MiniFlex XpC

XRD solution for Industrial Quality & Process Control

Rigaku MiniFlex XpC – Xpress Connect is the powerful, easy-to-use, and expandable industrial X-ray diffractometer.

Rigaku

POWERING NEW PERSPECTIVES

MiniFlex XpC

The powerful, easy-to-use, and expandable industrial X-ray diffractometer.

The MiniFlex XpC is powerful.

Its optimized performance-to-cost ratio enables high-throughput process control. Rigaku's unique compact X-ray source and large-detection-area detector achieve fast and reliable measurements and high sample throughput.

The MiniFlex XpC is easy-to-use.

Simplify your daily operations with our EasyX software and benefit from customized test method setups provided by experienced Rigaku application specialists. We offer a variety of application packages and test methods individually tailored to your specific industrial needs. In case of any abnormalities, our team is ready to provide troubleshooting support to ensure smooth operation.

The MiniFlex XpC is expandable on-site.

You might start with a single sample port and later add a small or large sample changer, or even extend to a fully automated lab. The Xpress Connect sample stage allows fast and seamless integration into your existing automation process.

MiniFlex XpC + EasyX software provide analysis procedures tailored to specific industry needs

Regardless of how complex your analytical test method is, the **EasyX** software keeps everyday operations easy and simple. You can obtain accurate and reliable results with only three clicks and obtain pass/fail and trend reports at a glance.

Minerals and Mining

Quantify minerals and identify impurities

Battery

Quantify crystalline phases in cathode materials and check the degree of graphitization of anode materials

Metals

Quantify oxidized phases or polymorphs to ensure the high purity of metal raw materials

Cement

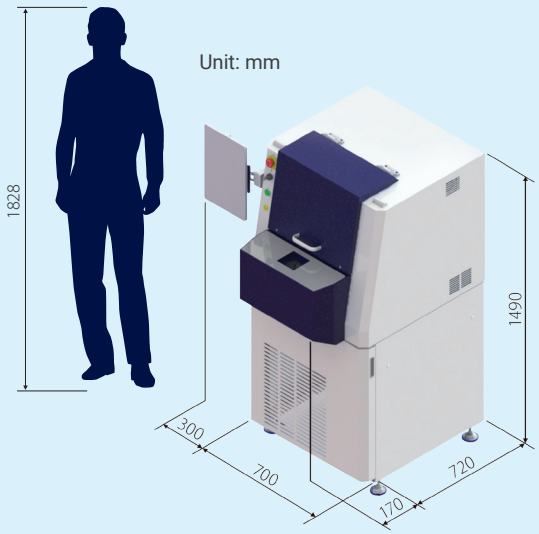
Quantify main components, additives, and impurities at different stages in the cement-making process, like hot meal, clinker, and finished cement

Pharmaceuticals

Identify and quantify polymorphs and percent crystallinity

Fast and easy installation

Get started right away. MiniFlex XpC is plug-and-play and has a small footprint (44% smaller than other instruments in the market), requires minimum space and no external water or compressed air supply.

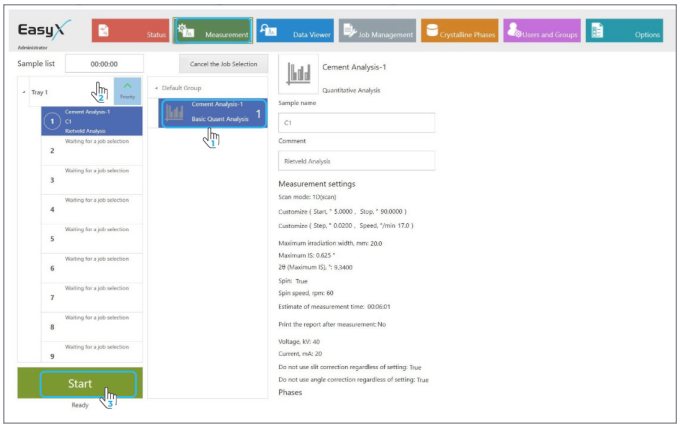


Robust design

MiniFlex XpC was designed for use in industry. The XRD components are fully covered, and protected from harsh environments, with minimum maintenance needs.

Easy-to-use interface

The EasyX software was developed for industrial users and keeps daily operations easy and simple. Test methods are running in the background while users can perform all operations with three simple clicks.

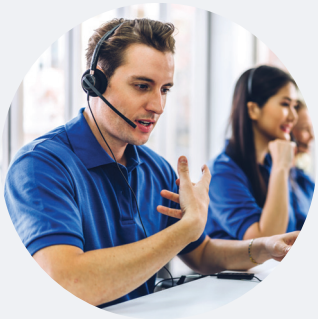


Operational cost efficiency

Rigaku's unique 800 W X-ray source, combined with the **D/teX Ultra250 1D detector** with the largest sensor in this class provides the performance you need at lower initial and running costs compared to traditional higher power XRDs.

