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HIDEN ANALYTICAL

HPR-30
Vacuum Process Gas Analyser

A differentially pumped RGA system for vacuum process monitoring

HPR-30 vacuum process gas analyser

- To analyse processes with high dynamic range operating at pressures >10^{-4} Torr it is necessary to pump the RGA with its own pumping group and sample the process through a sampling connection
- The sampling connection to the process chamber is optimised to maintain fast response time and maximum sensitivity
- The HPR-30 uses an orifice inserted into the process chamber with a high conductance path from orifice to RGA

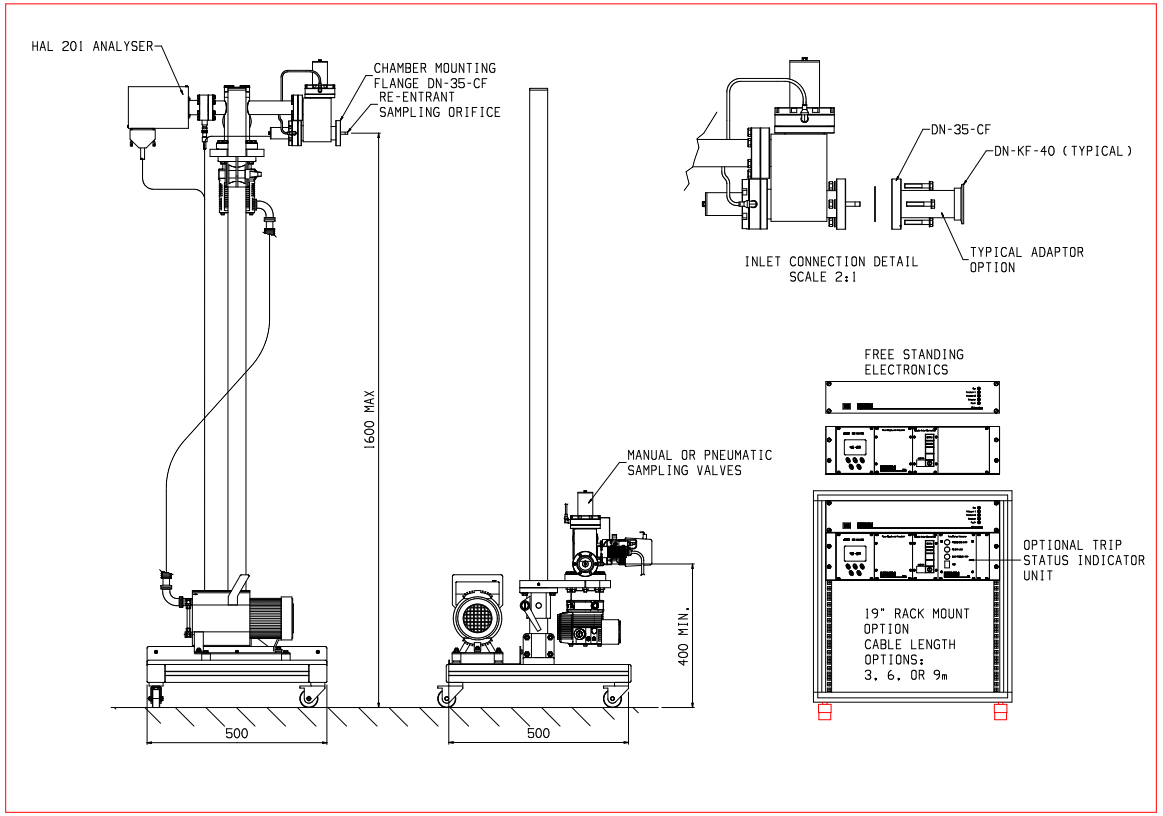
For monitoring gas composition and contaminants in sputtering, CVD, ALD, MOCVD,PECVD,PVD, evaporation, and optical coatings.

HPR-30 vacuum process gas analyser

- The re-entrant orifice provides for fast response, high sensitivity sampling
- A special high conductance sampling path provides for residual gas analysis when the chamber is at less than 10^{-3} mbar, or at base vacuum
- The re-entrant orifice is custom designed for special process monitoring requirements, for both process chamber configuration and process pressure
- Cart mounted system

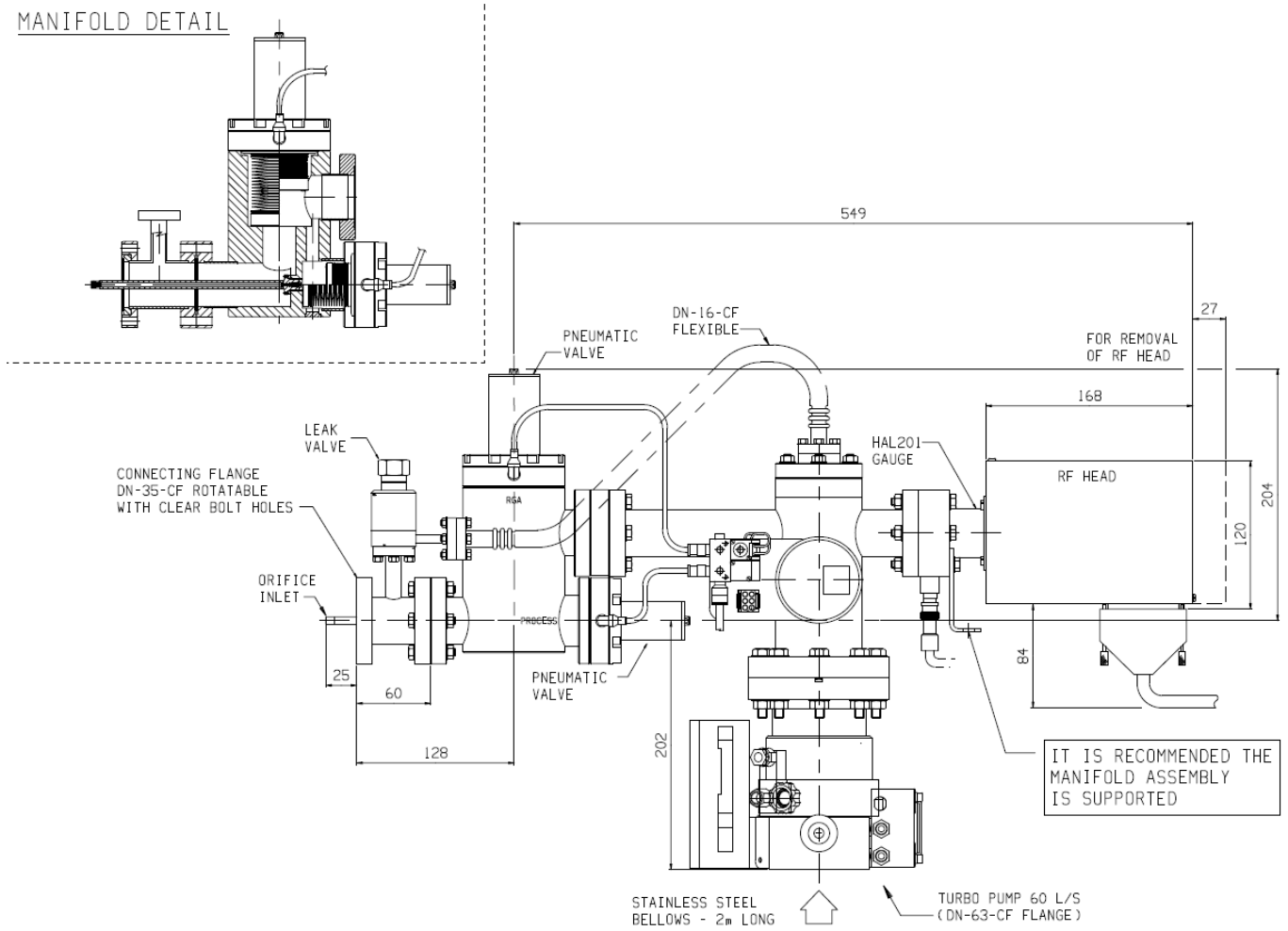
The HPR 30 system includes a complete turbo molecular UHV pump set and Penning gauge with interlock protection in case of over pressure

