

X-MET5000 for:



X-MET5000
Lightweight, hand-held XRF analyzer

▶ METAL RECYCLING ▶ PMI IN METAL ▶ ROHS COMPLIANCE ▶ LEAD SCREENING ▶ MINING PROCESSES ▶ SOIL SCREENING

The banner features a large image of a hand holding the X-MET5000 device. Below this are six smaller images illustrating the device's use in various industrial settings: metal recycling, PMI in metal, ROHS compliance, lead screening, mining processes, and soil screening. Each image is accompanied by a small blue arrow icon and a text label.



X-MET5000

Lightweight, hand-held XRF analyzer for quality control and material verification

PMI - Positive Material Identification

Battery lasts for one working day!

Certified IP54 splash and dust proof!

X-MET5000



The **NEW** X-MET5000 enables more accurate and faster verification of critical materials in the PMI testing process along the whole metal manufacturing supply chain -

- inspection of incoming goods
- testing during production and
- manufacturing of goods

Important tool in routine maintenance in any plant when building up a power plant or petrochemical plant



Proven design based on over 35 years experience in the field of portable hand-held XRF analyzers

Field conditions are tough on PMI tools!

- An analyzer must be able to measure the alloying elements at very low concentrations (e.g. Ti in stainless steels at the level of 0.05%)
- Material range is often very wide
- The analyzer must be robust and easy to use
- Fast, accurate results are a pre-requisite
- For most applications calibration of the unit must be traceable
- For these reasons EDXRF is the preferred measurement technique when concentrations of light elements such as Carbon are not of interest



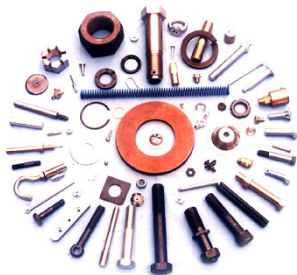
The analyzer of choice in all conditions, on-site or in-field

- The material to be inspected can be difficult to access (e.g. a refinery platform)
 - The X-MET5000T analyzer is battery operated, compact, robust and withstands harsh use
- The material to be inspected can be hot (e.g. like a tube in a power plant)
 - Integrated heat shield allows the measurement of surfaces up to 400°C / 750°F for extended periods
- The weld material often needs to be verified from narrow seam (material around the seam must be excluded)
 - The X-MET5000 enables the analysis of narrow weld seams down to 2 mm



Analyze large or small samples structures like bolts, thin tubes or honeycomb in seconds – just point and shoot

- X-MET5000 compensates for the shape of sample
- Inspect pipes and welds for corrosion resistance and pressure equipment for alloy composition
- Wires of less than 1mm in diameter can be identified in seconds
- Avoid material mix-ups
- High speed averaging function – up to 50 successive measurements for fast effortless batch evaluation



PMI Cannot be Easier

- 1) Name your sample
- 2) Measure it
- 3) Produce the PMI report

- A practically unlimited number of grades can be stored in the analyzer
- Recording of results can be automated if required
- Results can be read by a PC
- An unlimited number of results can be stored for further processing

Positive
Material
Identification

Name Sample

Sample Name:

Test 1

OK Cancel



```
sample15909.ksp.txt - Notepad
File Edit Format View Help
Method: ANALYSIS Sample: 12/13/05 3:35:33 PM
Screening Method: SS CHEM
Analyte Ti V Cr Mn Fe Co Ni Cu Nb Mo W
% <0.00 0.04 24.31 1.99 50.44 0.19 22.08 0.04 0.02 0.19 0.08
Grades:
Scaling Ref.: SS 310
Scaling Method: SS ID

Method: ANALYSIS Sample: 12/13/05 3:36:51 PM
Screening Method: SS CHEM
Analyte Ti V Cr Mn Fe Co Ni Cu Nb Mo W
% <0.00 0.19 16.57 1.73 67.25 0.25 10.54 0.22 0.01 2.25 0.18
Grades:
Scaling Ref.: SS 316
Scaling Method: SS ID

Method: ANALYSIS Sample: 12/13/05 3:38:03 PM
Screening Method: SS CHEM
Analyte Ti V Cr Mn Fe Co Ni Cu Nb Mo W
% 0.43 0.10 17.81 1.48 68.74 0.23 9.99 0.24 0.00 0.31 0.07
Grades:
Scaling Ref.: SS 321
```

