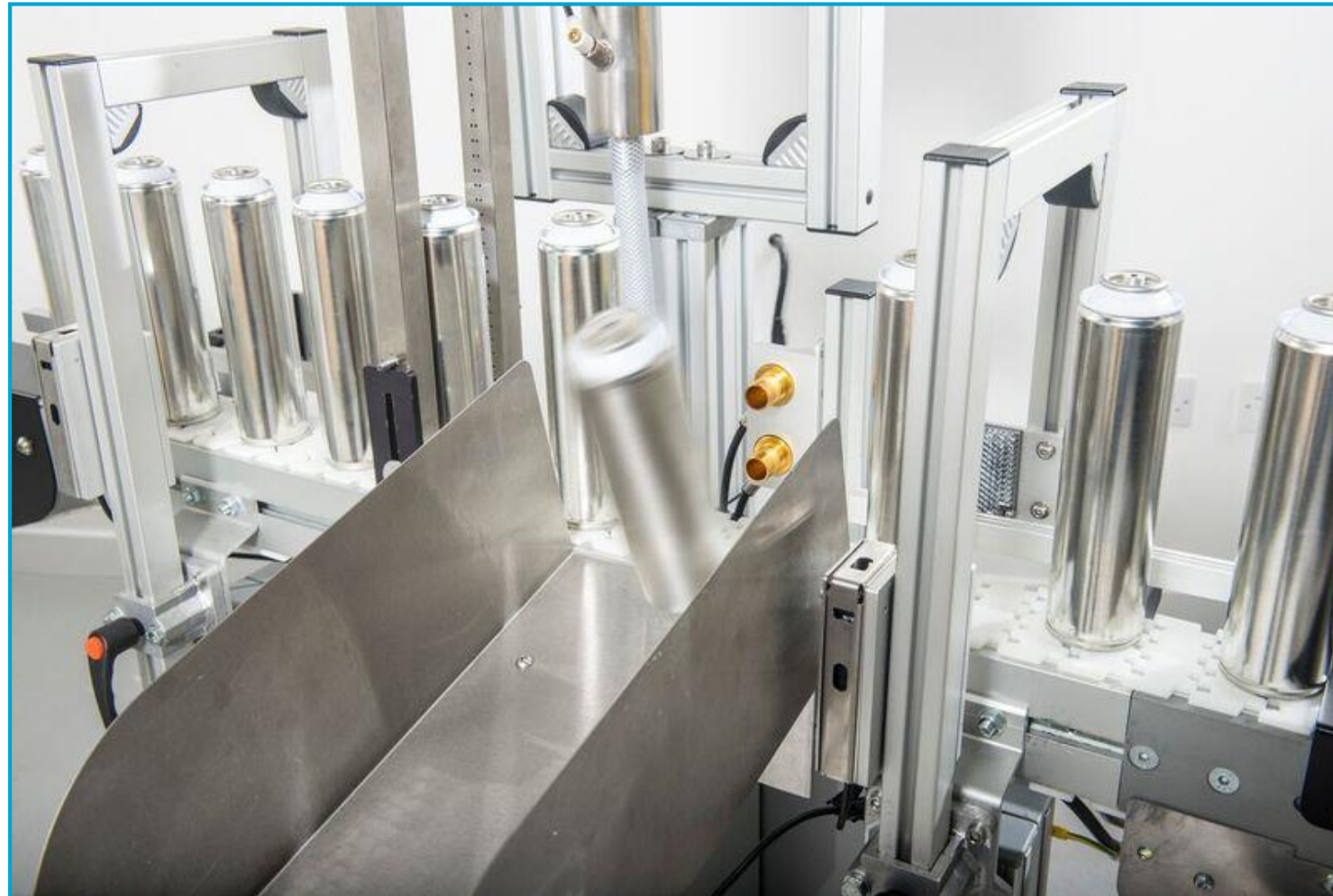
Typical Installation



- **Purge air** – maintain positive pressure within enclosure for environmental immunity
- Carbon filter – filtered air is pushed into the enclosure. Maintaining a positive pressure with respect to the environment. Prevents ingress of propellant from the environment
- Polycarbonate enclosure – protection from airborne contamination
- **Multi-laser** detection head
- Pneumatics – compressed air rejection, cell purge

