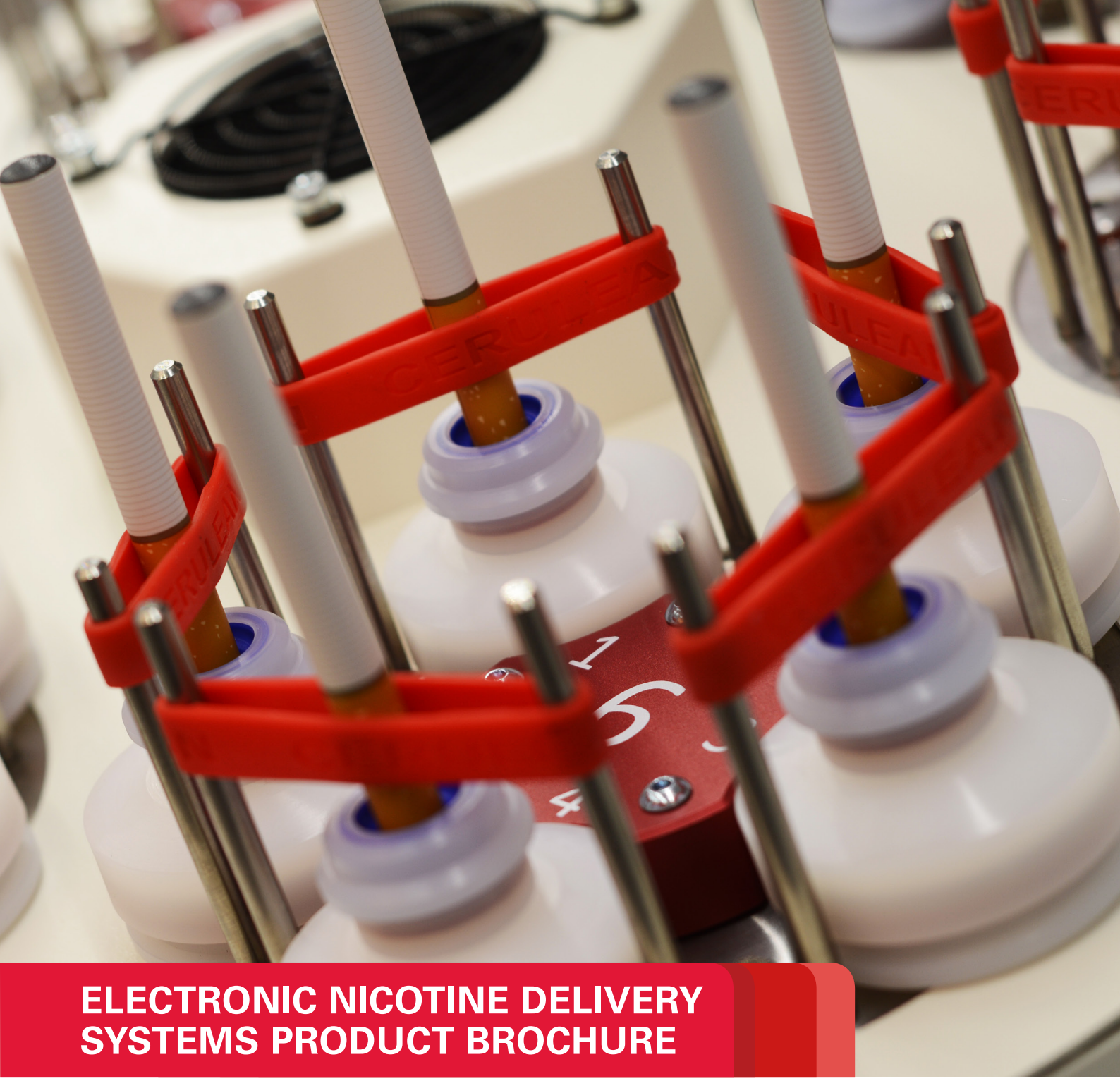


ELECTRONIC NICOTINE DELIVERY SYSTEMS PRODUCT BROCHURE

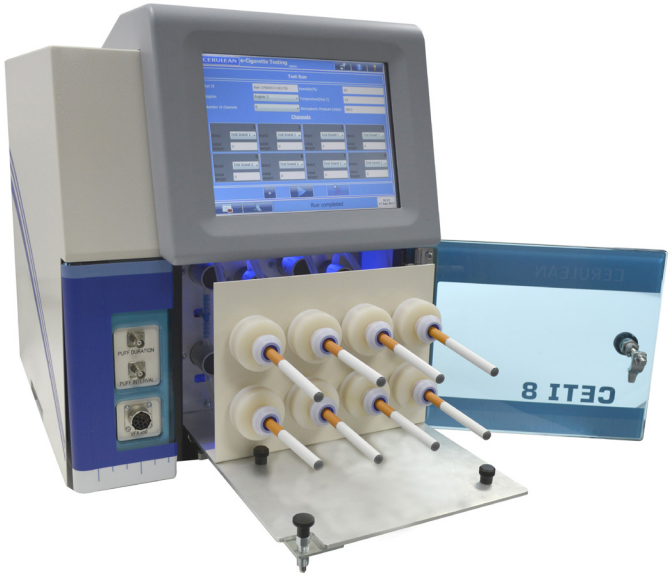
CERULEAN

a coesia company

ENDS TESTING EQUIPMENT

The CETI8 was the world's first dedicated vaping machine which was launched in August 2013 and showcased at the Tobacco Science Research Conference (TSRC) the same year.

Optimisation and redesign brings us to the Mk 5 machine which is now available with an array of options allowing the CETI8 to be the answer to your vaping needs.



CETI8 Mk 1
August 2013

CETI8 Mk 5 with End-point Detection
August 2020

Cerulean has been at the forefront in providing the tobacco industry with innovative solutions for analytical testing of vaping devices.

Whether your testing needs are for conventional flow-activated e-cigarettes or sophisticated multi-segment heat not burn products, we have the equipment to test it.

Cerulean's equipment offerings include continuous vaping machines with traditional capture requirements of aerosol through to x-ray technology to view inside your complex devices.

COMPANY INTRODUCTION

For 75 years, Cerulean has been synonymous with the supply of precision test and measurement equipment solutions. We manufacture and supply quality control instrumentation equipment for the tobacco industry, tube packing machines, carton testing equipment and temperature measurement instrumentation.

Cerulean's success is built on positive customer partnerships and the ability to create industry centred products of both quality and relevance. Continually releasing new devices and innovative solutions, Cerulean are positioned at the forefront of technology and industry requirements, ensuring that the solutions of tomorrow are always developed with customers' needs in mind.

Cerulean is part of Coesia, a group of innovation based industrial solution companies operating globally, with headquarters in Bologna, Italy.

SM450e

The SM450e is a 20-port dedicated vaping machine allowing 4 different regimes to be used simultaneously.

Equipped with angled vaping, button activation and optional integrated end-point detection which allows full control of experiments based on aerosol opacity, when the vapour stops, the experiment stops.