Rugged, reliable and durable tool

- Certified IP54 splash and dust proof verified by third party (NEMA 3)
- Withstands all weather conditions from -10°C to +50°C
- Battery operating time of one working day
- Minimal service costs and down time
- CE, cCSAus certified
- 2 year Instrument warranty; including X-ray tube, excluding consumables



Grade Identification and highly accurate alloy analysis in seconds

- Measure known or unknown sample – with ease - Just point, shoot and read the result
- Grade Identification in 2-5 seconds
- Valuable elements (e.g. Ni, Cu and Mo) in 5 – 10 seconds
- 304/321 separation or Grade 7/CPTi in less than 5 seconds



Safe use during analysis

Radiation Safety:

- Password protection
- IR proximity sensor
- Failsafe warning lights



OI's PentaPIN™ detector provides faster analysis and lower detection limits

- As example, a 10 second analysis produces the equivalent result to that of a 30 second analysis made using a standard Si-PIN detector
- It will even separate out the small amounts of Hf and Ta in Nickel alloys in seconds



- PentaPIN™ Detector
 - Based on Oxford patented PentaFET® technology
 - High resolution - high count rate SiPIN detector
- Very low detection limits
 - Improved precision from higher count rate
 - Better inter-element correction due to improved resolution and background

PDA based technology for flexibility and simplicity

- Bright color touch screen display visible in any lighting condition
- Easy-to-use menu system
- Full Microsoft Windows® compatibility
- Memory card for easy data transfer and back-up (no additional software necessary)
- Data transfer via supplied USB cable or wirelessly by WiFi or Bluetooth

PDA = Personal Digital Assistant



Computer

- HP PDA with Windows Mobile 5.0
- Key locked to prevent unintended removal
- 128 MB Internal memory
- Min. 1 GB Removable memory
- Capable of holding > 100,000 results and spectra



Easy reporting - time saving and trouble-free

- Results and spectra can be stored on a SD memory card
- Recording of results can be automated if desired
- Data can be downloaded to a PC using either
 - Memory card reader (Standard accessory)
 - Microsoft Active Sync over the USB cable
 - Wirelessly, using the built-in Bluetooth capability
 - Practically unlimited number of results can be stored for future processing
- PC Report Generator for easy and versatile formatting of final QC reports available
- Microsoft Excel and Access can be used to store and process the data and to generate custom reports



Long battery life

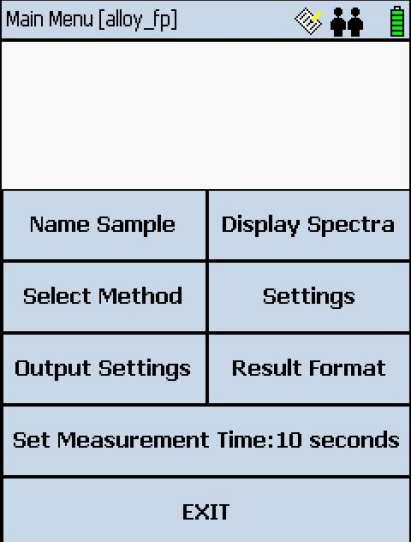
Battery lasts for one working day!

- Rechargeable, removable inside handle
- Li-Ion batteries (Quantity 2)
- Typical duty cycle: 6 hours of operation each
- 110/230V 50/60 Hz battery charger, including AC adaptor



Short learning curve

- Intuitive user interface makes it possible to learn basic functions in a few minutes
- Minimal training is required
- Our network of specialists is ready to provide training for the more advanced features of the analyzer



Main Menu [alloy_fp]	
Name Sample	Display Spectra
Select Method	Settings
Output Settings	Result Format
Set Measurement Time: 10 seconds	
EXIT	



Three modes of operation

Assay and Grade library ID

uses two synchronized analytical modes which automatically select the correct mode to give the best analytical result.

Empirical Assay Calibration mode produces fast, accurate analysis even at low concentrations. Traceable reference standards establish the calibration. This method is useful in situations where all main elements present in a sample cannot be analyzed (e.g. metallic carbides, Ti alloys, Al bronzes).

Fundamental Parameters (FP) is a universal standardless calibration where practically any combination of physically measurable element can be analyzed with good accuracy. FP can measure up to 30 elements between Ti-U regardless of concentration. The elements analyzed can be customized for specific applications.

These two modes run smoothly together even when the user has no information about the material's composition.

Three modes of operation

2

Direct spectral identification

is based on the comparison of known standard spectra and the measured spectrum of the sample. Material can be identified even when no analytical assay data is available.

