 ISSN 0737-5921, ISBN 978-1-878068-44-6

Instrument/Instrument and Supplier/Supplier On-Line and Laboratory Reproducibility Considerations

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A proprietary approach to reflection and transmission measurements using the Carl Zeiss ThinProcess UV/Vis/NIR platforms will be discussed. The following topics will be included: conventional design; Zeiss design; instrument to instrument reproducibility; supplier to supplier reproducibility; measuring on-line reflection and transmission with “lab-like” uncertainty.

 DOI: https://doi.org/10.14332/svc24.proc.0038

INSTRUMENT/INSTRUMENT AND SUPPLIER/SUPPLIER ON-LINE AND LABORATORY REPRODUCIBILITY CONSIDERATIONS

-BRIAN WERNER
APEX MEASUREMENT SYSTEMS

- Your system's results do not match my laboratory system's results.

PROBLEM

APEX
MEASUREMENT
SYSTEMS

- What is the true value?

- Trueness: The trueness compares the parameters determined with the test method, with the certified values of a certified reference material.

QUESTION

APEX MEASUREMENT SYSTEMS

- Incorporated 2007
- Lower 48 States; Mexico; Latin America
- Offices: Michigan, Illinois, Texas, Florida

APEX MEASUREMENT SYSTEMS

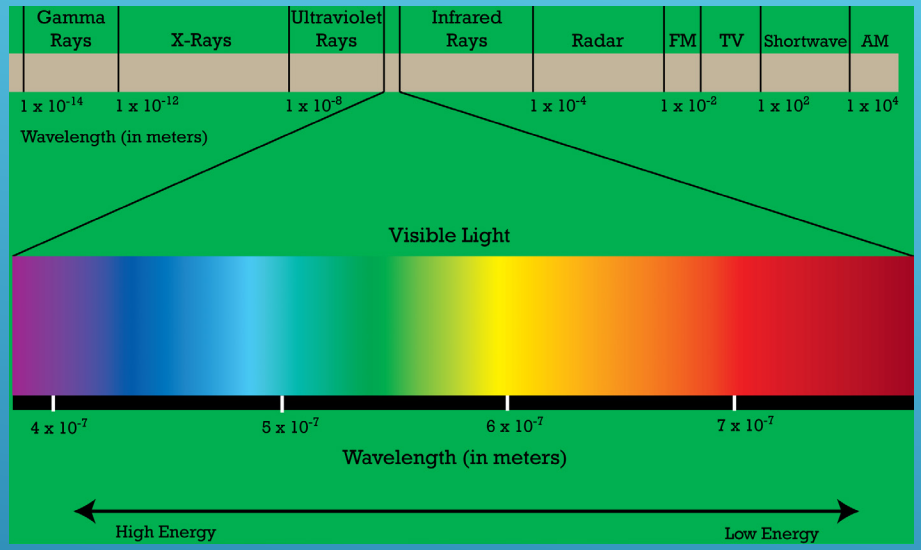
- QC Laboratory to Process On-Line Analyzer
- Spectroscopy Base: XRF, UV/Vis, IR/NIR
- Integration
- Sample Preparation and Presentation
- Standards
  - Tailored Calibration Sets
  - CRMs, RMs
  - Custom Standards/”Proxy” Standards
  - Drift Monitors, Control/Check Samples

APEX MEASUREMENT SYSTEMS

APEX
MEASUREMENT
SYSTEMS

CORE CAPABILITIES

- Spectroscopy Systems
  - UV/Vis
  - Infrared
  - XRF
- Applications
  - Absorption/Transmission
  - Reflection
  - Florescence
  - Chemometrics/Modeling
  - Emissions/Remote Sensing



