



# Bruker's Q4 TASMAN™ Series 2 benchtop OES

Enhanced analytical performance, flexibility, and usability



# Q4 TASMANTM Series 2 OES Metals Analyzer



- History of Q4 TASMANTM
- Q4 TASMANTM Series 2
  - Visual Changes
  - Concepts, Key Components
  - Configurations
  - Improvements
- Inside ELEMENTAL.SUITE
- "Hands-on" (in applications lab)
- Q&A Session



**Thiago Souza**  
Application Scientist OES  
Karlsruhe, Germany



**Dr. Peter Papelewski**  
Productline Manager OES  
Karlsruhe, Germany

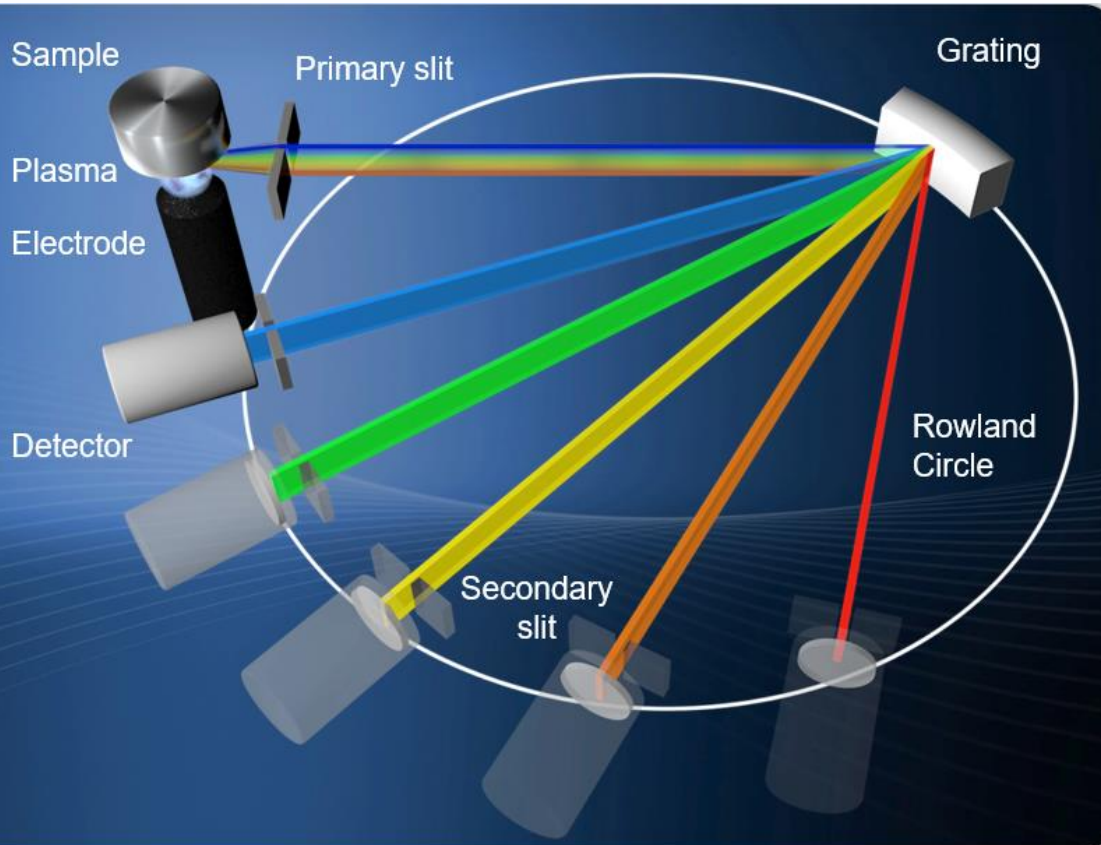
# spark-Optical Emission Spectrometry Requirements and Expectations



The workhorse for all metal analysis tasks

- Analytical tool with high flexibility
- Full alloy analysis with excellent data quality (compared to XRF: superior for light elements, better suited for traces and lower concentrations)
- Speed: Time-to-result 25-35 s
- Easy sample preparation
- Reliability: high uptime and robustness of hardware and method, even in the 3<sup>rd</sup> shift
- Cost-effective: moderate acquisition costs, low operational costs, able to adopt to changing requirements