- Dedicated 20 channel vaping machine
- Optional integrated end-point detection system
- Angled vaping and button activation
- Ample room for additional capture devices
  - Impinger use
  - Electrostatic trap capture
- Easy to set-up and use
- HNB/THP and e-cigarette compatible
- Windows 10 with optional 21CFRpart11 compliance package

VAPING MACHINES

CETI8

The CETI8 is an eight-port vaping machine that conforms to ISO20768:2018 and with CORESTA recommended method CRM81.

The End-point Detection System (EDS) is an option which monitors the aerosol opacity and can be set-up to stop the experiment when the vapour stops. More can be read on the EDS later in this brochure.

Equipped with features such as automatic button activation for pre-activating electronic devices and angled vaping make it an ideal machine for testing electronic cigarettes.

- Compact desktop-mounted 8-channel machine
- Ample room for additional capture devices
  - Impinger use
  - Electrostatic trap capture
- Options include:
  - Integrated end-point detection system
  - Vaping angle
  - Button activation

ORBIT20

The Orbit20 is our next-generation semi-automatic 20 port vaping machine specifically engineered for Heated Tobacco Products (HTPs) applications.

Minimising dead volume between the sample and capture point is critical with vaping products due to the high moisture levels in the aerosol. The smaller the dead volume the less aerosol lost before capture.

For most routine applications, the aerosol is trapped using a standard 92 mm Cambridge Filter Holder (CFH). However, the Orbit20 can accommodate a wide range of alternative trapping systems such as 20 individual 44 mm CFH, impingers or an electrostatic trap.

- Optimised 20-port rotary vaping machine
- Minimised dead volume for optimum aerosol capture
- Automatic button activation
- Semi-automatic functionality
- Designed for routine analysis and R&D studies
- Options include
- CO analyser, Hoffmann capture impingers and electrostatic trap

CHIMERA

The Chimera is a 30-port vaping machine specifically designed for toxicology studies.