HPR-30 Cart – vacuum process analyser



The cart mounted design has a small footprint, adjustable height, and is easily moved from process tool to tool.

HPR-30 – Vacuum manifold detail

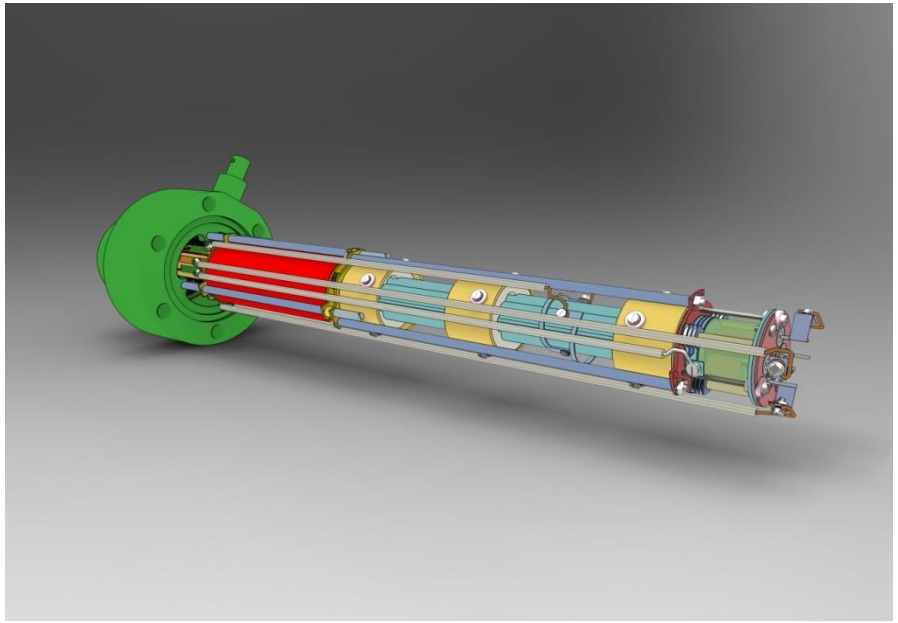


The leak valve option shown extends the sampling pressure range.

HPR-30 vacuum process gas analyser
The mass spectrometer:

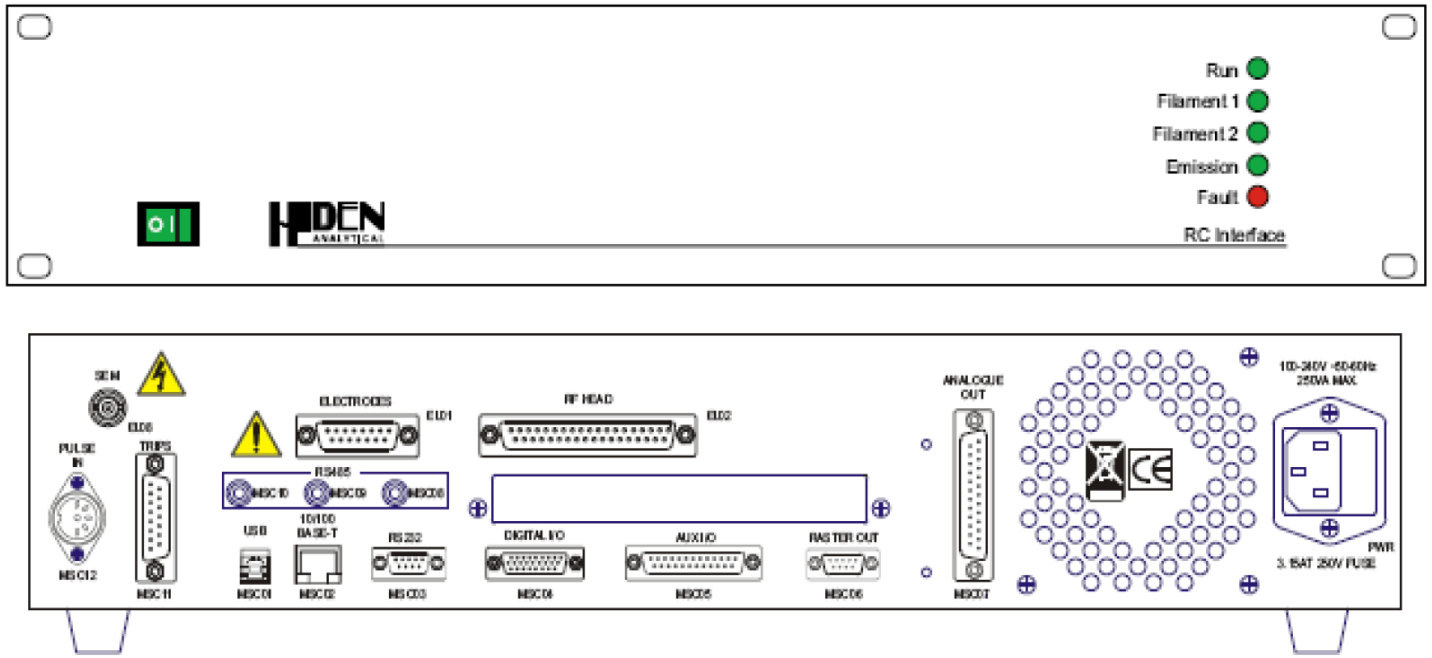
The Hiden HAL 201 RC residual gas analyser is included as standard:

- Mass range: 200 amu
- Detector: Dual Faraday cup and single channel electron multiplier
- Ion source matched to HPR-30 sampling system
- Data acquisition speed up to 650 measurements per second
- MASsoft Professional PC software



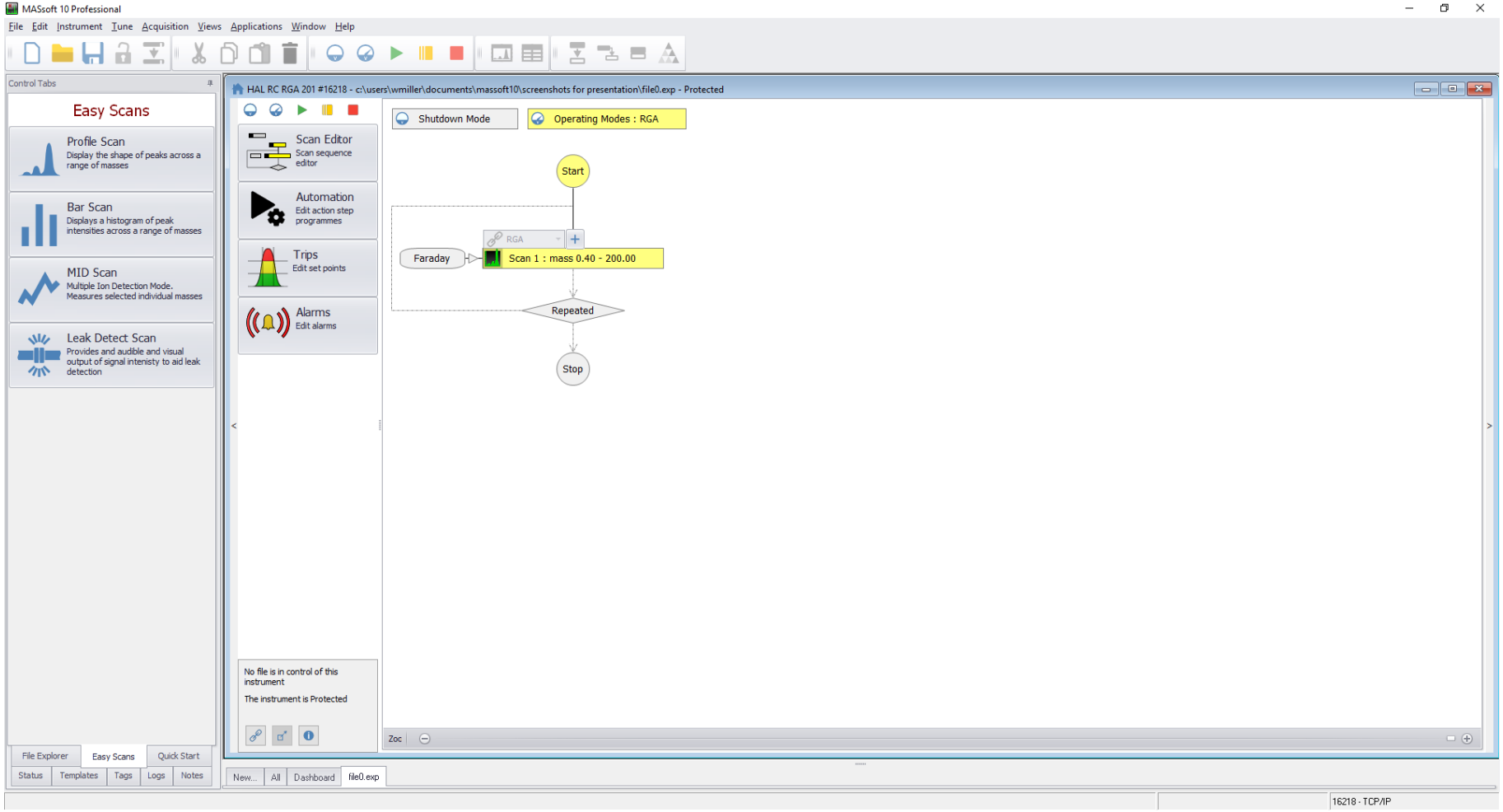
Mass range options: 300 AMU, 510 AMU or 1000 AMU

Mass Spectrometer Interface Unit



- Ethernet TCP/IP, USB and RS232 communication links
- I/O subsystem with:
  - multi protocol RS485 links for external devices, mass flow controllers, CO analyser, total pressure gauges for example
  - 5 channel TTL for process control / automatic start - stop trigger
  - Analogue inputs and analogue signal output options