# Optical Emission Spectrometry Principle

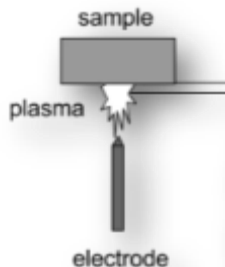
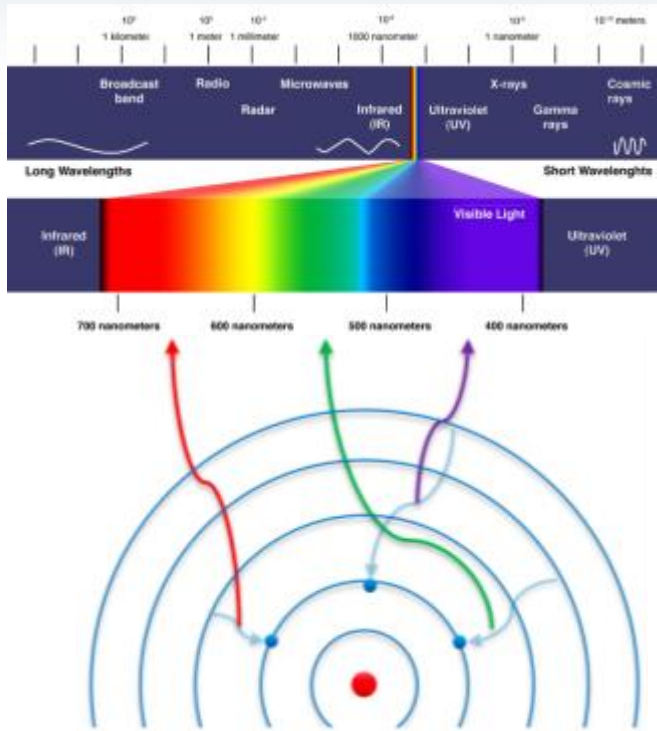


- Emitted light is guided into the optical system and dispersed by a diffraction grating.
- Detectors on specific positions on the Rowland circle are quantifying emitted light.

Useful wavelength in OES: 120 – 800 nm

- The intensity of a specific line correlates directly to the abundance (concentration) of the element in the sample.

# Optical Emission Spectrometry Continuous Improvements



The principles of spark-OES remain. Historical and recent improvements in hardware, methodology and especially software result in many benefits:

- Shorter measurement times
- Better analytical quality
- Reduced argon consumption and operational costs
- Higher system uptime, little maintenance requirements
- Advanced data evaluation algorithms (e.g. analysis of non-metallic inclusions)
- More intuitive user interfaces and easy to use software



# History of the Q4 TASMANTASMAN Continuous Development



- 2008: Introduction of Q4 TASMANTASMAN
  - UV/VIS-optics for non-ferrous metals
  - 2009: introduction of dedicated VUV-optics for ferrous metals
- 2010-2017: Continuous Development
  - Availability of all 10 major metal bases (Fe, Al, Cu, Ni, Co, Mg, Ti, Pb, Sn, Zn)
  - New generations of digital spark generator (source) with improved source curves
  - Improved high-resolution CCDs, introduction of ClearSpectrum™ technology
  - Improved spark-stand with co-axial argon flow, new gas distribution module
  - Switch to next generation software platform: ELEMENTAL.SUITE

As the evolution of metals continues, Bruker continuously drives the improvement of solutions that let you achieve your goals faster, more reliably, and more cost-effective:

## Q4 TASMANTASMAN Series 2



# Q4 TASMAN Series 2 Visual Changes



- Bulky side covers with edges
- Old fashioned design



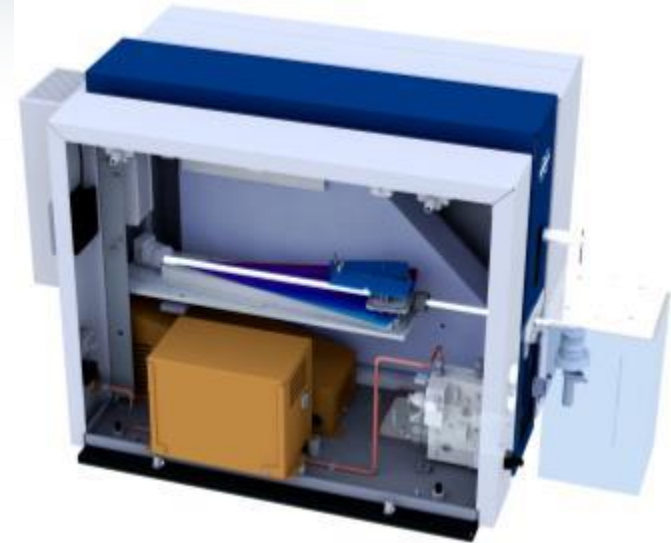
- New side covers
- Improved housing
- New color & design
- Push buttons with status indication