This machine can be configured to generate a continuous vapour stream for exposing in-vitro biological systems for the comprehensive analysis of the effects of e-juice vapour and heat-not-burn aerosol on primary cultures and cell lines.

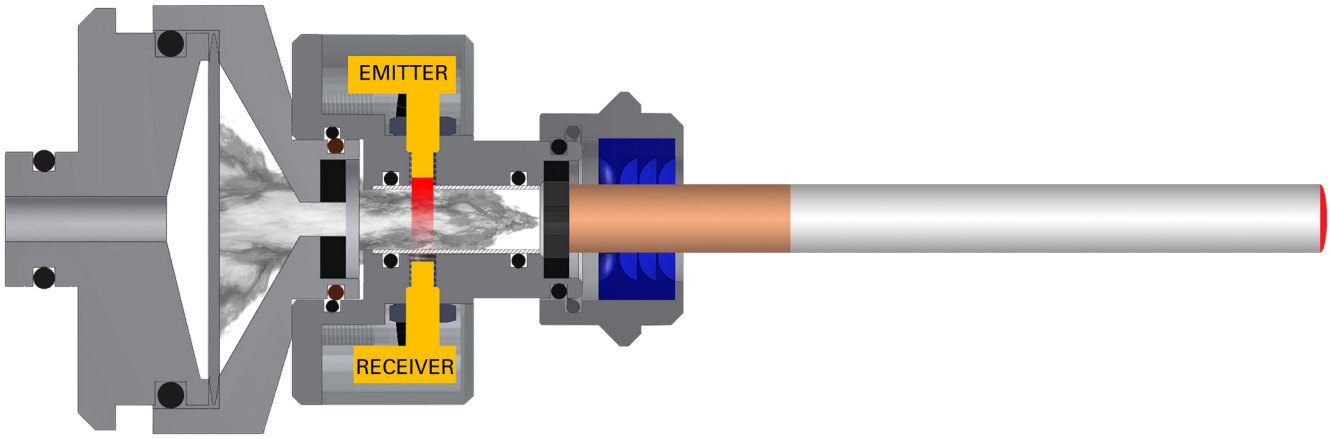
- Used for capture analysis and exposure studies of cell cultures
- Whole-life vapour creation
- Designed for toxicologists
- Fully customisable routines
- For use with e-cigarettes, NGPs and heat-not-burn devices
- Heated pathways
- Optional button activation
- Ultra low loss of aerosol mass

END POINT DETECTION

Cerulean's End-point Detection System (EDS) is specifically designed for research and quality assurance applications for E-cigarettes and Heated Tobacco Products (HTPs) and can be incoporated into the CETI8 and SM450e vaping machines.

It monitors and records aerosol opacity on a puff-by-puff basis in real-time, triggering an alarm when the vapour opacity drops below a threshold set by the user. This standalone solution enables a variety of aerosol generating machines to benefit from this innovative technology.

When the vapour stops, the experiment stops.



- Real-time monitor of aerosol density by measuring vapour opacity
- Compatible with E-cigarettes and Tobacco Heating Products
- User configurable alarm warning levels
- Intuitive graphical display of vapour opacity per channel
- Specially designed for research and quality assurance purposes
- Compatible with a variety of aerosol generating machines
- Built-in data logging and storage capability

