TORONTECH

# HANDHELD XRF ALLOY ANALYZER

# Handheld XRF Alloy Analyzer - ToronXRF™ 3000A

Handheld XRF Alloy Analyzer gives metallurgists, quality-control teams, and recycling operators on-site alloy grade identification without cutting or damaging the sample. The ToronXRF™ 3000A uses energy dispersive X-ray fluorescence to identify material composition and confirm alloy grade in as little as two seconds, matching the sensitivity of benchtop XRF systems in a handheld form factor. Built for both the factory floor and the field, the instrument analyzes precious metal alloys, stainless steel, tool steel, nickel and cobalt alloys, titanium, copper alloy, bronze, and tungsten alloy without sample preparation.

A digital signal processor and silicon drift detector give the ToronXRF™ 3000A the resolution needed for reliable positive material identification (PMI), while a 5-inch touchscreen that rotates a full 360 degrees keeps readings visible in bright sunlight or low-light conditions. Waterproof and dustproof housing lets the instrument move between raw-material inspection, in-process quality checks, and scrap sorting without a change in equipment.

Rapid detection on light alloy grades, including aluminum and magnesium, extends the instrument's PMI coverage beyond heavier alloys. Combined with dual Operator and Expert software modes, the ToronXRF™ 3000A lets both new technicians and experienced metallurgists confirm material composition quickly enough to keep production and sorting lines moving.

## APPLICATIONS

# Handheld XRF Alloy Analyzer - ToronXRF™ 3000A Applications

The Handheld XRF Alloy Analyzer supports alloy verification and material sorting across metals-intensive industries.

- Precious Metal Alloy Verification: confirms composition and purity of precious metal alloys during processing, trading, and quality inspection

- Iron and Steel Smelting: verifies grade and composition of low alloy steel, stainless steel, and tool steel during production and quality control
- Aerospace Manufacturing: confirms titanium, nickel, and cobalt alloy grades meet specification before components enter high-stress assemblies
- Boiler and Pressure Vessel Fabrication: performs positive material identification (PMI) on chrome/molybdenum steel and other alloys to confirm equipment meets project material requirements
- Machinery Manufacturing and Processing: verifies incoming raw materials and in-process components against required alloy specifications
- Waste Metal and Scrap Recycling: sorts and classifies scrap metals and steels on-site to maximize recovery value and prevent material mixing
- Petrochemical and Refining Equipment Inspection: confirms alloy grade of piping, fittings, and pressure equipment to prevent material mix-ups that lead to failures
- Nonferrous Metal Identification: distinguishes copper alloy, bronze, zinc alloy, and tungsten alloy grades for quality control and material sorting

Raw Material Testing

## Reliable Material Identification

Rapid material identification plays an important role in alloy manufacturing.

Fast, non-destructive elemental analysis helps verify incoming raw materials, reduce mix-ups, and avoid unnecessary material loss.

Quality Control on Industrial Products

Quality Assurance and Control

## Quality Control in Industrial Production

Fast, non-destructive elemental analysis is widely used in quality control and manufacturing processes across aerospace, steel production, boiler fabrication, and other high-spec industries where material quality must be verified.

## Waste Metals Recycling and Reuse

A powerful tool for identifying metals in the recycling industry.

It supports on-site detection and rapid classification of scrap metals and steels for efficient sorting and reuse.