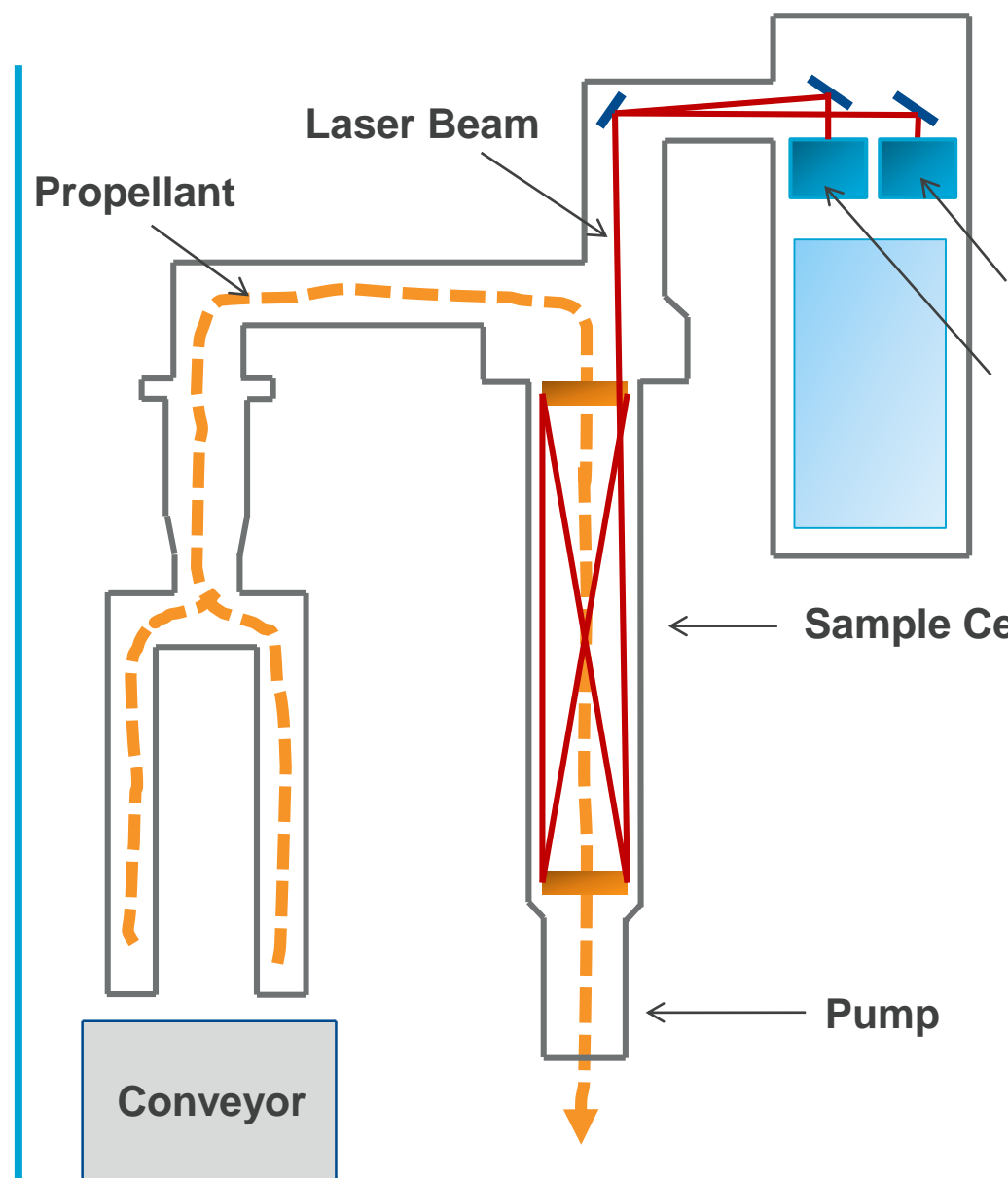