END FORM ANALYSER

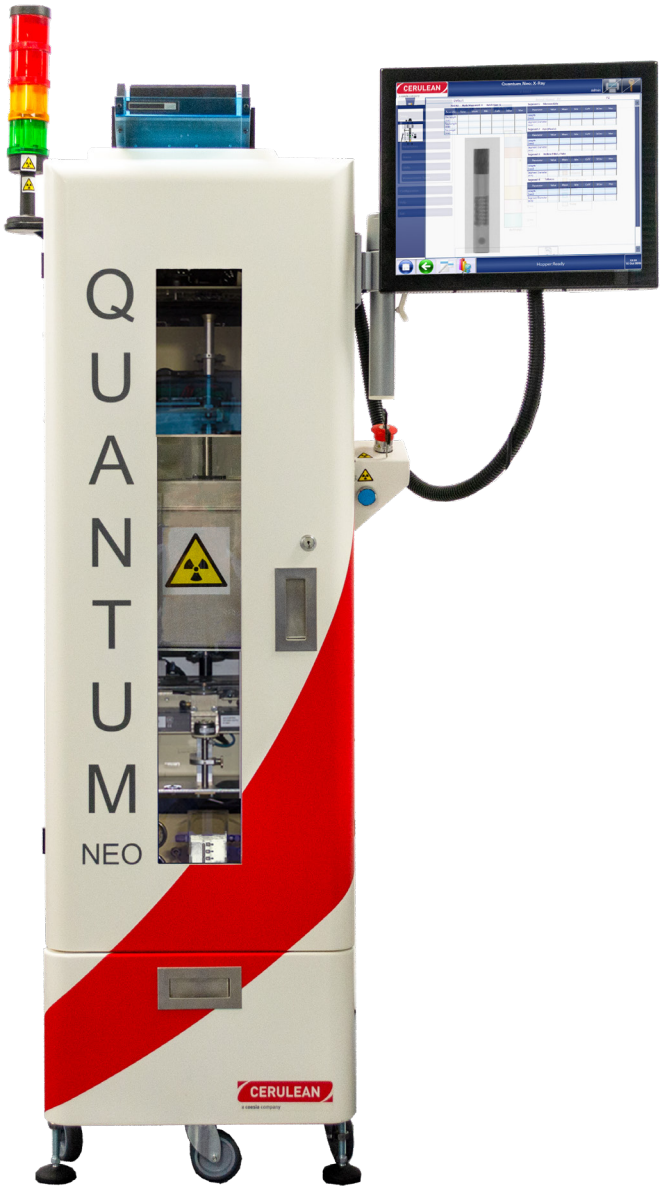
The EFA100 (End Form Analyser) is a part of Cerulean's instrument portfolio for testing the physical characteristics of Heated Tobacco Products, filter rod combinations and conventional burn down cigarettes.

Ever-increasing product complexity demands critical analysis of the individual tobacco product components. Using sophisticated vision system algorithms, the End Form Analyser can measure for shape, concentricity, open-area and component areas at both ends of the rod and give key product quality information.

The EFA provides data on the internal and external dimensions of hollow acetate paper tubes as well as key indicators for the concentricity of the open area.

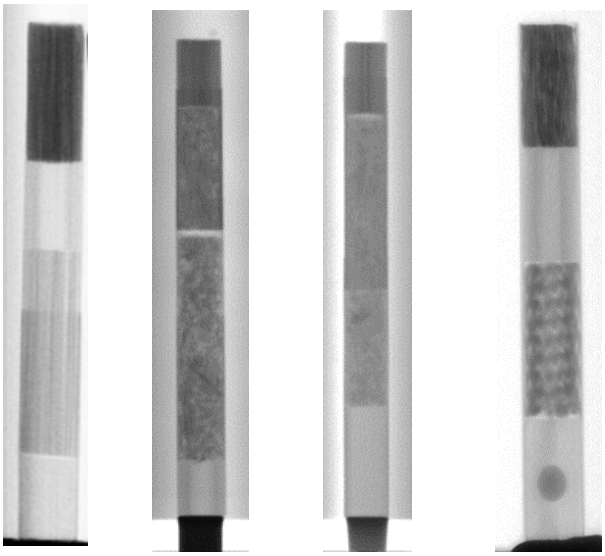
- Intuitive graphical user-interface
- In-built diagnostics
- Optimised speed of measurement throughput
- Flexible, configurable system
- PC control for ultimate usability
- Touchscreen Beckhoff PC with Windows 10™
- 21CFRpart11 compliant software
- GLP documentation installation

QUANTUM NEO: X-RAY



The Quantum Neo X-ray imaging shelf allows visualisation and accurate measurement of the size and position of hidden elements without damaging or destroying the product under test.

Now as part of the Cerulean Quantum Neo test station system it is a flexible and comprehensive platform for Quality Control testing of filters and cigarettes. The design is such that the user can specify the sampling, measurement and control options from a “mix and match” menu to customise the system to meet their own specific needs.



- New X-ray measurement shelf to measure what you can’t see
- Ideal for cigarettes, filters, rod components, superslims and HNB/HTPs
- Can be part of a fully configurable test station
- Up to five measurement shelves per station
- Intuitive graphical user interface
- Test station of choice for different multi-nationals
- More than seventeen shelves available

For full technical specifications visit our website: www.cerulean.com

AUTOMATE YOUR LABORATORY

XTrac®

In conjunction with Sirius Automation, Cerulean present the XTrac®, a fully automated CFH solvent extraction system that enables individual process control and simultaneous operation of different extraction methods.

This extraction system delivers sample handling uniformity with accurate quantitation that is ensured by automating the precise time each sample is exposed to extraction solvent, with programmable concentrations and sampling/end points.