Waste and Scrap Metal Recycling

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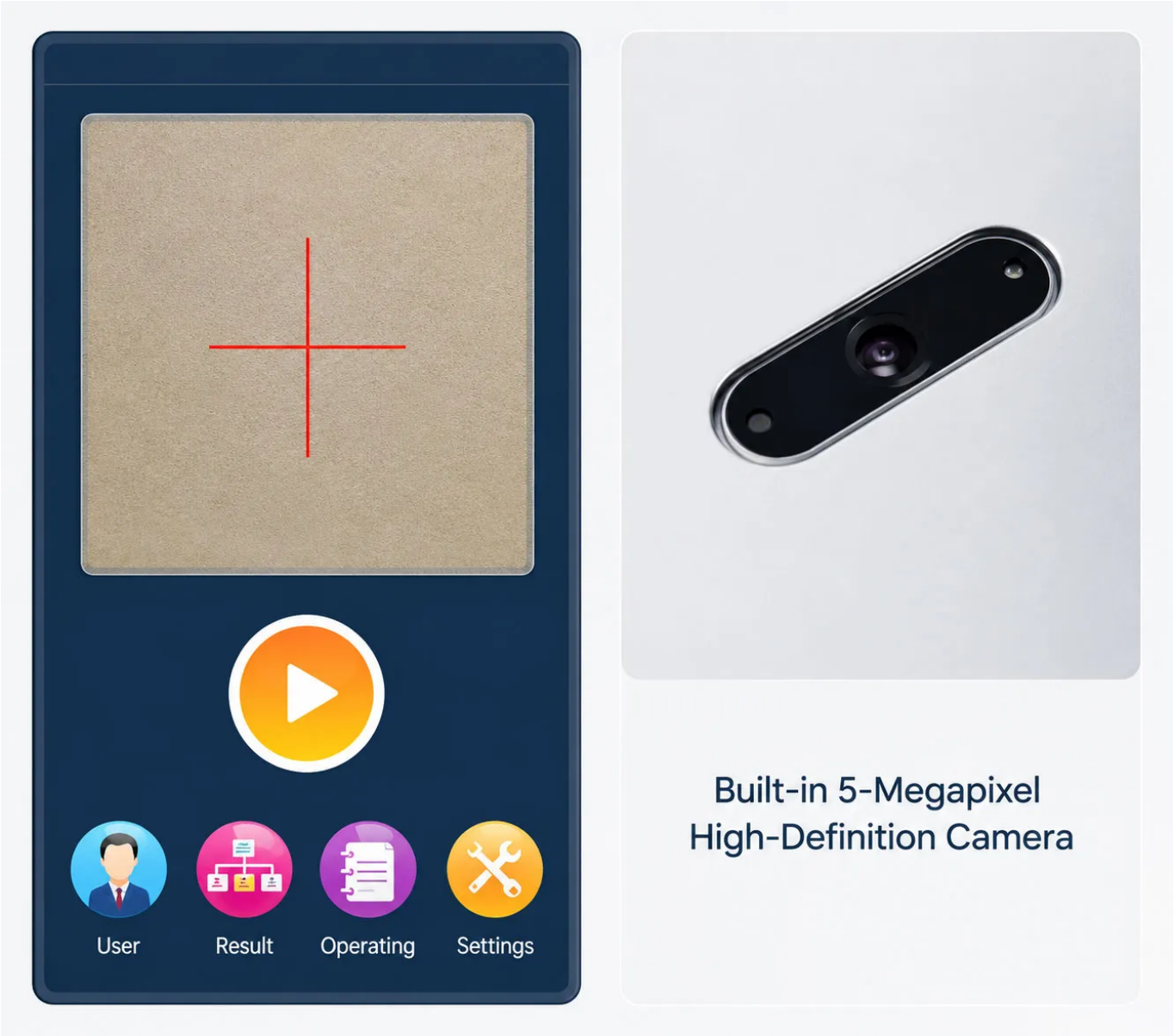
## FEATURES

# Handheld XRF Alloy Analyzer - ToronXRF™ 3000A Key Features

The ToronXRF™ 3000A combines benchtop-level alloy analysis with a rugged, field-ready design.

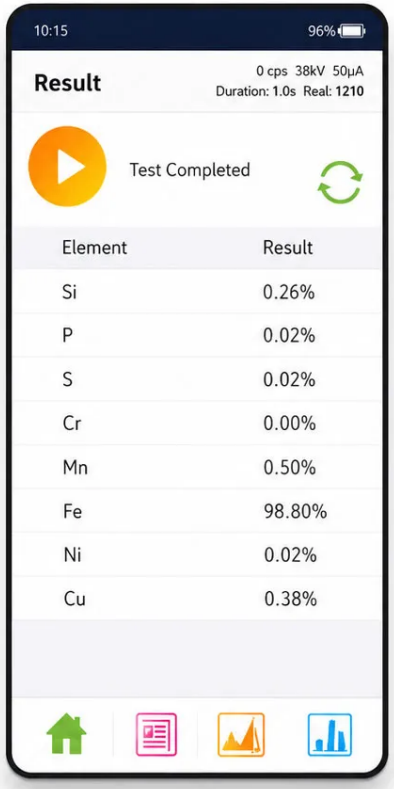
- Broad Alloy Coverage: identifies precious metal alloys, low alloy steel, stainless steel, tool steel, chrome/molybdenum steel, nickel and cobalt alloys, titanium, copper alloy, bronze, zinc alloy, and tungsten alloy
- Two-Second Grade Identification: confirms material composition and alloy grade in as little as two seconds for high-throughput sorting and inspection
- Light Alloy Detection: resolves aluminum and magnesium alloy grades for reliable positive material identification (PMI) across a wider material range
- Digital Multi-Channel Processing: processes spectral data at up to 500,000 counts per second for spectral resolution that approaches benchtop XRF performance
- 360-Degree Rotating HD Touchscreen: keeps the 5-inch display readable from any angle, including bright outdoor light and low-visibility conditions
- Waterproof and Dustproof Housing: withstands scrap yards, production floors, and outdoor field environments without sacrificing measurement accuracy



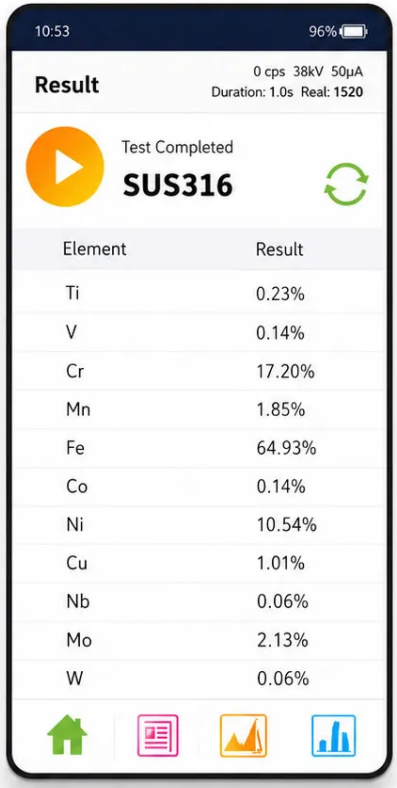

- Built-In 5-Megapixel Camera: lets operators confirm exact sample positioning before and during each measurement
- Automatic Collimator and Filter Switching: adjusts beam geometry and filtration automatically to match different alloy types and sample geometries