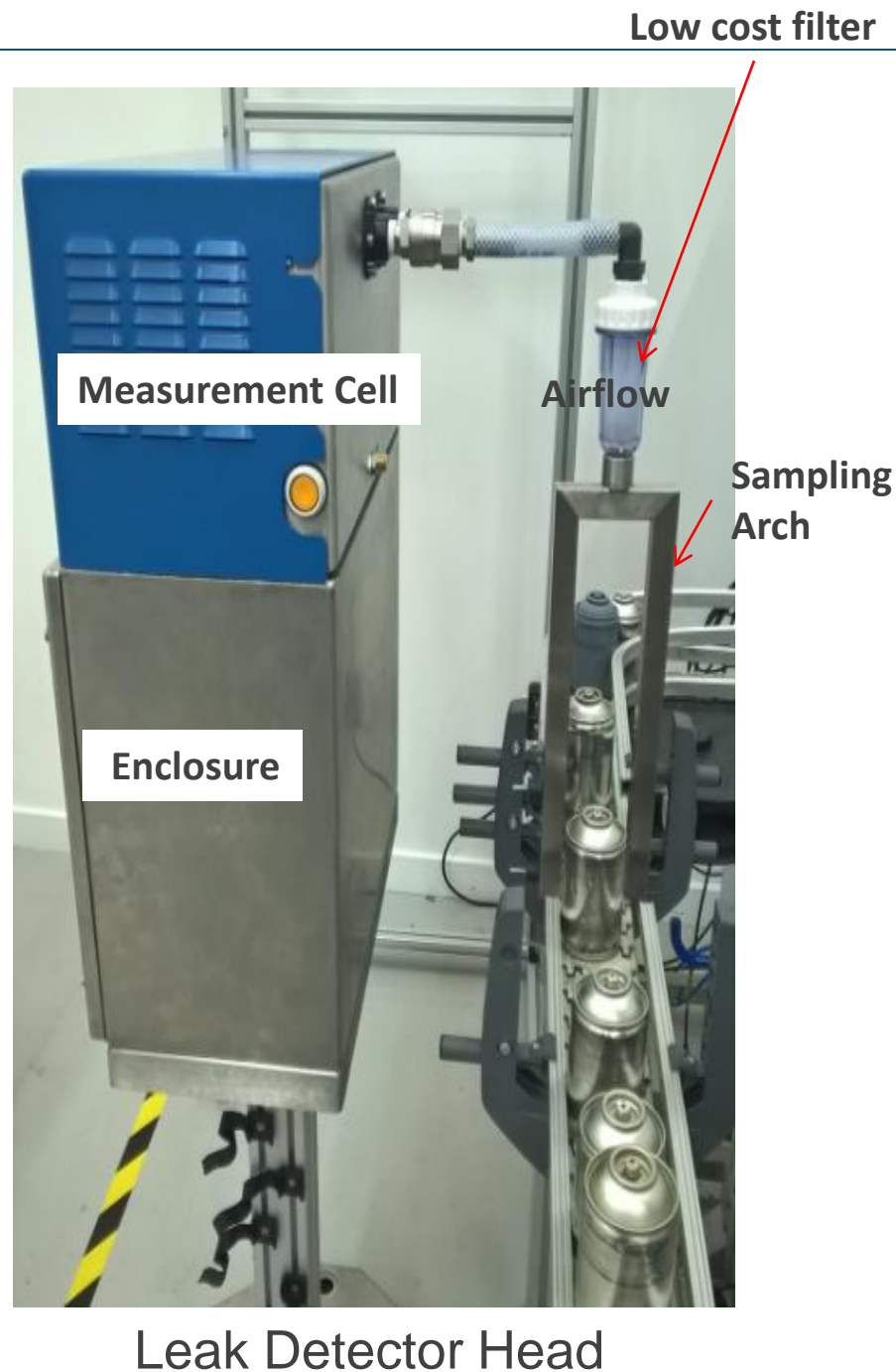
Rejection Mechanism