APEX PRINCIPALS

- Carl Zeiss Spectroscopy
- Fluxana GmBH
- Festo

APEX MEASUREMENT SYSTEMS

Gratings

Spectrometer Modules

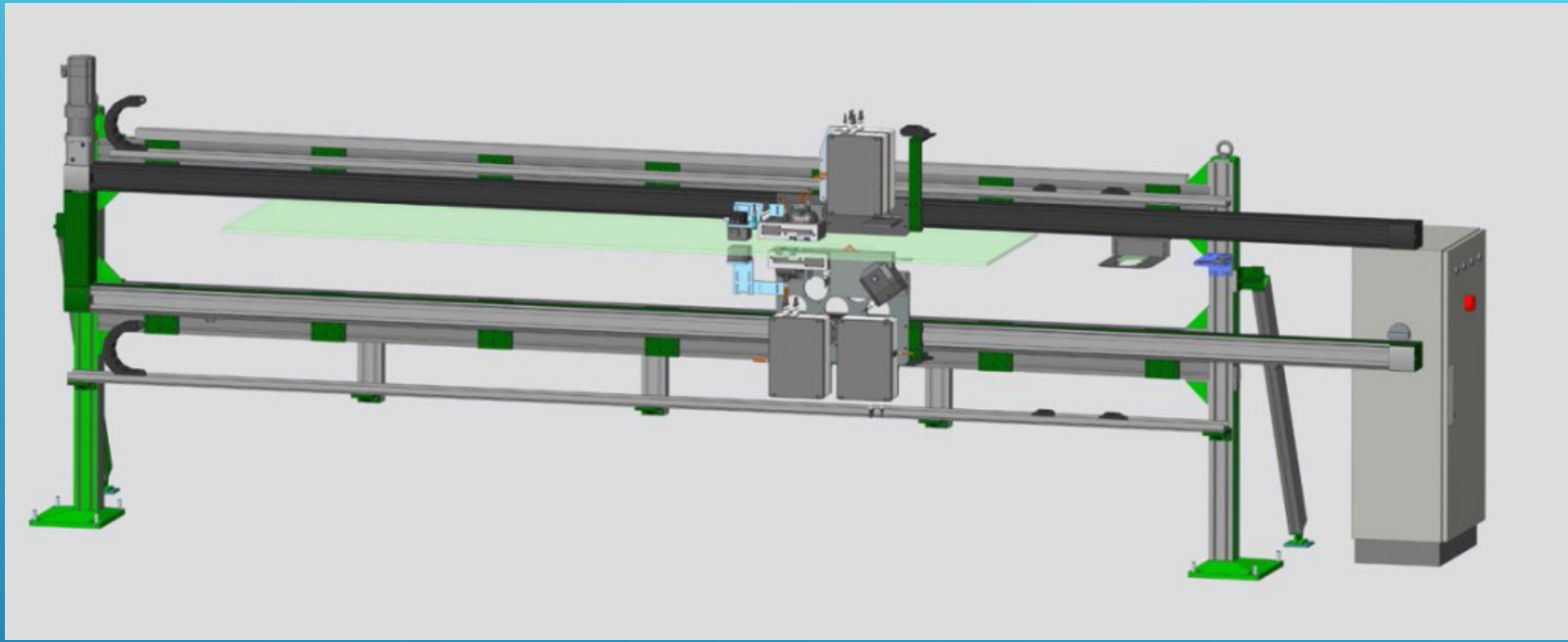
Spectrometer Systems

Solutions

Component Level Manufacturing
Spectrometer Modules
Spectrometer Systems
Integrated Turnkey Solutions