# Q4 TASMAN Series 2 MultiVision™ – Dual optics concept

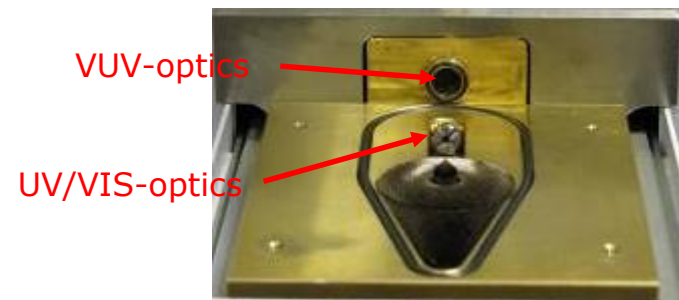


## MultiVision™ – Optimal Solution for Your Applications

- Vacuum UV (VUV)-optics
  - $\lambda$ : 130– 200 nm @ high-resolution (for challenging analytical emission lines)
  - Short, direct light path to spark stand
  - Argon purged for highest UV-transparency
  - Sensors with high quantum efficiency
  - Low internal volume, improved purge design, and careful selection of materials
    - outstanding performance
    - reduced argon consumption
    - high reliability



High efficiency VUV optics with small inner volume and superior, direct light coupling



Spark-stand chamber after 100 burns



# Q4 TASMAN Series 2 MultiVision™ – Dual optics concept

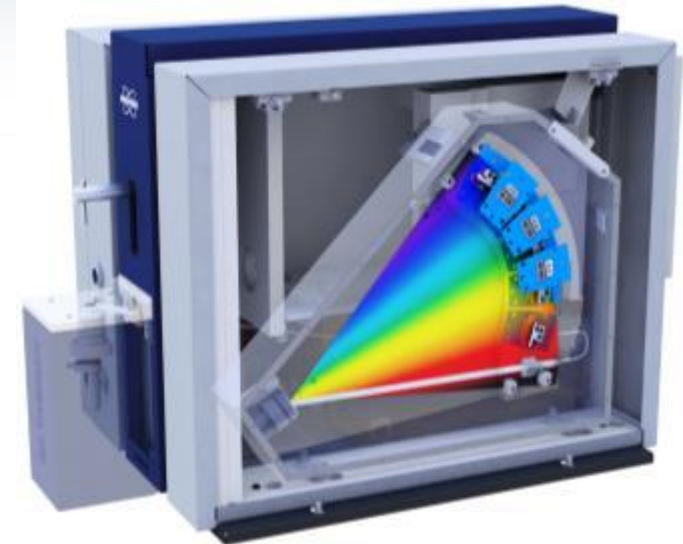


## MultiVision™ – Optimal Solution for Your Applications

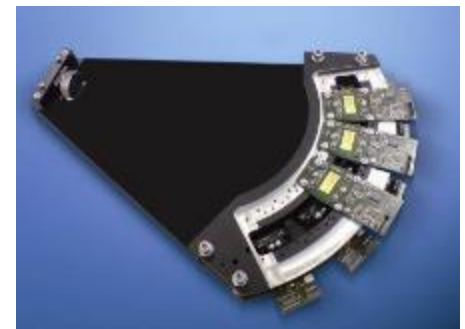
- UV/VIS-optics
  - $\lambda$ : 190– 620 nm coverage
  - Optimized Rowland Grating (ORG)
  - Fiber-light guide (deep UV-transmission, long-life)
  - Highest reliability

Additionally, both optics feature

- High resolution sensors
- Temperature stabilization
- Optional active thermal control system