- Leaking Cans Rejected Directly
 - **Single leaking can** activates a signal and is removed from the line for containment
 - **Multiple leaking cans** activate an alarm indicating process fault



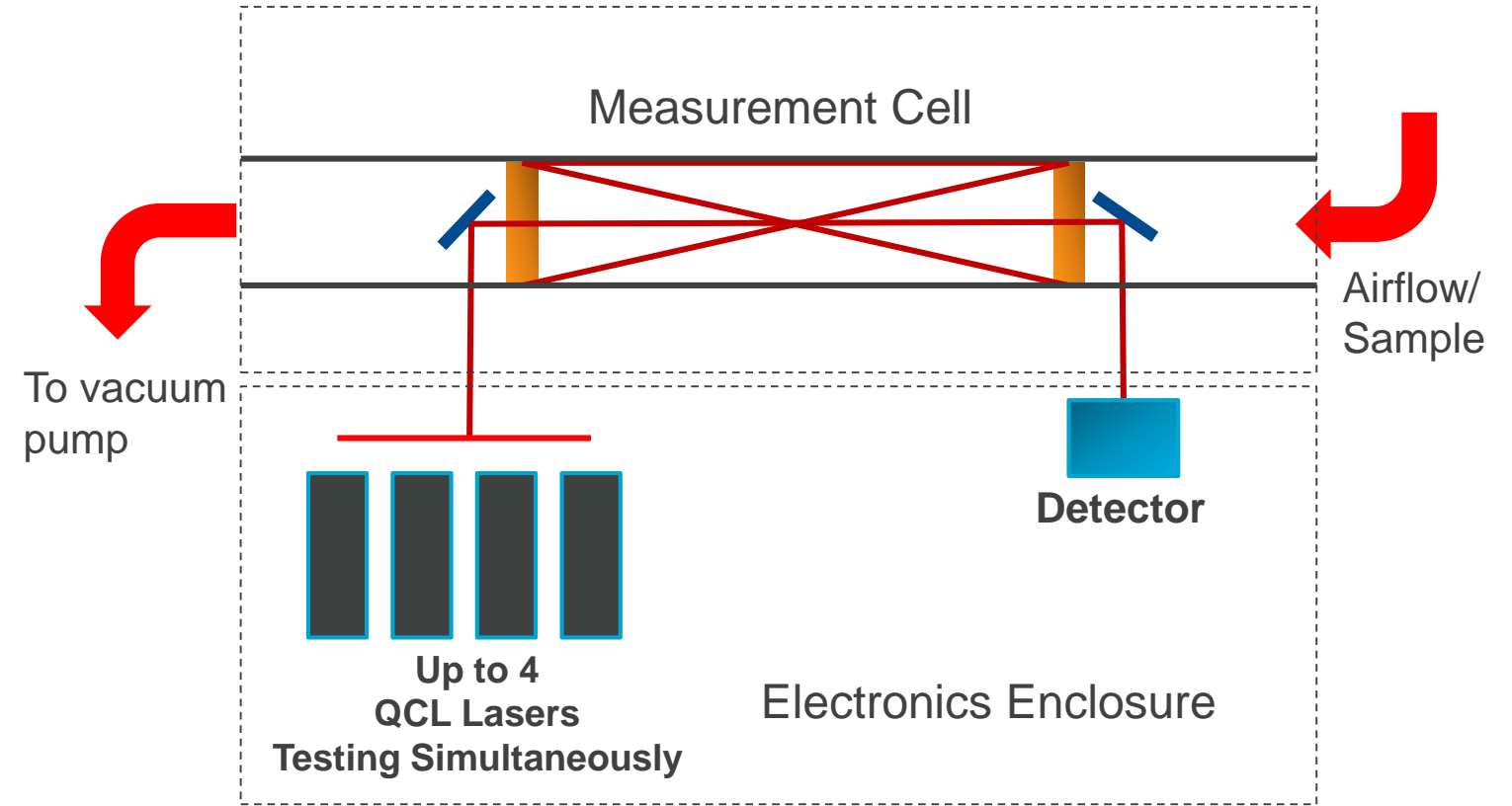
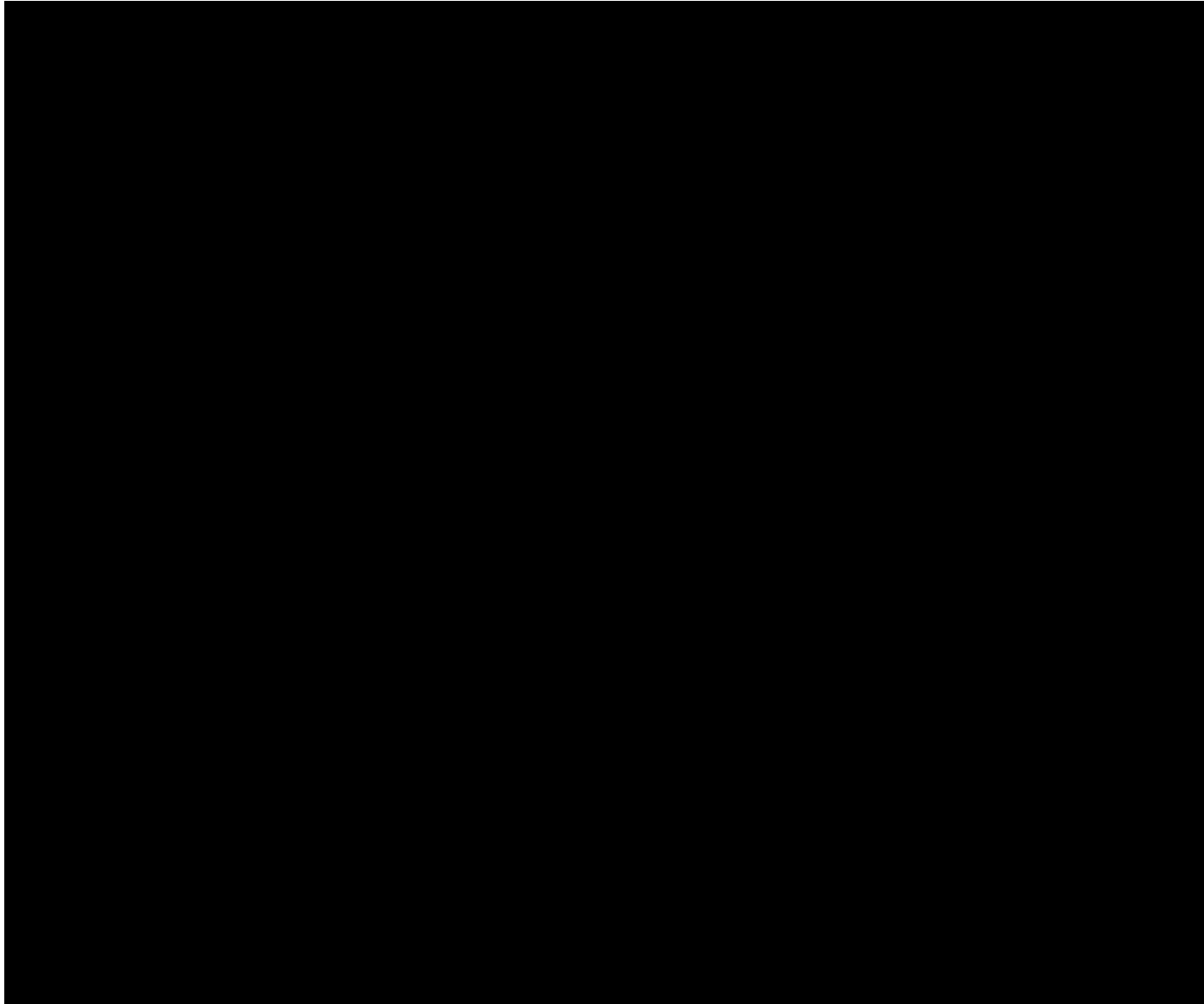
Operation