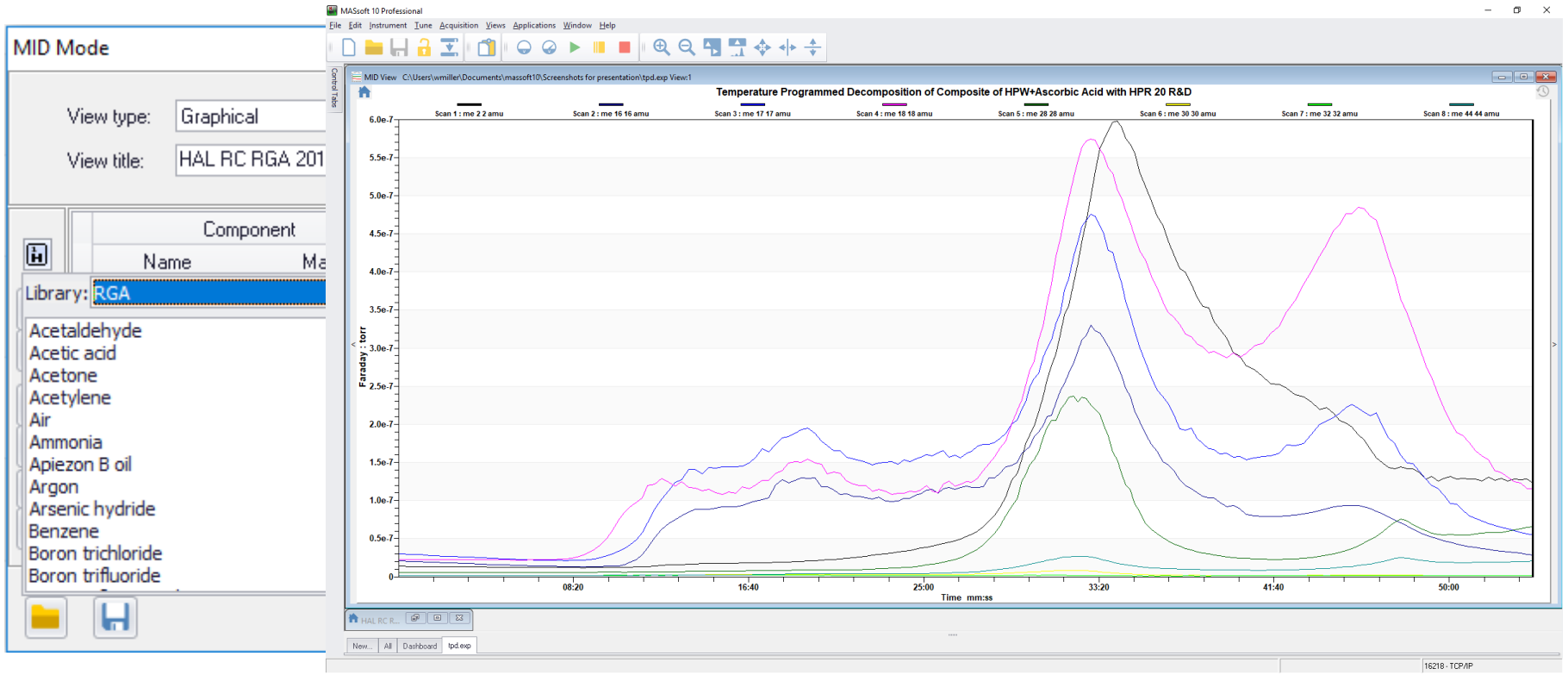
Mass Spectrometer software – easy start



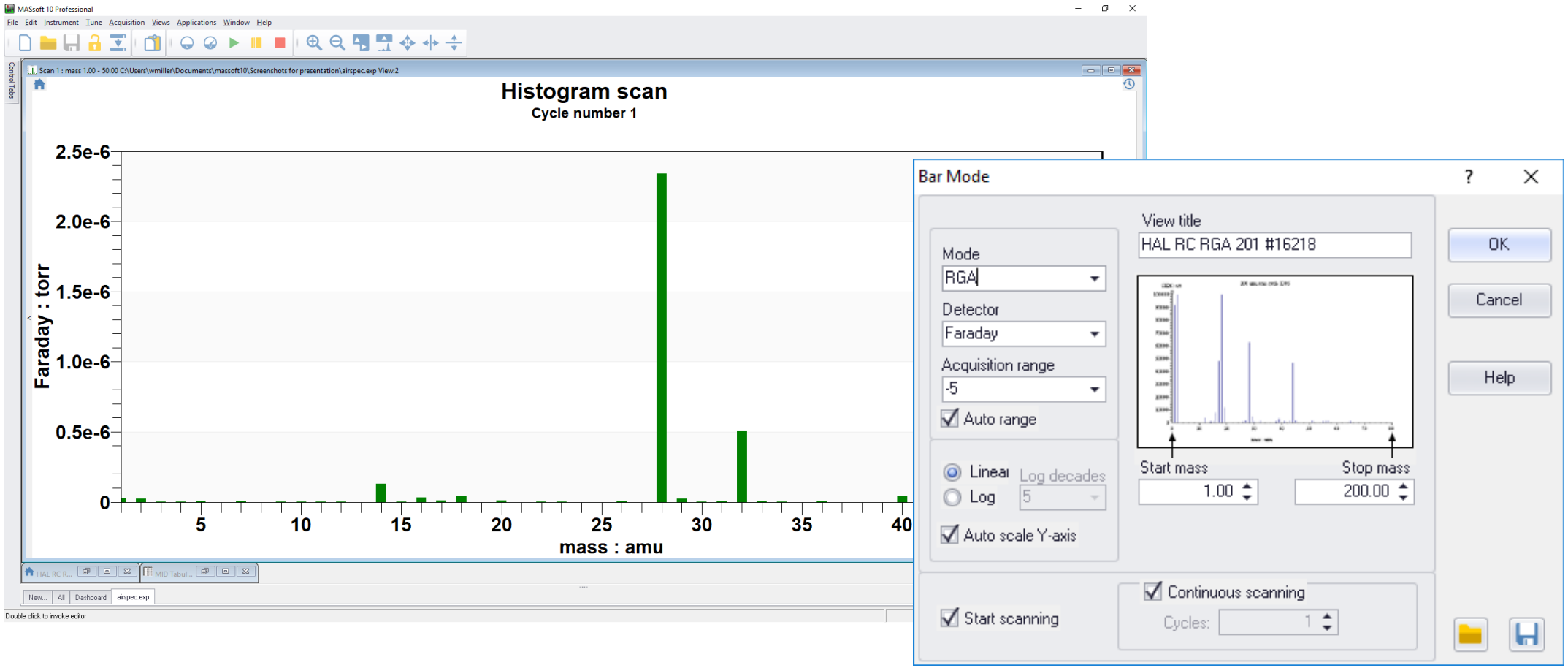
Pre-set modes of operation, templates and full control of mass spectrometers parameters.