No-purge (air) UV/VIS-optics; light transmission by optical fiber



# Q4 TASMAN Series 2 Configurations



## MultiVision™ – The Optimal Solution for Your Applications

MultiVision allows the optimal choice between three variants to match your analytical needs in the most economical way:

- **Q4 TASMAN 200**  
Ideal for all **non-ferrous** applications  
(elements in the VUV-range not required)
- **Q4 TASMAN 170**  
The choice for **ferrous** applications with  
important elements like: C, P, S, As, Sn, B
- **Q4 TASMAN 130**  
The most powerful variant, capable of analyzing  
**nitrogen** (N) in steel, **oxygen** (O) in copper



# Q4 TASMAN Series 2 SmartSpark™ – Advanced Digital Source

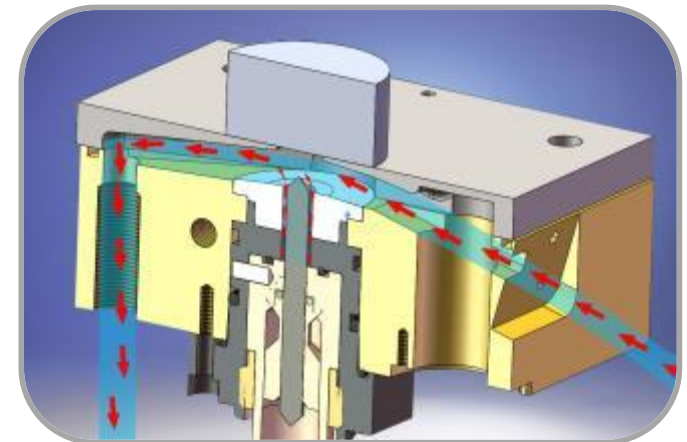


## SmartSpark™, the new, optimized digital spark source

- Produces ultra-stable sparks with 1–1,000 Hz, spark frequency and variable discharge times
- Source waveform control with 1  $\mu$ s resolution
- Provides high excitation power (peak current), suitable for all matrices
- Uses matrix-optimized high-energy pre-sparking
- allows application-specific fine-tuning of spark-parameter settings

## ...delivering

- improved analytical precision
- shorter time-to-result
- improved long term stability
- lower argon consumption (combined with an optimized co-axial argon flow design)

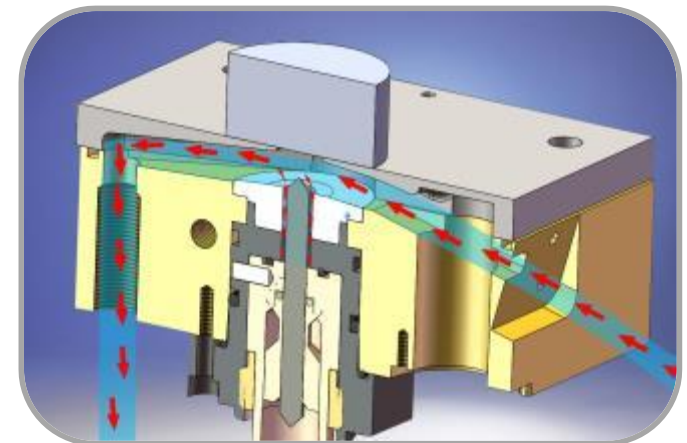


# Q4 TASMAN Series 2 Spark-Stand with Flexibility Built In



## Low-maintenance spark stand

- large and robust sample stage accepting bulky samples
- Unique pneumatic driven sample clamp
  - 120 mm sample height
  - improved operational safety and convenience
  - constant pressure on sample
- Optimized co-axial argon flow
  - directs the gas where it is needed: at the burn spot
  - efficiently directs condensate away (especially useful on "soft" matrices)
  - eliminates need for stand-by flow
  - improves analytical data with irregular shaped or small samples (pieces, wires, tubes, foils, ...) using adapter kits