- Sensor Head can be Installed on New or Existing Production Line
- Sample air containing the propellant that has leaked from the can is drawn into the system via the sampling arch
- **Quantum Cascade Laser Technology**
 - Laser modules mounted in leak detector enclosure
- **Response Time**
 - Up to 600 cans per minute
 - Automated Rejection of individual cans
 - Alarm after multiple failures



Eliminate
Product Recall

Detect and Reject Faulty Cans Directly On Line





Improve Health & Safety of Facility

- Complete Can Tested
 - Valves
 - Crimps
 - Tri-Weld
 - Seams
- Works with all can Sizes and Material of Construction



Aerosol fillers can collect samples of leaking cans identified by Micro Leak Detection System and take these to their supplier for improvement.

Regulatory Requirements

Aerosol dispensers shall be subject to one of the following final tests methods:

1. Hot Water Bath Test

- a) Each filled aerosol dispenser shall be immersed in a hot water bath until contents reach a uniform temperature of 55 °C.
- b) Any aerosol dispenser showing *visible* permanent distortion or a leak must be rejected.

2. Water Bath Alternative Test

- a) Empty Can Pressure Test
- b) Check weigher required
- c) Filled Can Leak Detection Test*
- d) Apply for water bath alternative certificate from appropriate local organization

Comply with Legislation & Contract Requirements

Sensitivity aligned with UN ADR
Waterbath Alternative requirements

Post Waterbath

$8 \times 10^{-3} \text{ mBarLs}^{-1}$

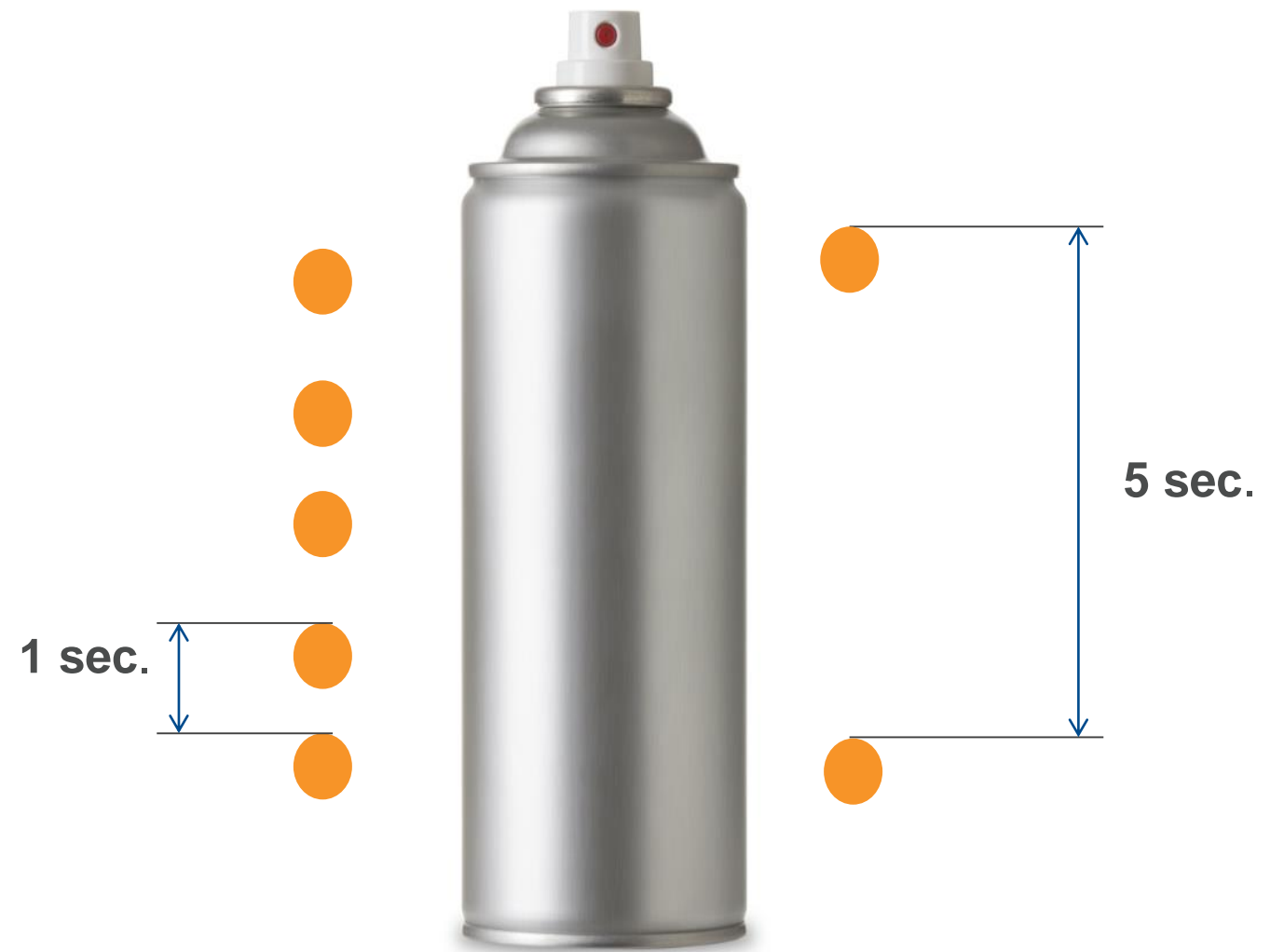
1 bubble / second @ 50°C

Waterbath Alternative

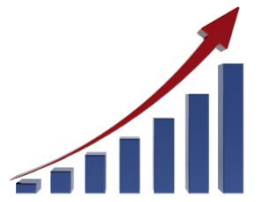
$2 \times 10^{-3} \text{ mBarLs}^{-1}$

1 bubble / 5 seconds @ 20°C

● = Bubble

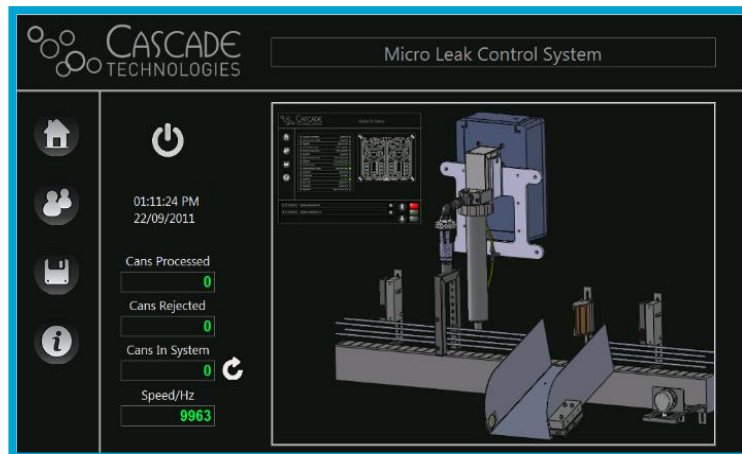


Increase Production Capacity

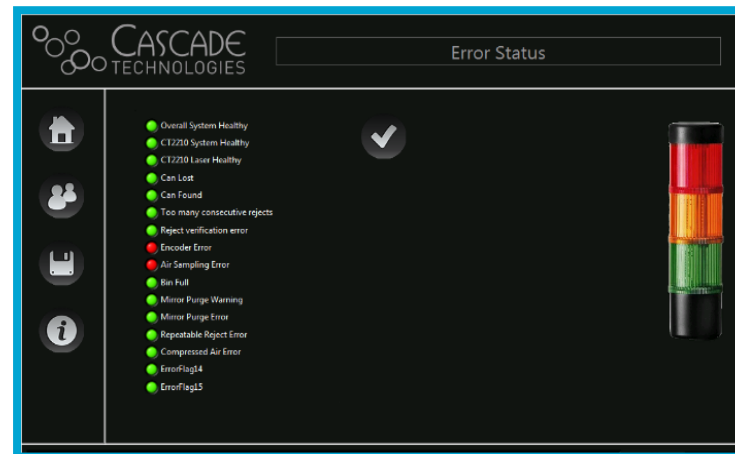


System Capabilities

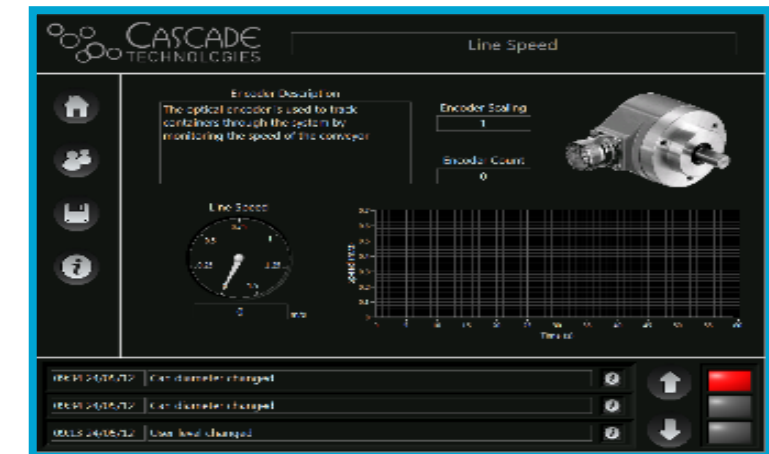
- Fully Automated: no user input required
- Alarm capabilities to identify production faults
- System logs production statistics to help identify root cause
- Password protect system changes



Track production: Cans processed and rejected.



Comprehensive monitoring screen linked to traffic light and programmable line stop.



Easy to navigate icon based display screens.