Trend Analysis

- Unlimited number of mass channels
- Full mass spectrometer control on a per channel basis
- Automatic mass peak selection from on board user editable library
- Quantitative analysis with user editable algorithms



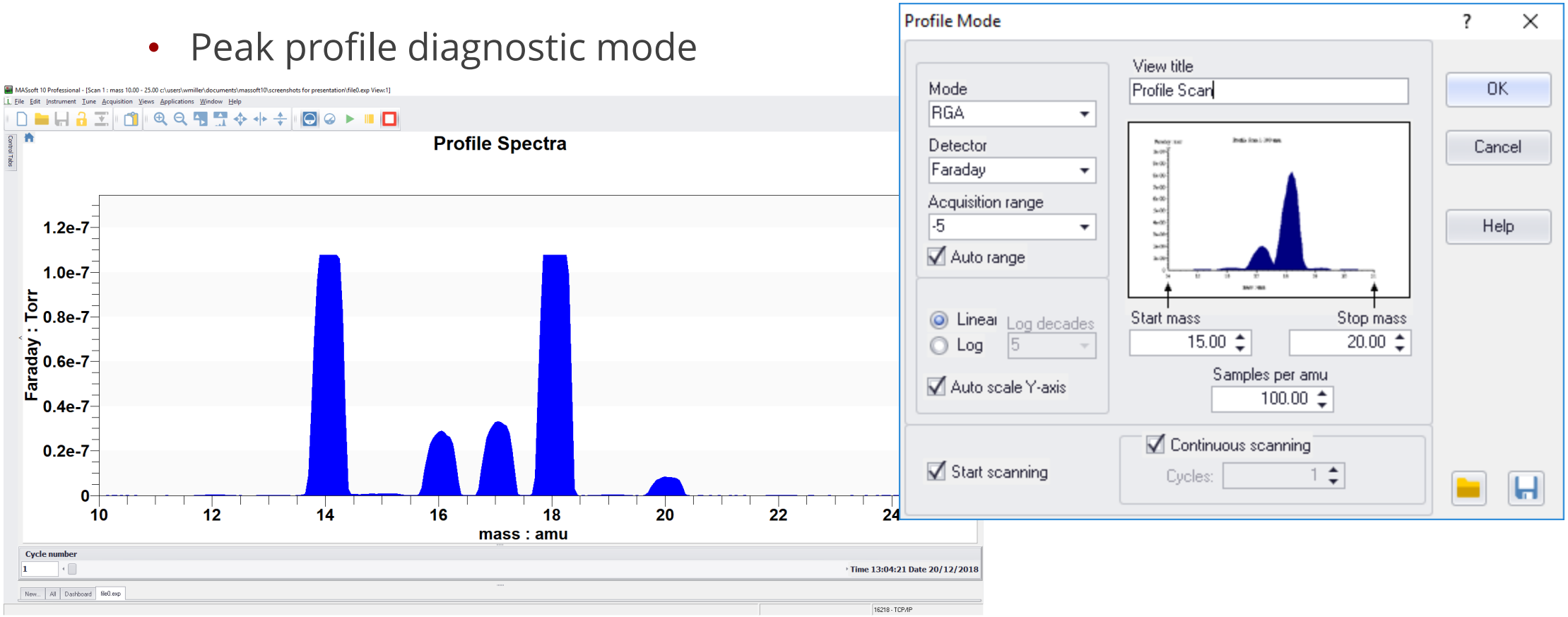
Mass Spectrometer – mass scanning -1



- Extract trend analysis for any mass peak(s) within the scan
- New 4, 6 or 8 decade dynamic range scan

