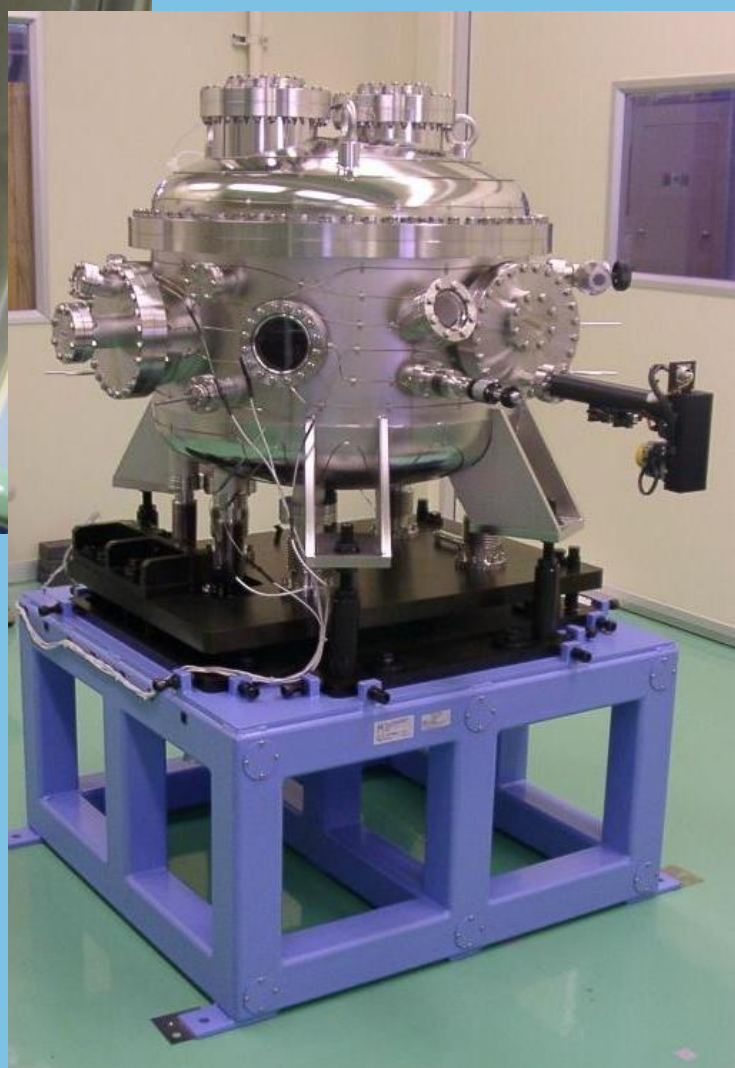
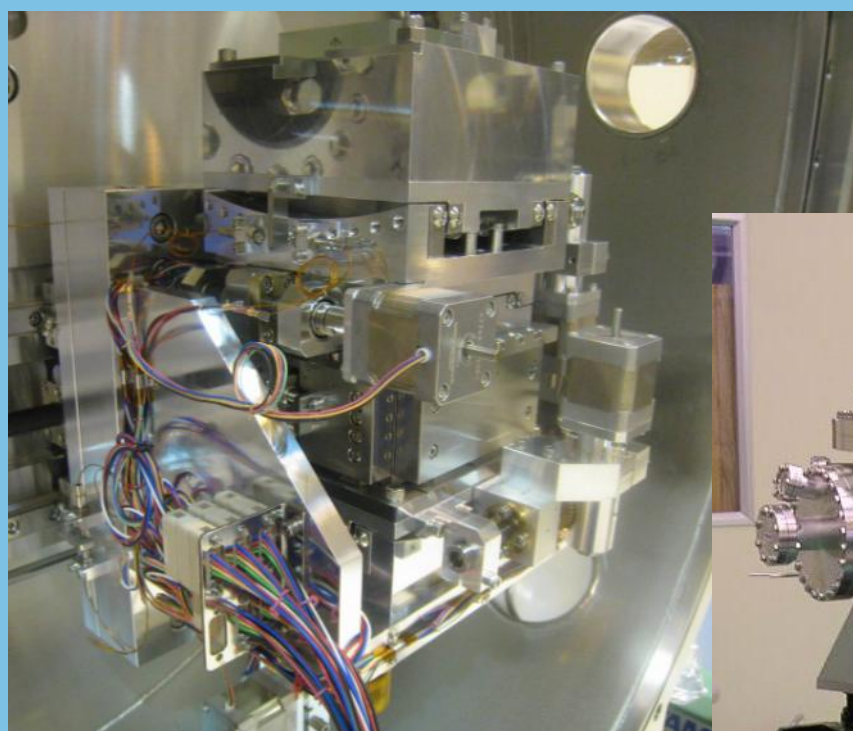


Pioneering New Horizons in Science

TOYAMA



www.toyama-en.com

Capabilities

Welcome to Toyama

Toyama manufactures ultra-precision systems for experimentation at the cutting edge of science. If you have a new concept that needs to be developed, then Toyama is the place to come. We have the technology and experience to turn your ideas into reality.