Video

Benchtop Based Leak Detection and Analysis for Aerosol and pMDI

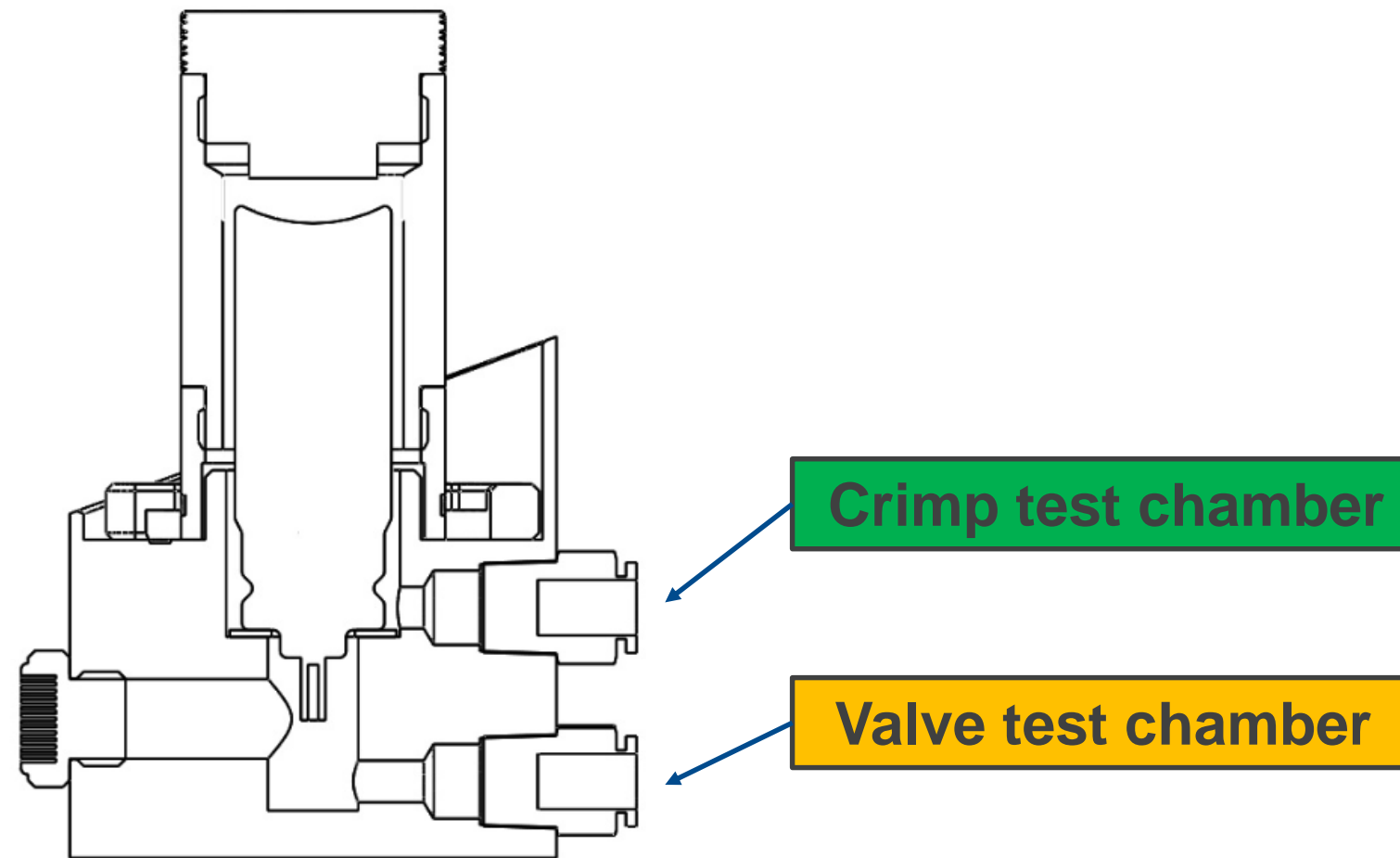


Testing individual cans for location and quantification of leaks

Method Development, QA and Troubleshooting

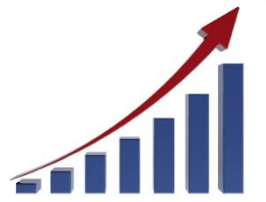
- Troubleshoot leak problems
 - Isolate valve, crimp and seam
 - Quantify leak rate
- Fast Batch Analysis –
 - Multiple cans in minutes
- Method Development
 - Long term leak profile of individual cans
 - Leak kinetics for process optimization
 - Leak kinetics for component selection

Multi-chamber Design for Process Fault Identification



Patent pending sampling head – identifies the leak at the source

Service and Support - Commitment to Excellence



- Easily installed on new or existing lines with little or no down time
- Minimal Consumables
- No Calibration
- Local Service Capabilities Globally
 - Ensure Right Sized System Installed
 - Personalized Support Contracts



Your partner in Leak Detection Systems!



Thank you

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Questions