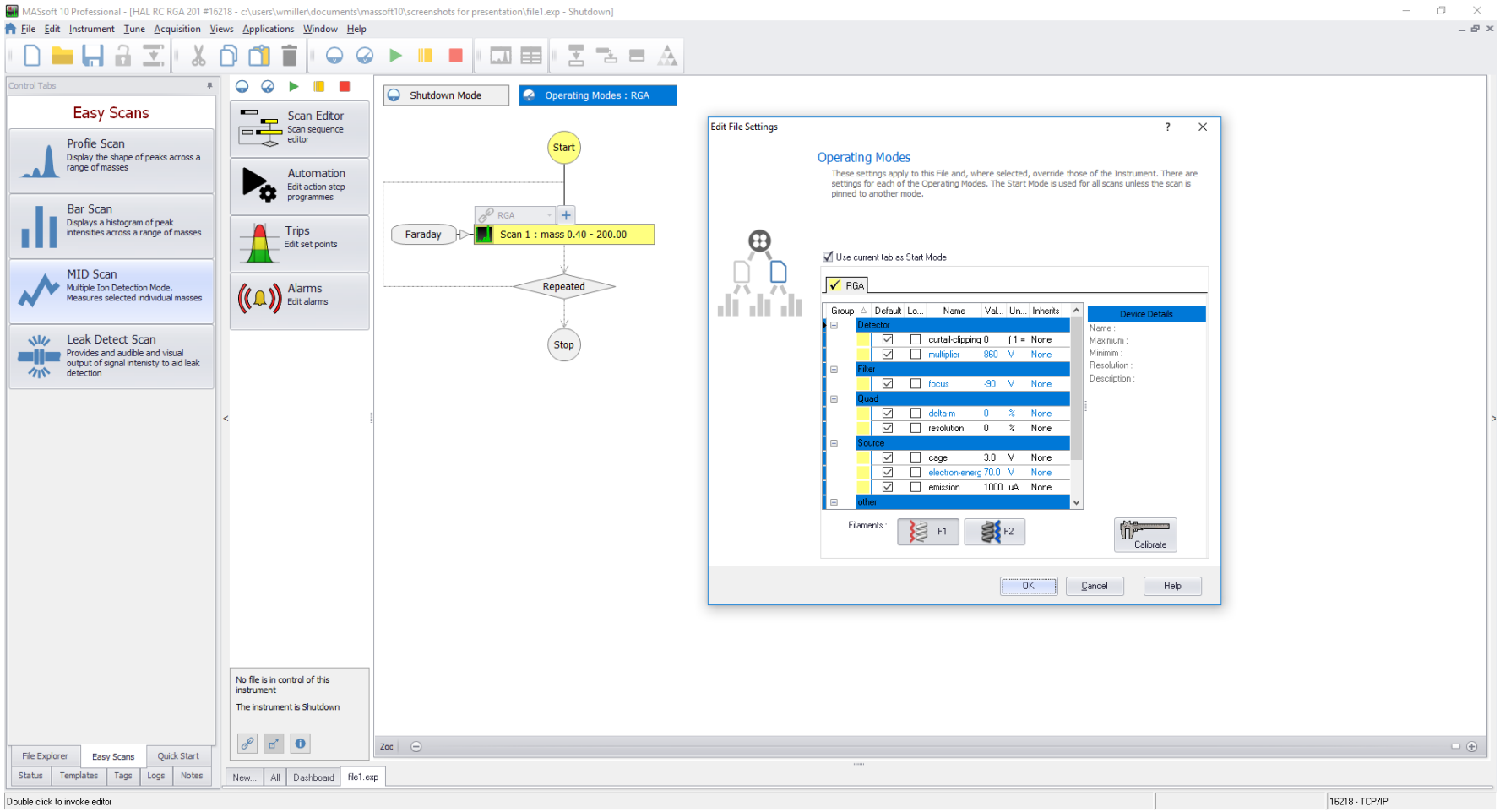
Mass Spectrometer – mass scanning-2

- Peak profile diagnostic mode



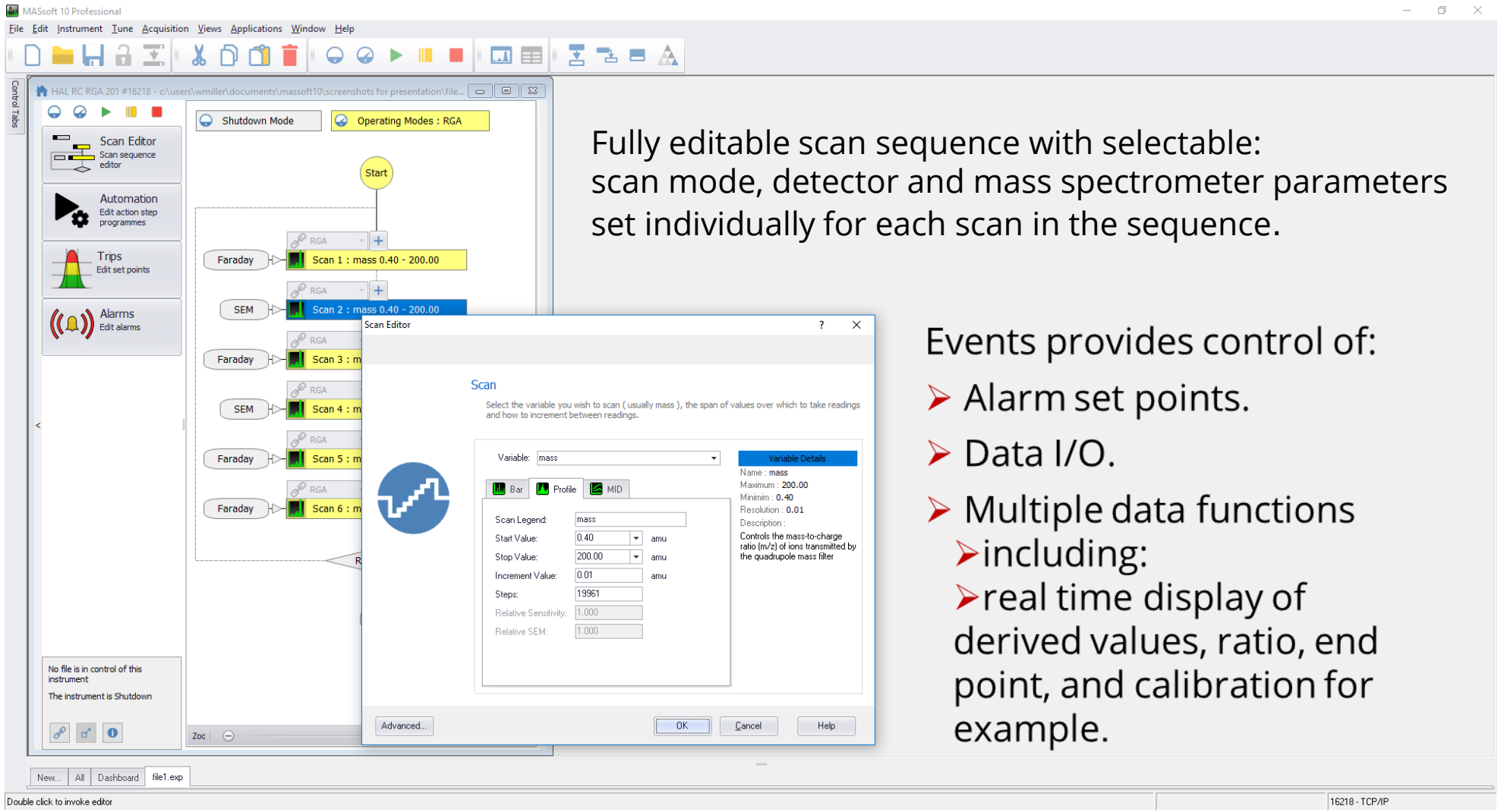
- Optimised multistage analysis - configure different analysis for different parts of the experiment

MS Control



Pre set modes of operation, templates and full control of mass spectrometers parameters.