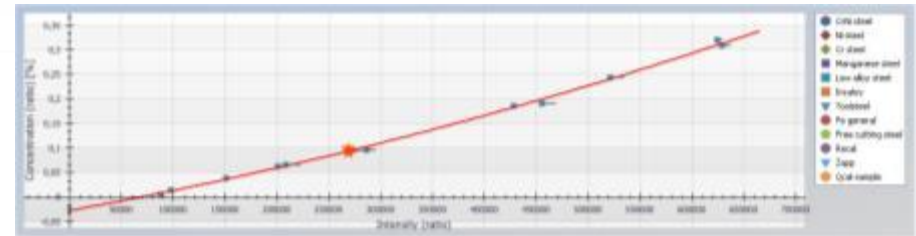


# Q4 TASMEN Series 2 Analytical Programs



## Analytical Solution Packages (ASPs)

- ready-to-use analytical programs within a matrix for all alloy groups: precisely tuned analytical performance
- include calibrations and parameters for all relevant element sets
- include standardization samples



Q4 TASMEN 130    Q4 TASMEN 170    Q4 TASMEN 200

Al Base	Al Base	Al Base
Co Base	Co Base	
Cu Base	Cu Base	Cu Base
Fe Base	Fe Base	
Mg Base	Mg Base	Mg Base
Ni Base	Ni Base	
Pb Base	Pb Base	Pb Base
Sn Base	Sn Base	Sn Base
Ti Base	Ti Base	Ti Base
Zn Base	Zn Base	Zn Base
Information		
Type Comparison		

Q4 TASMEN Series 2 - Analytical Program



Periodic Table of the Elements

rev. Dec-2020



# Q4 TASMAN Series 2 Analytical Improvements



The new analytical solution packages for the Q4 TASMAN Series 2 available include

- Al: 8, Co: 4, Cu: 10, Fe: 8, Mg: 4, Ni: 6, Pb: 5, Sn: 4, Ti: 4, Zn: 8  $\Sigma = 61$
- Within a given matrix: Extendable any time, without service intervention
- High concentration range extended for many elements

New additions:

- Sc in Al-base: 8 ppm – 0.6% in ASPs:
  - Al 100 (global)
  - Al 140 (Al-Mg alloys)
- C in Ti-base: 28 ppm – 0.16% in ASPs:
  - Ti 100 (orientation)
  - Ti 130 (Ti-Al/V/Nb)

Brand new (available Q1/2021):  
“High” nitrogen in steel by the Q4 TASMAN 170

**Lab Report Q4 TASMAN**  
Analysis of Iron & Steel

The analysis of iron and steel is the most prominent analytical application for today's spark spectrometers. Besides the traditional commercial applications for this metal, a more demanding automotive industry has recently led to rapid alloy developments. These alloys have become popular in automotive manufacturing thanks to its light weight and improved properties.

Q4 TASMAN's rugged, compact design makes it suitable not only for laboratories but also for the shop floor. An integrated air-circulation system ensures high thermal stability even in hot and humid environments where necessary. Maintenance work is drastically reduced: self-cleaning spark stand, long-lasting electrodes, argon stop function helps to save time and cost.

**Certified Reference Material (CRM)**

Certified Reference Material (CRM) are reference material characterized by a metrologically valid procedure for one or more specified properties, accompanied by a certificate that provides the value of the specified property, its associated uncertainty, and a statement of metrological traceability.

The CRMs are certified by a recognized certifying organization using approved certification procedures as reproduced in the most recent ISO Guide 35. The organization is usually a function of a federal government or recognized by a federal government or an accreditation organization. A CRM is the highest level to which an analytical reference material can be elevated because it is already traceable to SI units and because of the attributed confidence in the company or organization which produced the material.

Material Designation	Description	Typical Measurement Time (s)
1420	Orientation	30
1421	Low-Alloy Steel	30
1423	Free Cutting Steel	30
1426	Cast Iron	30
1428	Fe-Cu-Ni Steel (Eutectic Base)	30
1430	High Speed Steel	30
1439	Microalloy	30
1438	Microalloy Steel	30

