# Discover Industrial Cleanliness Monitoring

Technical cleanliness in industrial manufacturing with proven CleanCHK gauge

**ThermoFisher**
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**Could your automotive cleanliness monitoring program be outdated?**

**The Thermo Scientific™ Explorer™ 4 Analyzer with CleanCHK™ software was developed for engineers to monitor industrial cleanliness more effectively over traditional gravimetric methods.** Traditional methods only provide bulk weight of the dirt and debris on the cleaned part and do not identify the particulate contamination source. The Explorer 4 Analyzer with CleanCHK software replaces traditional particle cleanliness methods by allowing engineers to see micron sized particles and determine their chemical composition, thus identifying the contamination source.

Lodged Particle. SEM image of particle found lodged inside a nozzle resulting in blockage of fuel flow.

# The Importance of Cleanliness in Automotive Manufacturing

Cleanliness in the automotive manufacturing environment is expanding the responsibility of both Production Engineers and QA Managers with the transformation to smaller, more efficient engines. Using gravimetric analysis will not produce individual particle data such as size and shape or even composition. As a result, components with tight tolerances may pass gravimetric testing, yet still fail to function due to small particle contamination. Manufacturers already encounter "dangerous" abrasive contaminants such as aluminum oxides that are just 2 μm in size, which would not be detected via traditional gravimetric methods.

### ISO 16232 and VDA 19 as guidance

ISO (International Organization for Standardization) developed 16232-07, which is based on VDA 19-2. This set of general directives for contamination testing of fluid components in road vehicles regulates both particle extraction methods and measuring equipment to be used. Adhering to standardized regulations creates mutual understanding between manufacturers and customers.

### Chemistry matters too

Cleanliness goes further than just determining the contamination source; the hardness of the particle determines the damage it can do. Hard materials left in an assembly can cause much more damage than soft materials. Determining these characteristics earlier in the process can save future costs.

### Explorer 4 Analyzer with CleanCHK software as a Cleanliness Control Gauge

Historically, scanning electron microscopy with energy dispersive X-ray spectroscopy (SEM/EDX) has been key to providing cleanliness data for components. However, there have been issues with training personnel to operate the instruments causing delays in obtaining results. Using customer feedback from the automotive industry, Thermo Fisher Scientific developed the Explorer 4 Analyzer with CleanCHK software providing unmatched ease of use. Production Engineers now have the ability to monitor cleanliness control on the production floor.
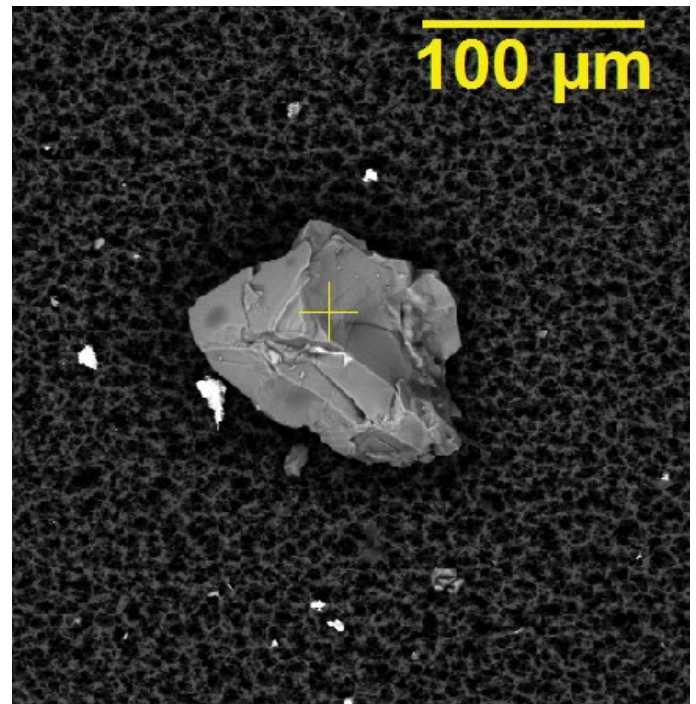


Particle Contamination. Aluminum Oxide particle contamination traced back to an abrasive used during the cleaning process.

# CleanCHK Software Solution

CleanCHK software is comprised of four integrated platforms in one powerful package that controls the instrument, automates sample analysis, easily relocates identified particles and automatically produces customized reports. Access to any one of the four platforms is controlled by a permission-based access which is customized based on individual staff authorizations. All of this is supported in a Windows 10 platform for file sharing and storage.

## Perception

Perception is Thermo Scientific's proprietary software that controls the SEM/EDX for easy operation. The unique design of the user interface allows controls to be moved and placed in user preferred locations and saved to a custom layout. The QuickPrint feature allows an image to be easily created (single click) as a PDF with accompanying annotations along with chemistry composition and spectrum.
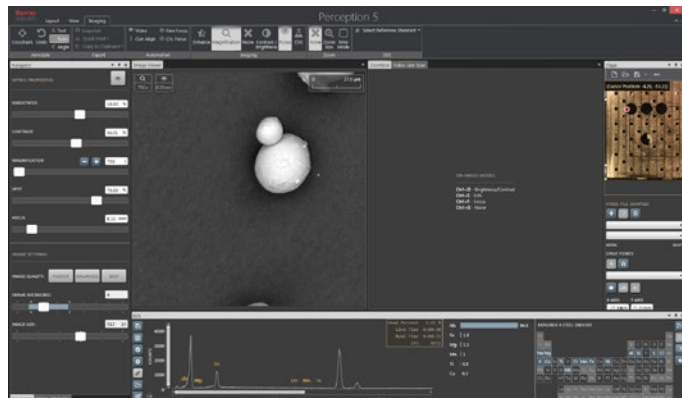