MS Control



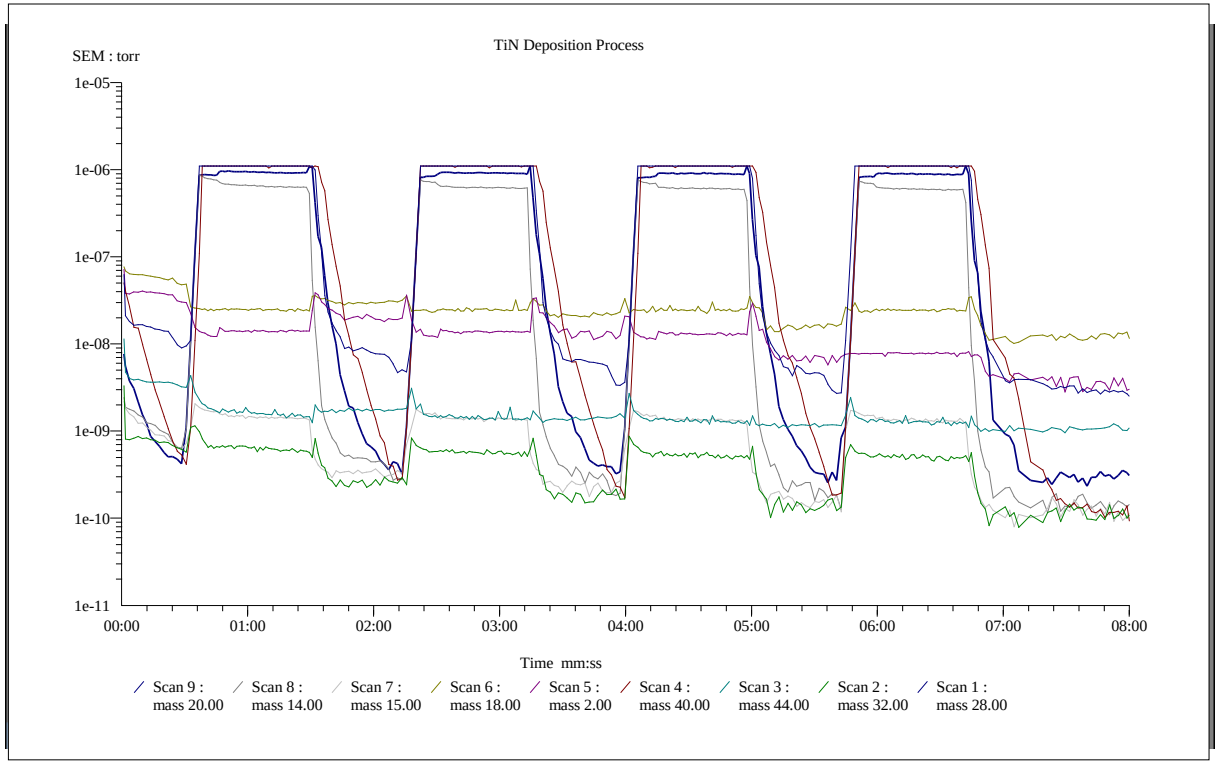
Fully editable scan sequence with selectable:
scan mode, detector and mass spectrometer parameters set individually for each scan in the sequence.

Events provides control of:

- Alarm set points.
- Data I/O.
- Multiple data functions
  - including:
  - real time display of derived values, ratio, end point, and calibration for example.

HPR-30 vacuum process gas analyser
Data examples

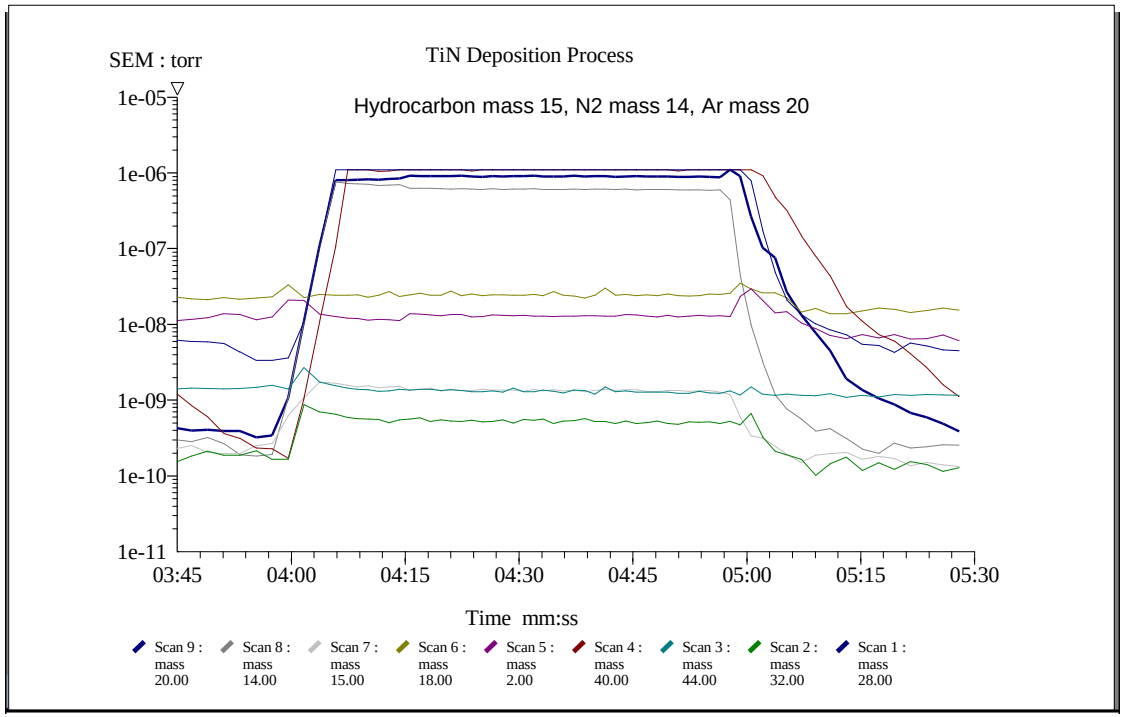
- Pump down Profiles
- Vacuum Diagnostics
- Base Pressure
- Residuals
- Backfill
- Sputter-On
- Bake-Out
- Leak Checking



Trend Analysis of: water, hydrogen, hydrocarbons CO_2, Ar, N_2 in four titanium nitride deposition cycles.