- Multi-Layer Radiation Safety System: combines automatic tube shutoff without a sample present, a lead-coated steel housing, and a rubber scatter shield with a manual security interlock that blocks unauthorized software control
- Color-Coded Status Indicator: signals power, active testing, and fault conditions at a glance through a green, red, and yellow warning light system
- Dual Operator and Expert Software Modes: gives new technicians a simplified one-step workflow while offering experienced metallurgists full access to advanced analysis settings
- Extended Battery Life: runs up to 12 hours on the standard 9,000mAh battery, with an optional 27,000mAh battery extending runtime to approximately three days
- Portable Test Stand Compatibility: mounts to an optional table stand for bench-style measurement without sample preparation

18K Precious Metal Detection




Low Alloy Steel Test




Alloy Test

## THEORY & METHOD

# Theory and Method

Energy dispersive X-ray fluorescence identifies alloy composition by exciting the sample with a primary X-ray beam and analyzing the fluorescent radiation that returns. When a high-energy photon strikes an atom in the alloy, it can eject an inner-shell electron through the photoelectric effect, leaving a vacancy. An electron from an outer shell fills that vacancy and releases the energy difference as a fluorescent X-ray photon with an energy unique to that element, allowing the instrument to identify which elements make up the alloy and in what proportion.

The ToronXRF™ 3000A generates its excitation beam with a miniature silver-target X-ray tube operating at up to 50kV and 200uA. A silicon drift detector measures the energy of each returning photon individually, and digital multi-channel processing technology sorts these measurements into a spectrum at rates up to 500,000 counts per second. Peak positions in the spectrum identify the elements present, while peak intensity determines their relative concentration, which the instrument's curve-matching software converts into an alloy grade match.

Automatic collimators and six switchable filters shape the excitation beam to optimize sensitivity across different alloy families, from light aluminum and magnesium grades to heavier nickel, cobalt, and tungsten alloys. This combination of a silver-target tube, high-resolution detector, and digital multi-channel analysis lets the ToronXRF™ 3000A resolve closely related alloy grades, such as distinguishing chrome/molybdenum steel variants, without sending samples to a laboratory.

## TECHNICAL SPECIFICATIONS

# Handheld XRF Alloy Analyzer - ToronXRF™ 3000A Technical Specifications

| Parameter | Specification |
|---|---|
| Analytical Method | Energy dispersive X-ray fluorescence (EDXRF) |
| Elemental Range | Atomic number 12 to 92 (magnesium to uranium) |
| Simultaneous Elements | Up to 40 elements |
| Detection Time | 1 to 60 seconds |

| Parameter | Specification |
|---|---|
| Content Range | ppm to 99.99% |
| Detection Limit | Approximately 5 ppm (element and matrix dependent) |
| Detector | SDD detector, optional Fast-SDD detector |
| Detector Resolution | 128 eV |
| Excitation Source | 50kV / 200uA silver-target miniature X-ray tube with integrated high-voltage power supply |
| Collimator and Filter | 4.0mm and 2.0mm collimator diameters, 6 filters with automatic switching |
| Sample Types | Solid, liquid, powder |
| Data Processing Technology | Digital multi-channel processing, up to 500,000 counts per second |
| Application Convenience | Intelligent curve matching for alloy grade identification |
| Video System | 5-megapixel high-definition camera |
| Display | 5-inch transflective LCD touchscreen, 360-degree rotation |
| Connectivity | GPS, WiFi, Bluetooth, waterproof mini USB, SPI data transmission |
| Microcomputer | 1 GHz CPU, 1GB system memory, expandable to 32GB storage |
| Voltage | Rechargeable lithium battery, standard 9,000mAh (up to 12 hours), optional 27,000mAh (up to 3 days); 110V to 220V universal charging adapter |
| Operating Temperature | -20°C to +50°C |
| Operating Humidity | 90% or less |
| Dimensions | 244mm (L) × 90mm (W) × 330mm (H) |
| Weight | 1.7 kg |

## Included Accessories

| Item | Description |
|---|---|
| Standard Battery | 9,000mAh rechargeable lithium battery |
| Spare Battery | Optional 2,700mAh battery for extended field use |
| Travel Case | Heavy duty travelling case with foam insert for safe transport |
| Bluetooth Printer | Optional portable Bluetooth printer for on-site report printing |
| Car Charger | Optional vehicle charging accessory |
| Table Stand | Optional portable test bench stand for bench-style measurement |

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