# Inside ELEMENTAL.SUITE Metal Analysis Made Easy



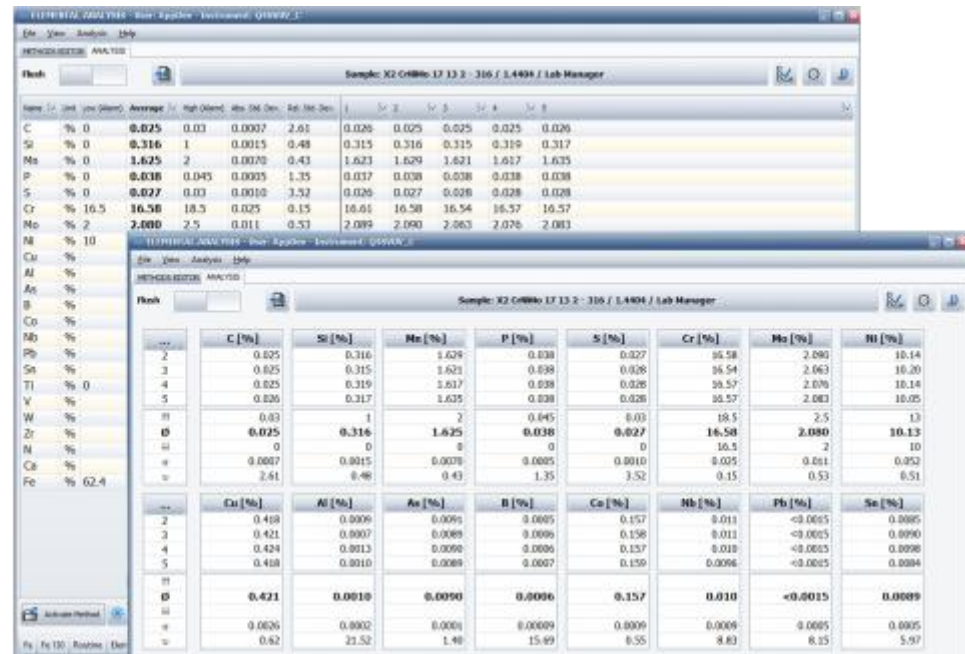
ELEMENTAL.SUITE is Bruker's next generation software combining high functionality with ease-of-use

- Maximum flexibility by plug-in based architecture
- Operates all Bruker OES systems, covering the entire range of applications (incl. automation)



## Intuitive Productivity

- Workflow guide you through complex tasks without restricting routine operation
- Automatic average and limit check
- Easy to use screens, layouts with scalable fonts
- Professional Reporting System
- Integrated powerful Analysis Viewer
- Statistical Process Control included
- Universal Export and Publishing to files or SQL-databases



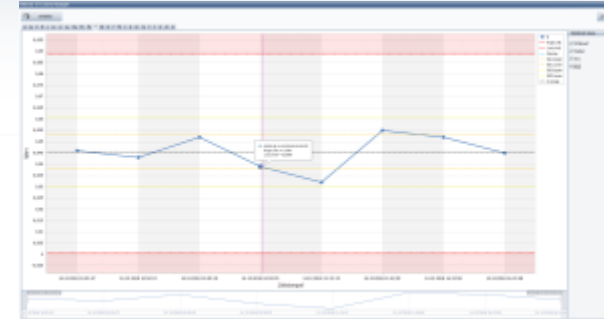
Easy-to-use and read screens with scalable font size

# Analysis Viewer: Information at Your Fingertips



The new Analysis Viewer makes advanced data mining a snap. Queries to the database can be easily created, customized and stored.

- Powerful but easy-to-use grouping and filtering functionality on queries provide the flexibility of a pivot table



Just 1 click away:

- Queries to the Total Material or internal grade library
- Generation of SPC charts
- Reporting, printing, or exporting

Exploring your data with different views becomes easy: filtering and grouping settings are saved for future use and can often be used in place of an expensive LIMS system

A screenshot of the Analysis Viewer software interface. The window title is "Analysis viewer". On the left, there is a "Choose Time Period" panel with "Dynamic Time Period" selected and a "1 week" dropdown. Below it is a "Static Time Period" section with "From" and "To" date pickers. The main area shows a table with columns: "Timestamp", "Workflow", "Calculation Method", "Material", "Method", "Proben ID", "Hist.No", "User", "C", "Si", "Mn". A search bar is visible above the table. A dropdown menu is open, showing filter options: "Equals", "Does not equal", "Contains", "Does not contain", "Is like", "Is not like", "Begins with", "Ends with", "Is greater than", "Is greater than or equal to", "Is less than", and "Is less than or equal to". The table data includes timestamps like "11/17/2020 1:42 PM" and "11/17/2020 4:52 PM", and element concentrations for C, Si, Mn, and P.