In addition to our skills at developing new products, our long history of supplying scientific instrumentation means that we have produced a wide range of standard products. These standard items can meet the needs of many system requirements; alternatively they can be easily and quickly customised to meet your specific needs.



3D CAD modelling and design

Engineering Design

The design department is the heart of Toyama's success. We have a team of senior mechanical design engineers supported by CAD engineers and electronics and electrical design engineers. Our design teams have ability to undertake all aspects of system design from basic CAD modelling to applying tools for structural, thermal and vibrational analysis.



Class1000 clean room

Quality Control

We use the most advanced inspection machines to inspect every component that we manufacture. The accuracy of precision mechanisms is confirmed by using precision autocollimators and laser interferometers.



Katsumi (Joe) Endo, CEO of Toyama

Manufacturing

Manufacturing excellence underpins all of Toyama's work, our goal is to provide the best quality for the customer. Our skilled technicians operate a wide variety of manual and CNC tools.

Toyama is proud of its traditions of excellence in engineering design and manufacturing. Our extensive workshop facilities and highly trained manufacturing personnel give us very flexible production capabilities and ensures the quality of the components that are built into our systems.

Assembly

Our highly trained assembly team has many years of experience. Good organisation and teamwork ensures the efficient assembly and factory testing of our products.



Engineers assembling a mirror bender system

Installation and Commissioning

Toyama's trained engineers will come and install your equipment on site. We are flexible in our approach to commissioning, from working closely with local specialists (survey and alignment) to undertaking all works ourselves using our own survey equipment including laser trackers.

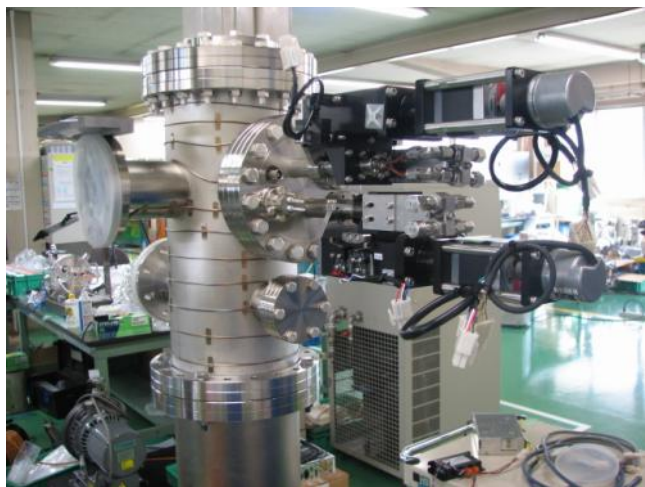
Synchrotron Beamline Components

Beamline Components

Toyama has developed an extensive range of components and systems for synchrotron beamlines and front ends. As well as providing individual components, Toyama has supplied many complete beamline installations.

High Heat Load Front Ends

Extensive experience at Spring-8 means that we have a deep understanding of the requirements of high heat load front end components and beamline systems. The range of front end products include high heat load slits, masks and absorbers. We have strong in-house expertise in thermal design at all heat loads, backed up by state of the art thermal modelling software.



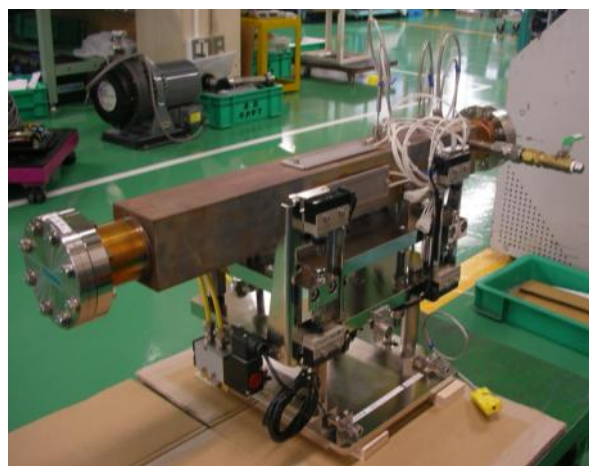
Motorised 4-jaw slit

Mirror Systems

All mirror systems from Toyama are individually customised to suit the requirements of the beamline where they are to be installed. Our range of mirror systems include mirror benders and K-B mirrors. We can design systems for mirrors that are cooled with water or liquid nitrogen; these systems are proven at a number of third generation synchrotrons. Toyama has experience of working with all the major mirror suppliers and is willing to supply complete systems including optics or to work with your preferred mirror supplier.