800 W, 40% less power consumption compared to the conventional 1200 W

67% larger sensor compared to other available instruments



Industrial Application Support

Take advantage of our experienced application specialists. With the optional **Pro Connect** service, our experts support you when needed, providing method development, troubleshooting, and tailored user training and more.

Be ready for future needs

Xpress Connect design allows you to add different sizes of automatic sample changers or integrate your system into third-party lab automation systems. You can expand your XpC setup in the future on-site without upfront commitment.

Full-scale automation

External sample changer integration

Reasons to choose the MiniFlex XpC for your process control needs

Low cost of ownership

Accurate and reliable results within minutes

Powerful and high sample thoughput

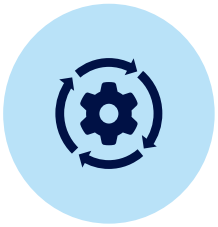
Minimum infrastructure requirements

No expertise required

Simple operation

Optional external sample changer

Robust design



Expandable and ready for automation

Application support when needed - Pro Connect

You don't need to hire or become an X-ray expert to use XRD for process control. Take advantage of Pro Connect, our on-demand application service.

You can work with Rigaku XRD experts when you need to change your analysis procedures, troubleshoot the analysis process, or prepare for new products to test. That is the Pro Connect service. It can be your expert partner, on call when you need it.

Order Pro Connect Application support

Meet your expert

Send samples to Rigaku

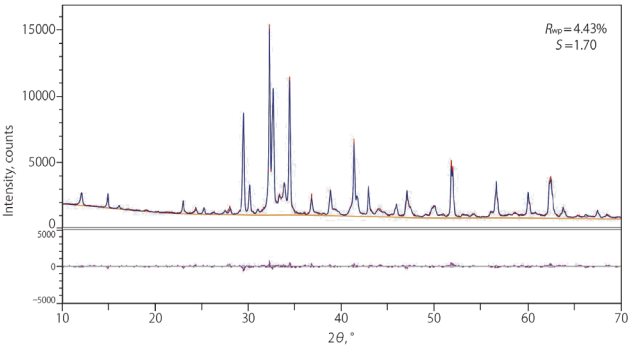
Build test method templates

Implement templates

MiniFlex XpC in action – example data

Distinguishing polymorphs

Quantitative analysis of clinker

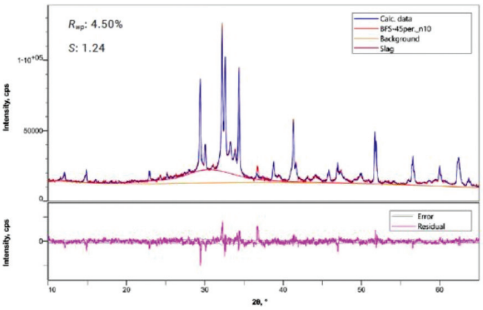


Different polymorphs can affect the durability, hydration characteristics, and thermal behaviors of cement products. Their quantities can affect the final product's quality. In this example, the MiniFlex XpC obtained high-count-rate data suitable for Rietveld refinement and quantified all phases with polymorphs separated in just five minutes.

Crystalline phase	Quantitative value (mass%)
Alite-M3 (C_3S)	51.6
Alite-M1 (C_3S)	15.9
Total Alite	67.5
Belite-β (C_2S)	13.3
Aluminate Cubic (C_3A)	1.5
Aluminate Ortho (C_3A)	0.9
Total Aluminate	2.4
Ferrite (C_4AF)	10.6
Lime (CaO)	0.2
Periclase (MgO)	4.4
Arcanite ($K_2(SO_4)$)	0.6
Aphthitalite ($K_3Na(SO4)_2$)	0.5
Langbeinite ($K_2Mg_2(SO_4)_3$)	0.3

Excellent repeatability

Quantitative analysis of blast furnace slag cement



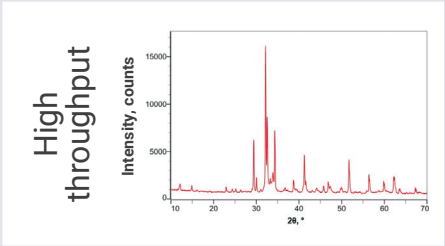
The ratio of all components in slag cement affects the strength and durability of the final cement products and is often monitored in the production process. In this example, the quantities of all components in blast furnace slag cement were analyzed using the MiniFlex XpC to test the reproducibility of the analysis results. The results show excellent reproducibility of less than 0.2 standard deviation for trace, minor, and major phases.