# Total Materia : Beyond Grade Libraries



In addition to its internal library ES optionally integrates today's most comprehensive materials database: Total Materia

- > 350,000 alloys from >75 countries
- Queried by patented search algorithm: SmartComp
- Bruker's OEM version does not require internet connection, up to 200 exports to the internal library

Total Materia not only contains chemical compositions, but also

- > 15 million properties (physical, chemical, mechanical, and metallurgical data), including suppliers and proprietary data sheets

Expert knowledge to complex questions:

- Finding equivalents to foreign materials and comparing alternatives side by side
- Deciphering material specifications and finding the correct grade for a specific application

The screenshot shows the Total Materia search interface. The search criteria are 'X2CrNiMo17-12-2 - EN / European Union' with a score of 0.91. The results table is as follows:

Index	Material	Match Rate	Element	Min. Value	Max. Value	AVG	Std. Deviation (%)
1	X2CrNiMo17-12-2 - EN / European Union	0.91	C	0.0250	0.031		
2	X2CrNiMo17-12-2 - EN / European Union	0.91	Si	0.2960	1.0		
3	L-4404 - EN / European Union	0.91	Mn	1.6440	3.0		
4	L-4401 - EN / European Union	0.91	P	0.0290	0.046		
5	A4-200 - EN / European Union	0.91	S	0.0250	0.031		
6	A4-201 - EN / European Union	0.91	Cr	30.5	30.75	18.5	
7	X2CrNiMo17-12-2 - EN / European Union	0.91	Mo	3.0	0.0790	2.0	
8	X2CrNiMo17-12-2 - EN / European Union	0.91	Ni	30.8	10.19	13.0	
9	L-4500 - EN / European Union	0.91	Ca	0.0440			
10	L-4500 - EN / European Union	0.91	Al	0.0063			
11	A4-50 - EN / European Union	0.91	As	0.0095			
12	A4-50 - EN / European Union	0.91	B	0.0095			
13	A4-60 - EN / European Union	0.91	Cu	0.1620			
14	A4-625 - EN / European Union	0.91	Nb	0.0110			
15	A4-625 - EN / European Union	0.91	Pb	0.0077			
16	A4-600 - EN / European Union	0.91	Sa	0.0110			
17	A4-120 - EN / European Union	0.91	Ti	0.0043			
18	A4-210 - EN / European Union	0.91	V	0.0570			
			W	0.0090			
			Fe	0.0160	0.1		
			Co	0.0025			
			Pb	0.017			

The screenshot shows the Total Materia search interface for '1.4404' with a score of 10.00. The results table is as follows:

Index	Material	Match Rate	Element	Min. Value	Max. Value	AVG	Std. Deviation (%)
1	1.4404	10.00	C	0.0250	0.031		
2	1.4405	10.00	Si	0.2960	1.0		
3	1.4542	10.00	Mn	1.6280	3.0		
4	1.4543	10.00	P	0.0290	0.045		
			Cr	0.0270	0.031		
			Ni	10.54	30.5		
			Mo	2.0040	2.5		
			Fe	10.17	13.0		
			As	0.0112			
			S	0.0095			
			Al	0.0063			
			Si	0.1580			
			Co	0.0025			
			W	0.0090			
			Fe	0.0160	0.1		
			Co	0.0025			
			Cr	0.0270	0.031		
			W	0.0090			
			Fe	0.0160	0.1		
			Co	0.0025			
			Pb	0.017			
			W	0.0090			
			Fe	0.0160	0.1		
			Co	0.0025			

The detailed view shows the chemical composition for 1.4404:

Element	Min.	Max.	Approx.	Comment
C	0.0250	0.0310		
Si	0.2960	1.0000		
Mn	1.6280	3.0000		
P	0.0290	0.0450		
S	0.0095	0.0095		For machinability, 0.010-0.015%. For weldability, 0.005-0.008%, for castability max. 0.010%.
Al	0.0063	0.0063		
Fe	10.0000	13.0000		For special reasons, e.g. not suitability for the fabrication of weldments, values allowed to deviate by increasing the maximum content or within the aim of low magnetic permeability, the max. of the conditions are increased by 1.00%.
Cr	10.0000	13.0000		
Ni	10.0000	30.0000		
Mo	2.0000	2.5000		
W	0.0090	0.0090		