3

PASS/FAIL

mode offers a convenient, fast way to sort material e.g. during delivery inspection

X-ray tube for optimized performance and maximum safety

Proprietary miniature X-ray tube

No isotope means

- Non-regulated shipping
- No leak testing required
- Easy, low cost disposal
- Low cost registration
(varies by region)

PDA Screens

Result

[1 Alloy Mode] []

Stainless Sample

Date: 5/16/05 12:49:15 PM

Analyte	Conc.	STD	Alarm
Ni	10.26%	0.208	
Cr	17.16%	0.227	
Mo	2.29%	0.040	
Mn	1.16%	0.115	
Cu	0.38%	0.049	
Ti	0.05%	0.049	
Co	0.29%	0.117	
Nb	0.02%	0.006	

Grade SS316

Spectra

Spectra

Counts in Channel *10

Energy

Zoom Out	Zoom on Y-Axis yes/NO
Zoom In	Fit to Window
XRF Line Display	Close

Total
Cnt Rate
5335
Cursor
Energy
20.5 keV
Channel
1023
Count
6

Typical Display

The screenshot shows a software window titled "[1Metal Mode]" with several icons in the top right corner. The main content area displays the following information:

- Analysis method: SS CHEM
- Sample name: Test 2
- Screening method: (blank)
- Measurement date and time: 5/13/05 1:09:14 PM
- Analysis result table:

Analyte	Conc.	STD
Ti	0.00%	0.045
V	0.07%	0.039
Cr	23.37%	0.298
Mn	1.32%	0.143
Fe	66.44%	0.319
Co	0.00%	0.120
Ni	5.68%	0.188
Cu	0.19%	0.044
Nb	0.02%	0.007
Mo	3.44%	0.053
W	0.00%	0.038

Grade information: Grade: Duplex 2205
Reference: SS ID/Duplex 2205

Reference ID: (blank)

Interface Languages

- User Interface is available in:
 - English
 - French
 - German
 - Italian
 - Japanese
 - Korean
 - Polish
 - Portugese
 - Russian
 - Simplified Chinese
 - Trad Chinese



Extensive and open grade library

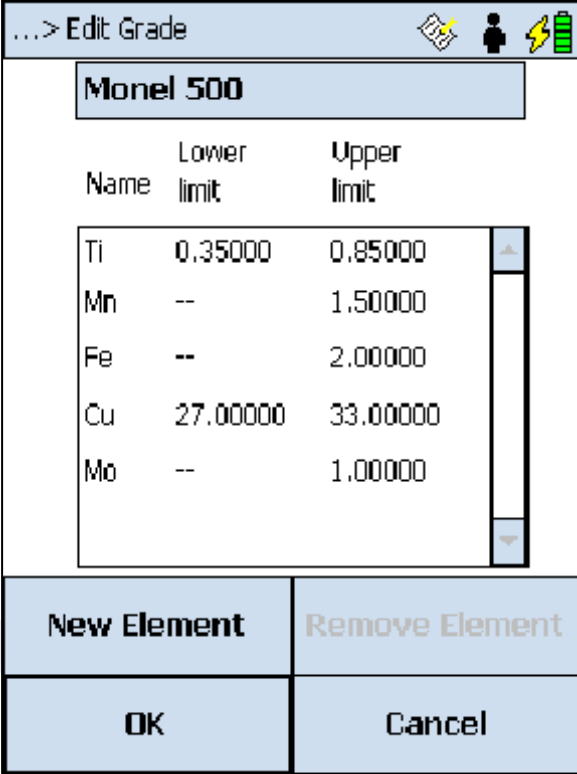
As standard X-MET5000
has an integrated grade library containing:

- Nickel Alloys
- Stainless Steels
- Cobalt Alloys
- Low Alloy Steel
- Tool Steels
- Copper Alloys
- Titanium Alloys
- Zirconium Alloys
- Aluminum Alloys
(heavy alloying elements)
- The X-MET5000 is capable of storing thousands of grade identifications
- Easy to add new alloys and to create a unique grade library
- The precision of the grades can be adjusted to prevent false alarms which may occur during short measurement times

Easy editing of the grade tables

Easy

- modification of the grade library
- addition of new alloys
- renaming of alloys
- In addition, the precision of the grades can be adjusted to prevent false alarms which may occur during short measurement times



...> Edit Grade

Monel 500

Name	Lower limit	Upper limit
Ti	0.35000	0.85000
Mn	--	1.50000
Fe	--	2.00000
Cu	27.00000	33.00000
Mo	--	1.00000