Liquid nitrogen-cooled mirror system



Mask and absorber for high heat load front end

Slits

A full range of two and four jaw manual and motorised slits can be customised for your specific beamline application including precision entrance and exit slits for high resolution soft x-ray monochromators. Slits can be supplied with a range of options including cooling, temperature monitoring and current pick-up.



Cooled slit with current and temperature monitoring

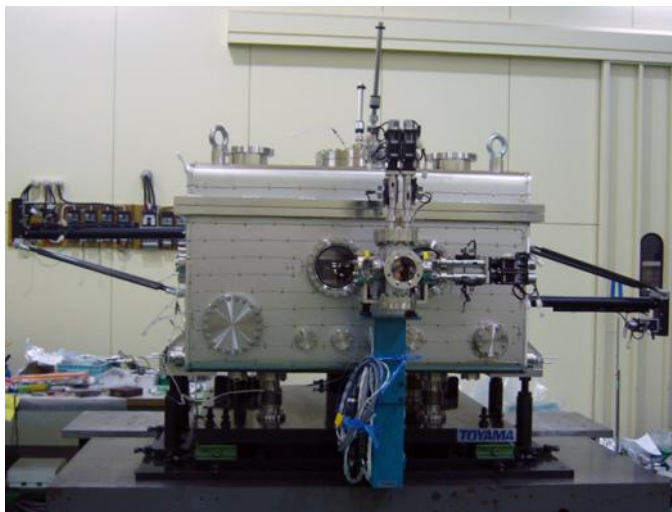
Beam Monitors

Toyama have developed a new range of beam monitoring hardware and electronics including mesh, quadrant, diode and screen monitors. Simple but powerful integrated electronics combined with easy connectivity and user-friendly software makes it practical to set up a network of multiple monitoring positions on the beamline.



Mirror systems being installed at NSRRC, Taiwan

Soft X-ray Beamlines



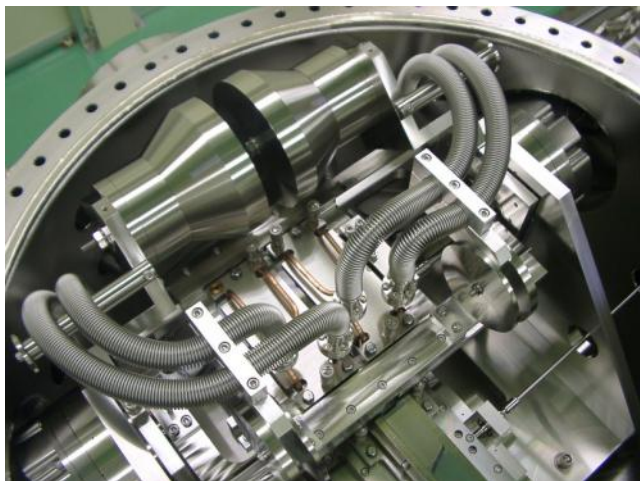
VLSPGM at the DEIMOS beamline, Soleil Synchrotron, France

Soft X-ray Monochromators

Toyama have established procedures for optical design to ensure that our soft x-ray monochromators achieve excellent resolving power with high photon flux.

We have a number of standard designs for Variable Line Spacing PGM and Variable Included Angle PGM instruments, as well SGM and other geometries. By working closely with our customers we can modify these standard systems to produce monochromators designed for your specific requirements.

In the last 10 years Toyama has supplied more than 20 soft x-ray grating monochromators to customers in Japan, Korea, Thailand, France and Spain.



Internal mechanism of PGM at KEK, Japan

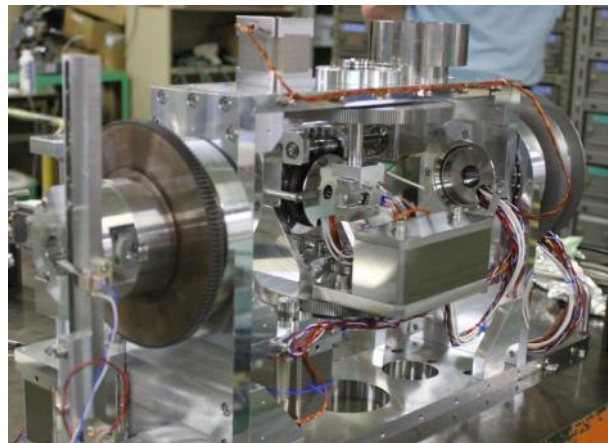
State-of-the-art computer modelling tools are used to optimise mechanical (gravity deflection and vibration) and thermal performance.