Components	Concentration (mass%) (n=10)	Standard deviation 1σ, n=10 (3 σ)
Alite-M3 (C_3S)	25.0	0.2 (0.6)
Alite-M1 (C_3S)	11.3	0.2 (0.6)
Total Alite	36.4	0.2 (0.6)
Belite-β (C_2S)	6.8	0.2 (0.6)
Belite-α' (C_2S)	1.2	0.1 (0.3)
Total Belite	8.0	0.2 (0.6)
Aluminate Cubic (C_3A)	1.4	0.1 (0.3)
Aluminate Ortho (C_3A)	1.8	0.1 (0.3)
Total Aluminate	3.2	0.2 (0.6)
Ferrite (C_4AF)	5.1	0.1 (0.3)
Lime (CaO)	0	0
Portlandite ($Ca(OH)_2$)	0	0
Gypsum ($CaSO_4(H_2O)_2$)	0.5	0.1 (0.3)
Bassanite ($CaSO_4(H_2O)_{0.5}$)	1.2	0.1 (0.3)
Anhydrite ($CaSO_4$)	0	0
Periclase (MgO)	0	0
Calcite ($CaCO_3$)	0	0
Langbeinite ($K_2Mg_2(SO_4)_3$)	0.3	0.1 (0.3)
Blast furnace slag*	45.2	0.2 (0.6)

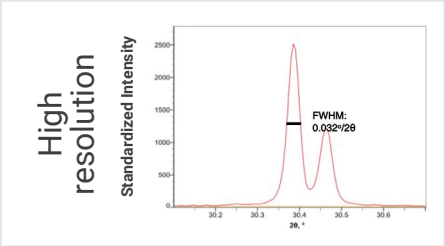
* Amount of BFS added: 45.0 mass

Proven performance

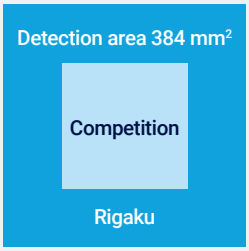
The MiniFlex XpC achieves fast, and reliable measurements with high-resolution, but without compromising data quality.



Sample Clinker
Measurement time: 3 min



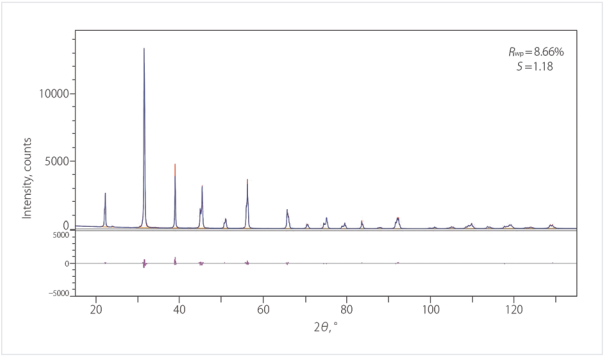
Sample: NIST LaB6 660c
FWHM: 0.032°



Large sensor 1D detector
D/teX Ultra250

Analyzing crystal structure

Lattice parameter analysis of barium titanate

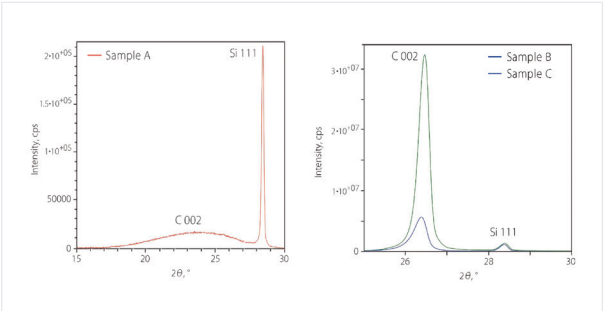


a (Å)	c (Å)	c/a Ratio
3 .99525	4 .03494	1.00993

The crystal structure of barium titanate can affect its ferroelectric properties and needs to be checked when synthesizing raw materials later used for electronic devices. In this example, the MiniFlex XpC automatically ran a scan and calculated the lattice parameters, a and c, and the c/a ratio by fitting the entire XRD pattern.

Analyzing crystal structure

Degree of graphitization analysis of Li-ion battery anode material



Sample	d Value (Å)	Crystallite size (Å)	Graphitization degree
A	3 .44	14	0
B	3 .371	575	0 .76
C	3 .363	1587	0 .85

Graphitization of the carbon anode can improve cycling stability and capacity of lithium-ion batteries. In this example, the MiniFlex XpC automatically ran a scan and calculated the degree of graphitization for three different carbon samples, demonstrating a wide range of graphitization can be measured by this technique.

EasyX – 3 easy steps

EasyX is the software user interface designed for industrial users, making sample analysis easier than ever before. You can obtain results with only three clicks.