New Element Remove Element

OK Cancel

Element ranges of XRF and OES analyzers

H																			He
Li	Be											B	C	N	O	F			Ne
Na	Mg											Al	Si	P	S	Cl			Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br			Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Tu	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I			Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At			Rn
Fr	Ra	Ac																	
			Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu			
			Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr			



Optical Emission Spectrometry



X-ray Fluorescence

Delivered as “turn-key” analysis tool

Calibration Certificate

X-MET5000

This certificate certifies that the X-ray fluorescence analyser identified with

Serial number: Serial number:

has been calibrated to analyse metals using calibration method based on Certified Reference Materials and Reference Materials

Suppliers of the materials used in X-MET analyser calibrations are:
 Element Standard Company Inc, USA
 Analytical Reference Materials International Inc, USA

Report: 123456789

Paula A Holden
 Calibration Laboratory Manager
 XRF, LIBS and ICP-AES Analyser

The Business of Science®

Oxford Instruments Analyser by
 the UK's most innovative
 company across the world
 for 50 years
 Now, 50 years on
 Oxford Instruments, still leading the way
 www.oxford-instruments.com



- Each delivery includes a calibration certificate
- Instrument performance is guaranteed by measuring alloy specific check samples (provided with each instrument)
- Calibrations can be customized using e-mail
- It is not necessary to send the unit to the factory for calibration

Optional Software

- *Empirical Calibration* – enables user to create a calibration from a set of standards for unique applications. Also allows data acquisition and analysis using a PC.
- *PC Spectral Display* – enables viewing and analysis of samples spectra on a user's PC
- *PC Report Generator* - enables the creation of specific reports containing user selected information and format

X-MET5000

Typical Performance for different types of Alloys
Alloy Mode

Aluminum alloys "Aluminum" empirical assay method										
Element	Ni	Cu	Zn	Mn	Fe	Cr				
Range, wt. %	0 - 2.2	0 - 6.9	0 - 5.9	0 - 1.3	0 - 1.22	0 - 0.3				
Average Error, wt. %	0,02	0,1	0,02	0,03	0,03	0,02				

Cobalt alloys "Cobalt" empirical assay method										
Element	Co	Cr	Mn	Fe	Ni	Mo	Nb	W		
Range	36.8 - 67	19.6 - 32.5	0.2 - 1.6	0.39 - 2.3	0.12 - 23.5	0 - 7.5	0 - 2.4	0.09 - 14.5		
Average Error, wt. %	0,9	0,34	0,13	0,15	0,23	0,13	0,03	0,19		

Copper alloys "Copper" empirical assay method										
Element	Cu	Fe	Ni	Zn	Pb	Sn	Mn			
Range	58.5 - 99.9	0 - 4.6	0 - 29.5	0 - 40.1	0 - 9.7	0 - 9.7	0 - 2.8			
Average Error, wt. %	1	0,03	0,06	0,25	0,15	0,11	0,02			

Low alloy steels "Low Alloy steel" empirical assay method										
Element	Fe	V	Cr	Mn	Ni	Cu	Mo			
Range	89.0 - 99.9	0 - 0.8	0 - 8.3	0 - 1.1	0 - 1.7	0 - 0.21	0 - 0.94			
Average Error, wt. %	0,40	0,02	0,08	0,06	0,06	0,02	0,02			

Nickel alloys "Nickel" empirical assay method										
Element	Ni	Ti	Cr	Mn	Fe	Co	Cu	Nb	Mo	W
Range	34.1 - 99.6	0 - 3.2	0 - 30.1	0 - 1.6	0 - 41.3	0 - 20.0	0 - 32.1	0 - 4.9	0 - 27.9	0 - 14.2
Average Error, wt. %	0,7	0,06	0,25	0,09	0,19	0,07	0,16	0,02	0,14	0,08

Stainless steels "Stainless" empirical assay method											
Element	Fe	Ti	V	Cr	Mn	Co	Ni	Cu	Nb	Mo	W
Range	38.8 - 86	0 - 2.2	0 - 0.26	0.09 - 24.5	0 - 15.1	0 - 17.3	0.23 - 36.1	0 - 3.3	0 - 0.65	0 - 7.3	0 - 2.6
Average Error, wt. %	1	0,02	0,03	0,27	0,10	0,18	0,22	0,05	0,02	0,06	0,03