- Easy to use
- Use for Cambridge Filters, raw tobacco and treated tobacco
- All timings precise and recorded
- All volumes precise and recorded
- ‘Orbital shaking’ mixing with your choice of extraction solvent
- Total control of methodology powered by SiriusSlate PDA® technologies
- Standard GC sample vials
- No manual transfers required
- ‘Right on time’ approach .... No need to wait, no need to be late, ever!

GraviTrac®

The GraviTrac® is a weighing robot with OMNI technology delivering fast and accurate weighing of labware ranging from minitubes to large containers i.e. 500mL Nalgene bottles. This robot also supports barcode-based or position-based labware sorting / cherry-picking.

The GraviTrac®, weighing robot can be equipped with sample racks, rotating gripper with barcode scanner and 4-place Mettler-Toledo analytical balance.

This robot is ideal for laboratory tasks where a lot of sample weighing is required, removing any chance of manual errors in reporting.

- 0.1mg or 0.01mg accuracy weighing (tare/gross/replicate weights)
- High-speed barcode scanner with rotating gripper and Wingman® scanner
- 2D matrix barcode reading for MiniTubes
- Barcode-based or position-based sorting
- Capping/uncapping
- Email notifications (start/stop/etc.)
- Seamless LIMS integration
- Optional ToolSwap® finger changer to handle multiple labware types

AFTERSALES

Cerulean has been leading the way in innovative solutions for 75 years, developing a diverse range of products for the modern market.

With Techical Service capabilities in the Americas, Africa, Europe and Asia, we offer a comprehensive service package to continuously support our growing global customer network.

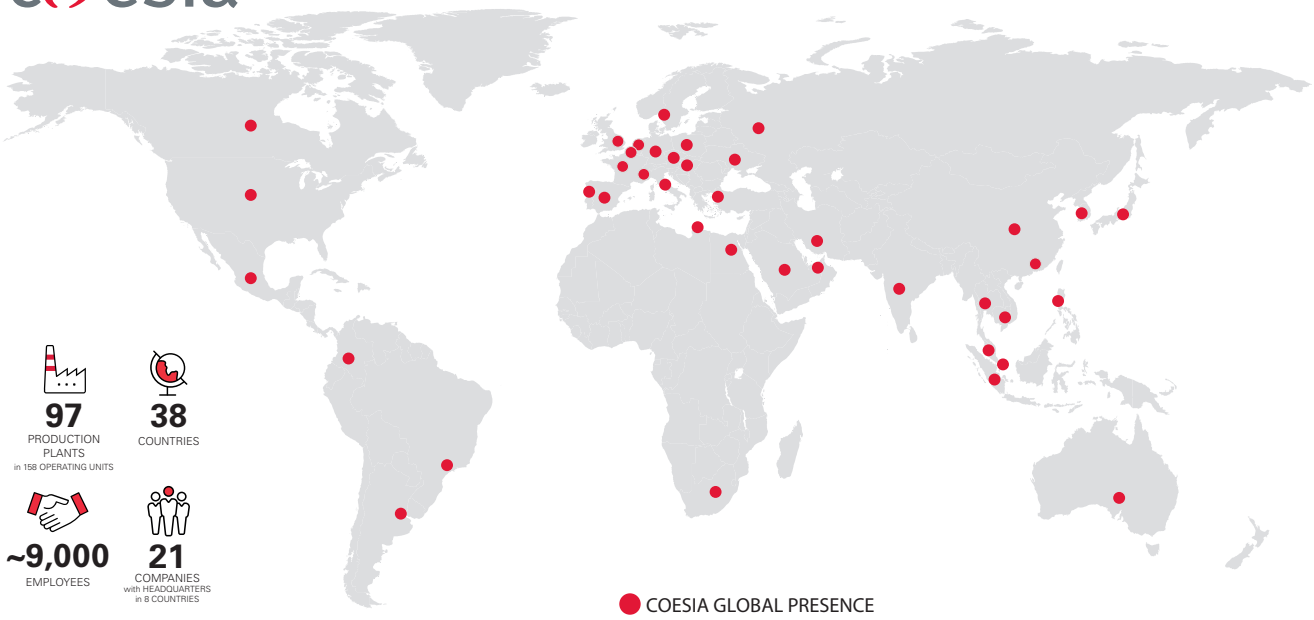
In addition to the UK-based head office, Cerulean has five regional offices and a further nine locations world-wide to support our growing customer base and their requirements.

From routine service work through to regional spares stock, Cerulean are commited to offering a high-level of aftersales support to meet customers every need. We can also offer training through a global network of expert engineers.

Technical Support operates from the UK and regional support is available at local hours if required.

CERULEAN: PART OF THE COESIA GROUP

coesia



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