Perception Software provides customized or standard instrument control

## CleanCHK Software Sample Set-up Assistant

Implementing CleanCHK software in your automotive manufacturing process means that no longer is it a requirement for specially trained personnel to use the instrument. The CleanCHK software workflow allows an administrative user to set up all sample calibration and testing parameters and store this as a "recipe" for testing. This recipe can then be executed in four easy clicks to initiate any sample testing. Once activated, the instrument takes over and requires no further monitoring until the analysis is completed and a report is automatically generated. This feature eliminates the need for constant monitoring of the tool, allowing a user to resume their dedicated duties while the samples are being tested.



CleanCHK Software Set-Up Assistance walks users through an automated sample set-up and analysis workflow
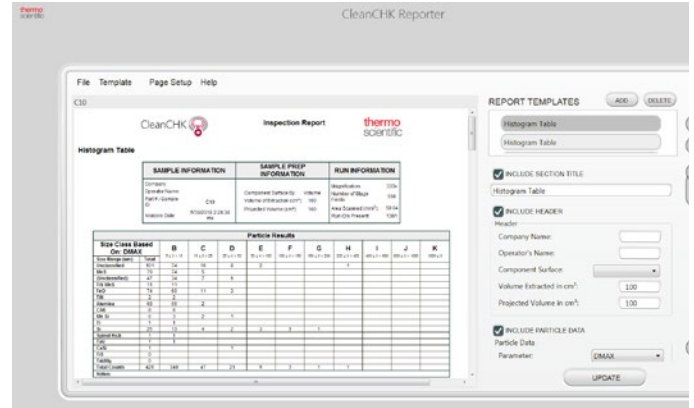
## CleanCHK Software Reporter

CleanCHK software's reporting module was designed to meet the automotive standards of both VDA 19 and ISO 16232, while also having the flexibility to allow users to customize the reports to their internally generated standards. Customized reports can be generated and exported to either PDF or Microsoft Excel formats while offering the following features:

- Automatic calculation of Component Cleanliness Code (CCC)
- Particle table featuring size and chemistry classifications
- Image of every particle or user defined number of particles
- Report individual particle parameters by chemistry classification
- Map of particle locations
- EDX spectra of each particle
- Sort particles on morphology parameters
- Create a histogram to trend data
- Reclassify data without need for reanalysis
- Relocate particles in one click
- Create custom templates for quick reporting

## Particle Inspector

Often particles of interest need further inspection based on size or chemistry. Particle inspector allows users to automatically relocate particles of interest and create reports containing individual particle images, particle parameters, and chemistry composition. This powerful program also provides an offline tabulated view of every particle freeing up the instrument for continued testing.



CleanCHK Software Reporter offers flexible reporting and customization
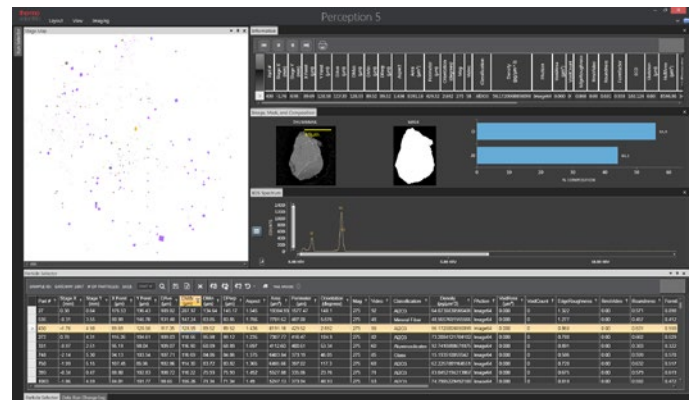


Particle Inspector allows for the creation of detailed reports on particles of interest.

# What Makes CleanCHK Software Ready for Your Environment?

The single sourced integration of CleanCHK software directly with the Explorer 4 Analyzer, allows size, image, and chemistry acquisition to be the most accurate, repeatable, and reproducible. The Explorer 4 Analyzer is the fourth generation of dedicated SEM/EDX solutions for industrial environments. Requiring just a single standard power outlet, the Explorer 4 Analyzer plugs into your local powergrid.

## Multiple Logins for Teams and Users

The CleanCHK software supports different logins; each team and user can have its own login with associated privileges. As administrator you control who has access to the various CleanCHK software functionality. As administrator you also control who can create and edit the analysis recipes. Electronic 'fingerprinting' of the analysis recipes prevents unauthorized modification of the analysis recipes. And when you are ready to scale up, electronic 'fingerprinting' of the analysis recipes provides you the ease of mind recipes are transferred correctly across the globe.

## Dedicated Production User Interface

For routine production analysis, CleanCHK software provides a dedicated user interface with 4 clicks to start. A user interface available in multiple languages makes the software even easier to use.

Click anywhere to start

Select analysis template

Enter sample information

Click 'Go'

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