This is backed up by in-house development programs working on specific aspects of the design such as ultra-low vibration cooling systems for the monochromator optics, and UHV bearing lubrication materials.

Complete Beamlines

Toyama has delivered a number of complete soft x-ray beamline projects to synchrotrons in Europe and the Far East. For these projects Toyama manages all aspects of the beamline delivery from the initial optical design through to installation and alignment, and final commissioning.

We are flexible in our approach to the supply of beamline optical components such as mirrors and gratings, either including these in our scope of supply, or working with the customer's preferred vendor.

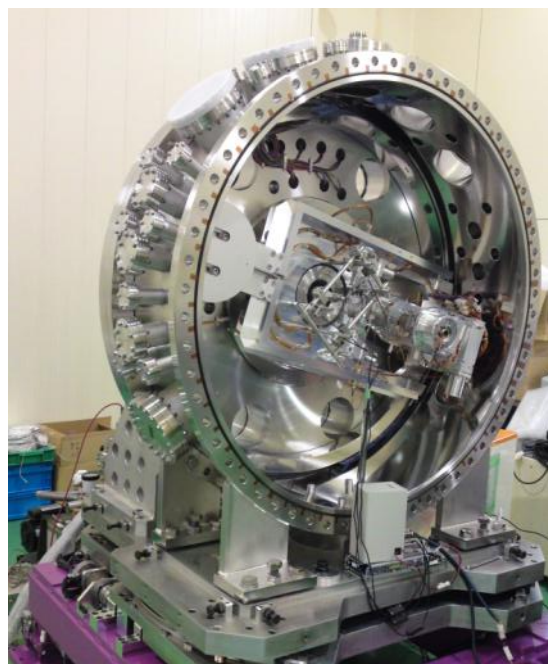


Internal mechanism of an ellipsometer

End Stations

Toyama constructs both standard and bespoke soft x-ray end stations. Standard designs include ellipsometers for polarisation analysis of soft x-rays, reflectometers and electron spectroscopy systems.

A recent example of a bespoke system is the RASOR soft x-ray diffractometer designed and built for the Diamond Light Source in Oxford UK to run diffraction and reflectivity experiments.

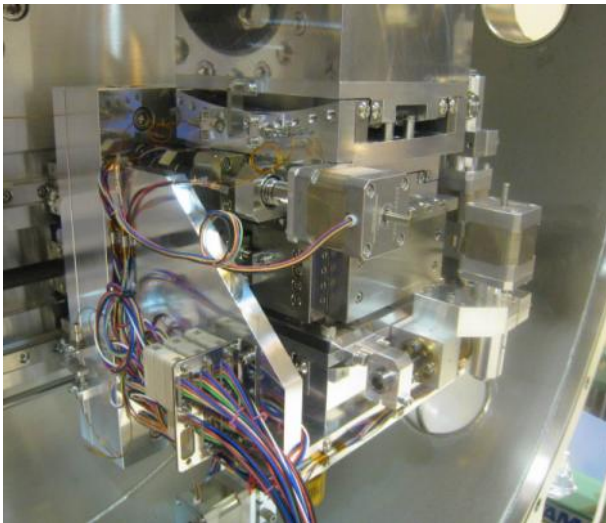


Diffractometer RASOR at I10, Diamond Light Source, UK

Hard X-ray Monochromator: DCM

Whilst Toyama has an excellent reputation for the supply of components for hard x-ray beamlines, it is only recently that the company has entered the market for hard x-ray monochromators.

Working in collaboration with scientists and engineers from third generation sources we have designed a new range of double crystal monochromators (DCM). High stability and excellent resolution are key aspects of the new monochromator and this, coupled with careful thermal design with high cooling capacity, results in a state-of-the-art instrument for hard x-ray beamlines.