ZEISS PRODUCTS

APEX MEASUREMENT SYSTEMS



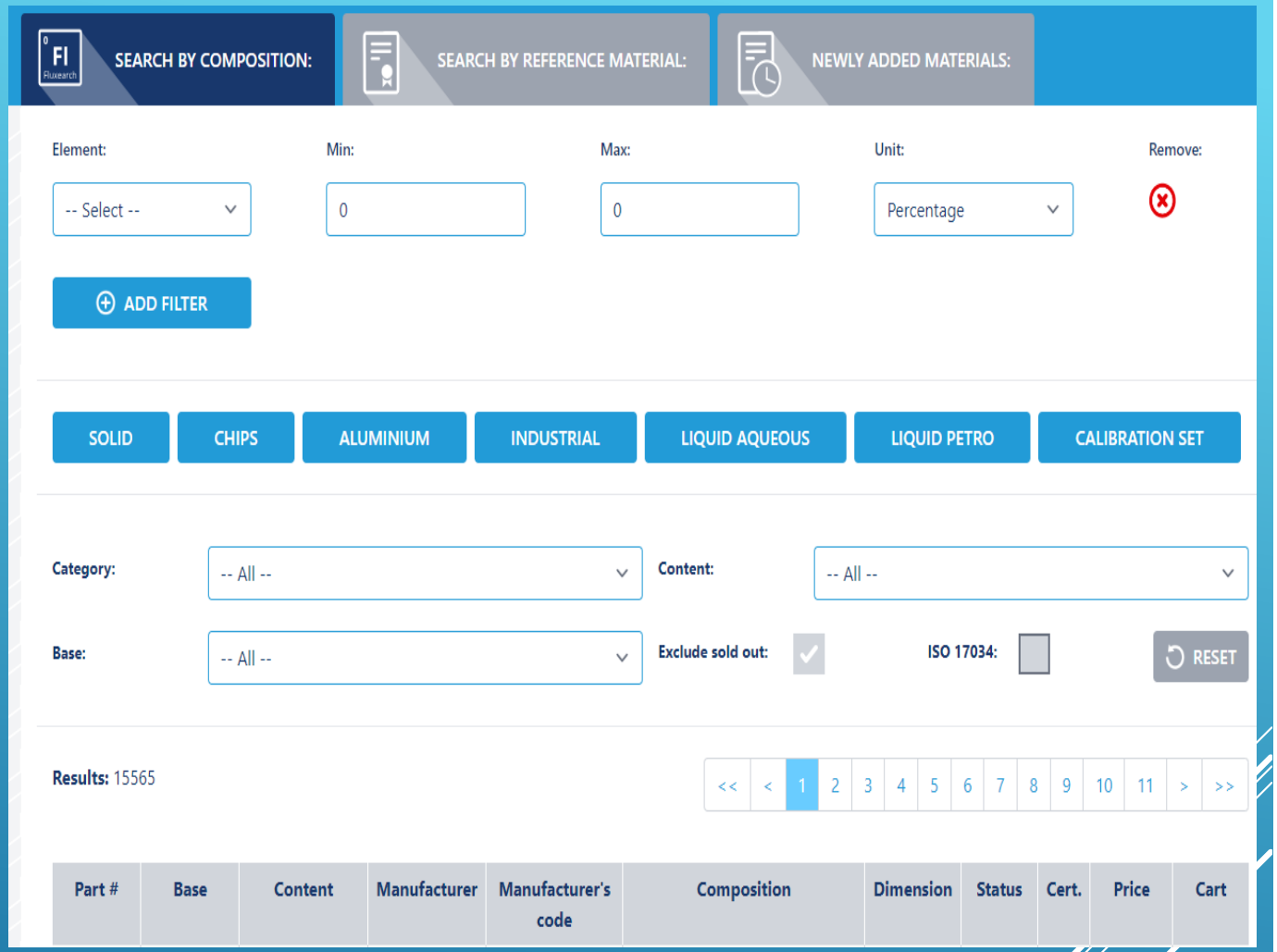
ZEISS THINPROCESS Q

APEX
MEASUREMENT
SYSTEMS

FLUXANA PRODUCTS

APEX MEASUREMENT SYSTEMS

- No Fee
- Over 15,500 Active Standards
- Over 9500 out of circulation catalogued
- Metal; Solid and Chips
- Mining/Minerals (Raw Materials)
- Glass/Ceramic
- Plastics
- Liquids



FLUXEARCH DATABASE

APEX MEASUREMENT SYSTEMS

CUSTOM STANDARDS/"PROXY" STANDARDS

- Commercially Available Standard Does not Exist
- Nature of Process: Difficult to Make a Standard
- Stability/Robustness
- Common in Coated Products

APEX MEASUREMENT SYSTEMS

- Your system's results do not match my laboratory system's results.
- What is the true value?

▶A 3rd Party CRM

ANSWER

APEX MEASUREMENT SYSTEMS

- Practical Goals
  - Reasonable Cost
  - Batch/Lot Size
  - Robust

3RD PARTY CRM

APEX MEASUREMENT SYSTEMS

3RD PARTY CRM

- Define the Parameter(s)
  - Color, TBD
- Determine Homogeneity
  - In progress, 1st batch of standards prepared
- Certification
  - Round Robin or other traceable means
- Stability
  - Long Term Studies

APEX MEASUREMENT SYSTEMS

- Repeatability: Repeatability is understood to be the standard deviation of a measured parameter that is determined with the same test method on an identical sample, by the same “user” with the same instrument in a specified amount of time.
- Reproducibility: Reproducibility is understood to be the standard deviation of a parameter that is determined with the same analytical principal, but under modified conditions, e.g. different plants, different laboratories, different users, different instruments, etc.
- Uncertainty: an estimation of the analytical error for an analysis assuming a certain probability of error based on random errors and systematic errors
- Trueness: The trueness compares the parameters determined with test method, with the certified values of a certified reference material.
- RM: A reference material sufficiently homogenous and stable for one or more parameters, and is considered to be suitable for use in a measuring process.
- CRM: an RM that has been analyzed with a traceable analytical method, for one or more parameters. Always provided with a certificate detailing uncertainty and metrological traceability
- Secondary RM: a sample for which the parameters were assigned using a comparison with a primary measurement standard (e.g. a CRM

TERMINOLOGY/DEFINITIONS

APEX MEASUREMENT SYSTEMS

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