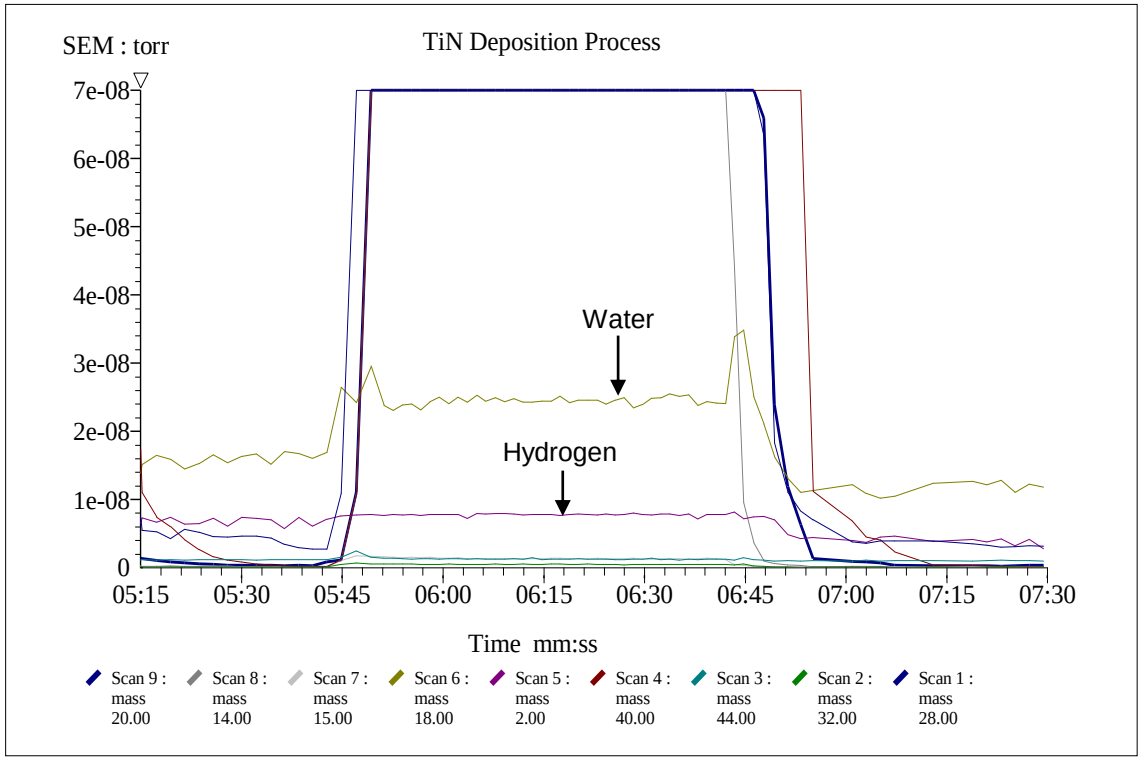
TiN Deposition: A Wafer Cycle Profile

- TiN Process Endura PVD
- Reagent Gas Levels Monitored
- 8mTorr process pressure
- Ultrapure Ti Target
- 60:40 N_2 to Ar



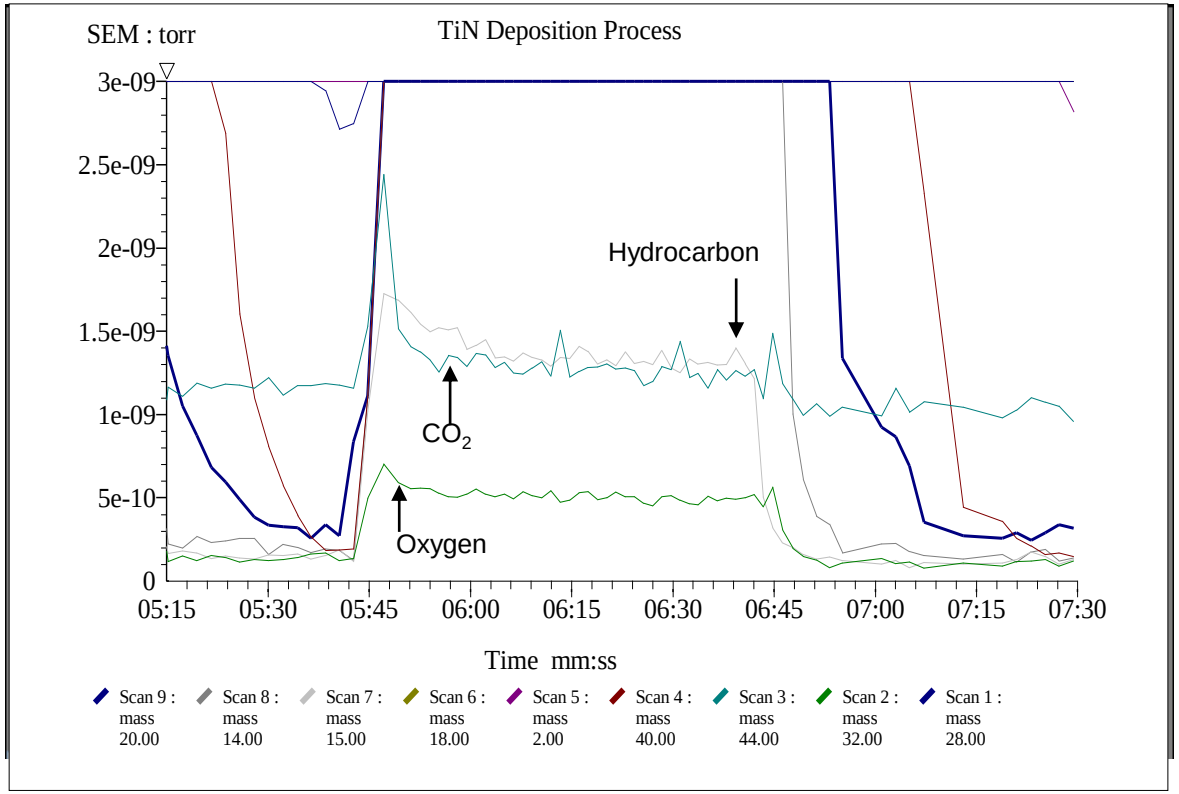
Primary Contaminant Analysis

- Zoom in on the process run data to reveal the primary process contaminants
- Water at 0.1%
- Hydrogen at 0.05%



Low Level Process Contaminants

- Further zoom to examine ppm level contaminants
- In process hydrocarbon background at 100ppm
- CO_2 at 120ppm



Installations the following sites use Hiden Gas Analysis Systems

USA	UK/Europe	Asia Pacific
Applied Materials	Bosch	Canon
Axelis	IMEC	Hitachi Fundamental Res.
CVC/Veeco	Motorola	Hyundai
DuPont	Nortel Networks	LG Electronics
General Motors	Oxford Plasma Technology	NEC
IBM Research	Philips	Samsung
Lawrence Livermore	Rolls Royce	Sony Corporation
Motorola	SGS Thomson	TDK
NIST	Siemens	Tokyo Electron
Semetech	Surface Technology Systems	Toshiba

- www.HidenAnalytical.com
- The Hiden website is an excellent resource with product pages, brochures, catalogues, product pages with some application notes, presentation and other information.
- Contact +44 1925 445225 for direct support.