For routine analyses, operators simply need to select the test method, sample ID and run the test. The results are automatically reported within minutes. The underlying analysis template is prepared by an XRD specialist beforehand. EasyX streamlines the operation and analysis. It also provides the user with on-spot measurement results, analysis trends, and statistics over time.

Three clicks

Only 3 clicks to measure, analyze, and report

Powered by SmartLab Studio II (SLS II) software

While EasyX is your easy-to-use software for daily routine analysis, the SmartLab Studio II Software serves as the underlying software that runs in the background. SLS II-built recipes can be applied to automate complex analysis, including Rietveld, lattice parameter, crystallite size, etc.

Pass and fail test results in one view

Pass and fail test results in one view for easy process monitoring and reporting. Parameters, limits and thresholds can be set. The reports can automatically be marked with a simple-to-understand color coding system

Trend tracking

Trend tracking of analytical results for troubleshooting and predicting potential quality problems

User-level permission control

User-level permission settings for data management and to control access to instrument parameters

Global service infrastructure - our locations worldwide

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Hong Kong, China

Rigaku Asia Pacific Pte. Ltd. (RAP),

Singapore

Rigaku Corporation Taiwan Branch (RCTW),

Taiwan

Specifications

X-ray Generator	
Output	800 W
Tube voltage	20 – 40 kV (1 kV step)
Tube current	2 – 20 mA (1 mA step)
X-ray tube	Cu
Tube cooling method	Water cooling (Built-in unit or external installation*)

* Can be combined with a separately installed water chiller prepared by the user (Please contact Rigaku).

Computer	
Optional touchscreen PC	Windows® operating system Touch panel display (Can be combined with external PC)

Windows® is a registered trademark of Microsoft Corporation in the United States and/or other countries.

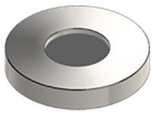
Detector		
D/teX Ultra250	Sensor	Semiconductor strip sensor
	Effective area	384 mm^2 (19.2 mm × 20 mm)
	Strip width	75 µm
	Maximum count rate	>2 .5 × 10^8 cps (global), 1 × 10^6 cps/strip

Goniometer	
System	θ-θ type sample horizontal goniometer
Goniometer radius	150 mm
Minimum step angle	θs: 0.00125°, θd: 0.00125°
Movable axis for measurement	θs /θd linked, θs /θd alone
Divergence slit	Operates in constant irradiation width variable mode at low angles to match the sample size Operates in fixed slit width mode at high angles
Soller slit	5.0° (Standard), 2.5° (Option)

Installation Condition		
Power	Main body	1φ, AC200 – 230 V±10%, 50/60 Hz±1%, 6.5 A
	Air-cooled cyclic water delivery unit	1φ, AC200 – 230 V±10%, 50/60 Hz±1%, 3.6/3.4 A
Ground wire	D class grounding, Grounding resistance 100 Ω or less (use dedicated grounding)	

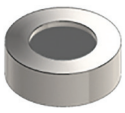
Sample holder size

Sample holder - 51.5 mm
Outer diameter: 51.5 mm
Inner diameter (without bottom): 35 mm
Height: 8.6 mm



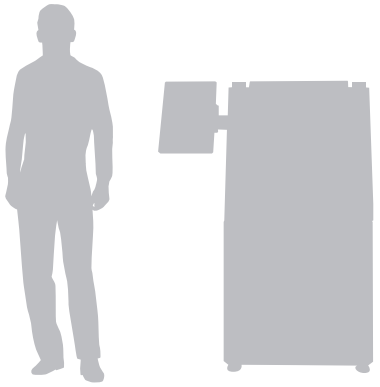
Sample holder - 51.5 mm with bottom
Outer diameter: 51.5 mm
Inner diameter (with bottom): 24 mm
Depth: 0.5 mm
Height: 8.6 mm

Sample holder - 40 mm
Outer diameter: 40 mm
Inner diameter (without bottom): 35 mm
Height: 14 mm



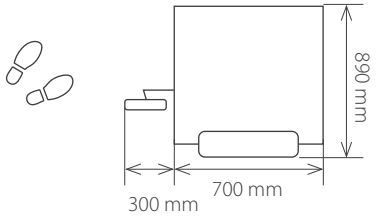
Sample holder - 40 mm with bottom
Outer diameter: 40 mm
Inner diameter (with bottom): 24 mm
Depth: 0.5 mm
Height: 14 mm

Footprint



Minimal installation requirements

- Small footprint
- Only power plug needed
- No compressed air needed
- Optional: Built-in touchscreen PC
- Built-in water chiller unit



Height 1490 mm
Main system: ~ 250 kg
Water supply: ~ 50 kg

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Scan to visit the MiniFlex XpC on our website.