Titanium alloys "Titanium" empirical assay method											
Element	Ti	V	Cr	Fe	Cu	Mo	Zr	Nb	Sn	Pd	Mn
Range	80.4 - 99	0 - 5.6	0 - 2	0 - 1.9	0 - 2.4	0 - 15.4	0 - 5.2	0 - 7.0	0 - 11.1	0 - 0.18	0 - 2
Average Error, wt. %	1	0,11	0,05	0,06	0,02	0,05	0,03	0,02	0,09	0,02	0,03

Tool steels "Tool Steel" empirical assay method										
Element	Fe	V	Cr	Mn	Co	Ni	Mo	W		
Range	69.5 - 95.9	0 - 4.9	0.22 - 11.4	0.20 - 2.0	0 - 8.1	0 - 1.5	0.05 - 9.6	0 - 18.0		
Average Error, wt. %	0,4	0,05	0,12	0,08	0,06	0,05	0,05	0,1		

Zirconium alloys "Zirconium" empirical assay method										
Element	Cu	Zr	Nb	Mo	Sn					
Range, wt. %	0 - 0.55	95.5 - 100	0 - 2.5	0 - 0.55	0 - 1.6					
Average Error, wt. %	0,05	0,65	0,04	0,22	0,18					

Average Error:
Average deviation from reference value when large set of test samples are measured using 15s measuring time with multiple production instruments. Notice that performance of individual instrument may differ slightly.

Range: Concentration range of the measured test samples (Same as calibration range)

This performance sheet is valid for X-MET5000 instruments with SW version 1.1 or newer

X-MET5000

Typical Performance for different types of Alloys
Alloy FP

Cobalt alloys										
Element	Co	Cr	Mn	Fe	Ni	Mo	Nb	W		
Range	36.8 - 67	19.6 - 32.5	0.2 - 1.6	0.39 - 2.3	0.12 - 23.5	0 - 7.5	0 - 2.4	0.09 - 14.5		
Average Error, wt.%	0,9	1	0,14	0,16	0,14	0,15	0,05	0,32		

Copper alloys										
Element	Cu	Fe	Ni	Zn	Pb	Sn	Mn			
Range	58.5 - 99.9	0 - 4.6	0 - 29.5	0 - 40.1	0 - 9.7	0 - 9.7	0 - 2.8			
Average Error, wt.%	2,7	0,21	0,09	0,19	0,17	0,25	0,02			

Low alloy steels										
Element	Fe	V	Cr	Mn	Ni	Cu	Mo			
Range	89.0 - 99.9	0 - 0.8	0 - 8.3	0 - 1.1	0 - 1.7	0 - 0.21	0 - 0.94			
Average Error, wt.%	0,52	0,02	0,21	0,18	0,11	0,05	0,03			

Nickel alloys										
Element	Ni	Ti	Cr	Mn	Fe	Co	Cu	Nb	Mo	W
Range	34.1 - 99.6	0 - 3.2	0 - 30.1	0 - 1.6	0 - 41.3	0 - 20.0	0 - 32.1	0 - 4.9	0 - 27.9	0 - 14.2
Average Error, wt.%	1	0,06	0,42	0,08	0,31	0,07	0,12	0,03	0,15	0,09

Stainless steels											
Element	Fe	Ti	V	Cr	Mn	Co	Ni	Cu	Nb	Mo	W
Range	36.8 - 86	0 - 2.2	0 - 0.26	0.09 - 24.5	0 - 15.1	0 - 17.3	0.23 - 36.1	0 - 3.3	0 - 0.65	0 - 7.3	0 - 2.6
Average Error, wt.%	0,8	0,08	0,04	0,35	0,11	0,11	0,25	0,1	0,02	0,04	0,05

Tool steels										
Element	Fe	V	Cr	Mn	Co	Ni	Mo	W		
Range	69.5 - 96.9	0 - 4.9	0.22 - 11.4	0.20 - 2.0	0 - 8.1	0 - 1.5	0.05 - 9.6	0 - 18.0		
Average Error, wt.%	1,6	0,05	0,27	0,22	0,06	0,08	0,04	0,13		

Average Error:
Average deviation from reference value when large set of test samples are measured using 15s measuring time with multiple production instruments. Notice that performance of individual instrument may differ slightly.

Range:
Concentration range of the measured test samples (calibration range is 0-100% for all measured element in AlloyFP)

This performance sheet is valid for X-MET5000 instruments with SW version 1.1 or newer

Our global network provides support in local languages

- Technical phone support
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- Post warranty local service contracts