# Q4 TASMAN Series 2 Additional Information



## Q4 TASMAN Series 2

Outstanding analytical performance and reliability combined with low cost of ownership

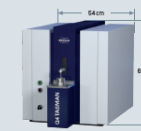
- MultiVision™ – Superior optics concept
- SmartSpark™ – Advanced digital source
- Low Maintenance spark stand with co-axial argon flow
- Pneumatic sample clamp
- Superior ELEMENTAL.SUITE software

For more information, please

- Download the brochure
- Inquire with our w.w. sales channel
- Maybe request a (video) demo



Overview of Features and Benefits		
	Specifications	Benefits
<b>Spark Stand</b>	Low-maintenance spark stand with co-axial argon flow, large & robust sample stage, accessible from 3 sides	Minimized maintenance & argon consumption, easy analysis of small & normal plates but also accepting bulky sample
<b>Sample clamp</b>	Pneumatically driven, 120 mm height	Hands-free sample handling and improved operational safety
<b>SmartSpark™</b>	Optimized digital spark source for stable spark generation up to 1000 Hz	Improved precision and stability
<b>MultiVision™ Optical System</b>	Dual optics concept with robust Paschan Runge mount, multi-plate system with temperature stabilization	Optimal choice between 3 variants to fulfil individual analysis needs
<b>VUV-Optic</b>	130 - 200 nm, Ar-purged	Outstanding performance with high resolution and low argon consumption
<b>UV-Vis-Optic</b>	190 - 600 nm, no-purge	Reliability meets low cost of ownership
<b>Models</b>		
Q4 TASMAN 120	L 120 - 600 mm	Best performance for hard CD
Q4 TASMAN 170	L 170 - 600 mm	Full equipment with C, S, Si, Ti, Ta
Q4 TASMAN 200	L 200 - 600 mm	Mastering non-ferrous metals analysis
<b>Electrical Data</b>	100 - 204 V via 10A, 50-60 Hz 18A (20A) or 32 A (100 A) slow-blow fuse 600 W maximum, 60 VA standby	Compatible to all worldwide power and current configurations



1. With optional active thermal control system

Spectrometer

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BRUKER AXS is a certified reference product. A reference weight is recommended for accurate weight measurements without a certified reference weight. © 2020 Bruker AXS.

• Bruker AXS GmbH  
info.bas@bruker.com

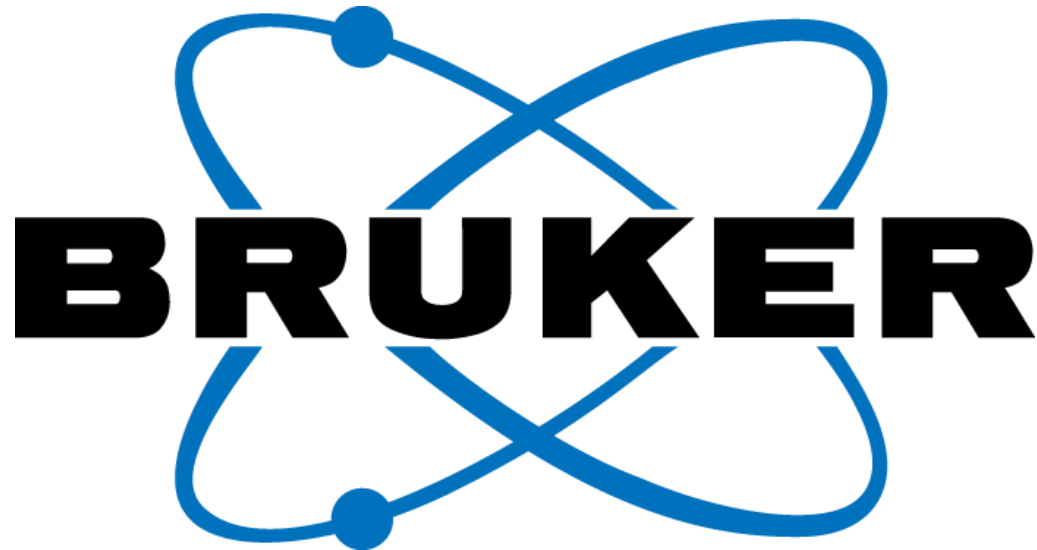
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Innovation with Integrity

**“Hands-On” session in  
application lab**