DCM crystal cage

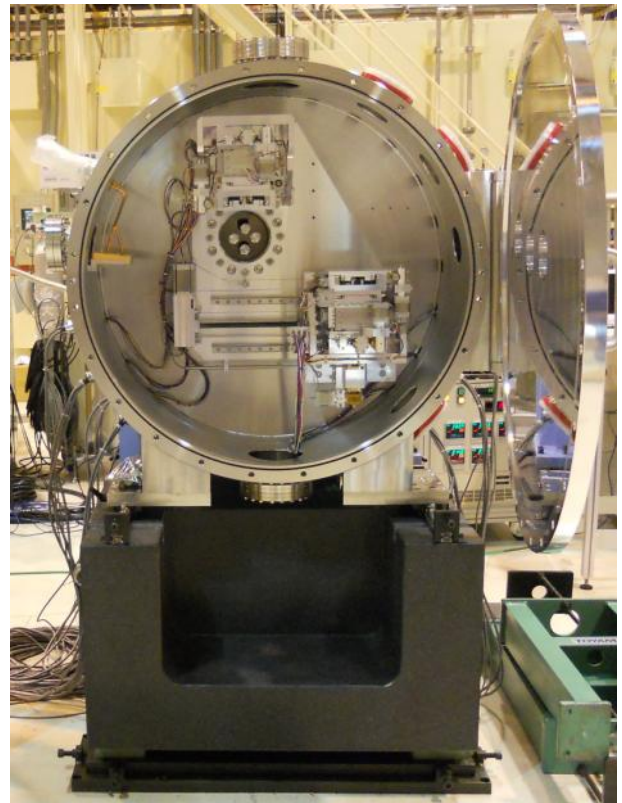
Ongoing development work with the DCM includes a method of controlling the crystal cage mechanisms to allow a fast scanning pseudo channel-cut mode of operation.

Quick EXAFS Monochromator

A further new development is a compact, UHV-compatible, fast scanning monochromator for QXAFS measurements. Fast scanning is achieved by using a DC servomotor. The crystal cage can be either water or liquid nitrogen cooled.



DCM for XFEL Beamline



DCM Double Crystal Monochromator

XFEL Beamlines

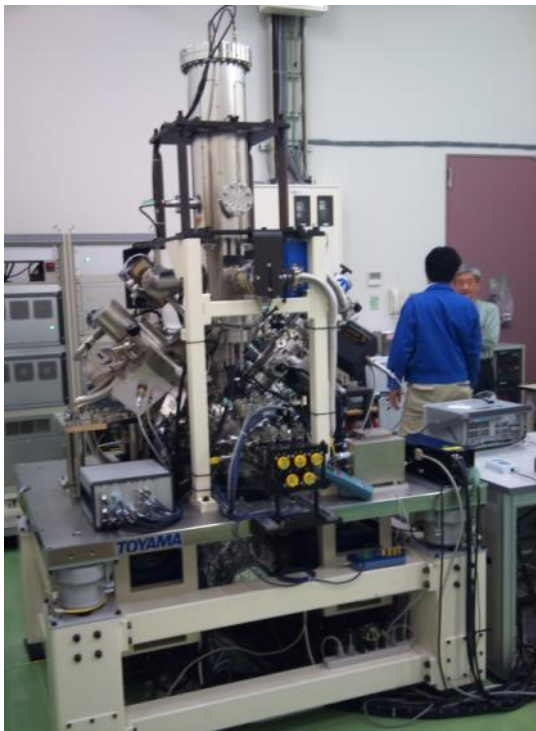
Toyama has developed a range of components for XFEL beamlines including monochromators and mirror systems. Working with XFEL sources demands new levels of precision and stability from the mechanisms, together with the requirement to operate in a true UHV environment.

Optimisation of the monochromator design results in a novel mechanism combining sine bar and flexure mechanisms to give very high levels of stability in energy dispersion for extended periods of time.



Crystal stage of DCM for XFEL Beamline

Analytical Instruments and Accelerator Systems



FIB-TOF-SIMS system

Environmental Analysis

Toyama has participated in government scientific research programs that have resulted in development of analysis equipment for measuring low levels of atmospheric contamination. The Jet Cooling Resonance Enhanced Multi-Photon Ionisation (Jet-REMPI) Mass Spectrometer and the Laser Ionisation Compact Analyzer Mass Spectrometer (LICA-MS) result from this work.

The Jet-REMPI system can achieve parts per billion sensitivity in a wide range of samples. The portable LICA-MS systems allow measurements on site and in real time.



Hydrogen ion source

Accelerator Components

Toyama has a significant track record in providing systems for particle accelerators, for example, at the Japan Proton Accelerator (J-PARC). Equipment supplied has included septum magnets, RF quadrupoles, beam position and profile monitors, beam stops, beam ducts and ion sources.

Surface Analysis

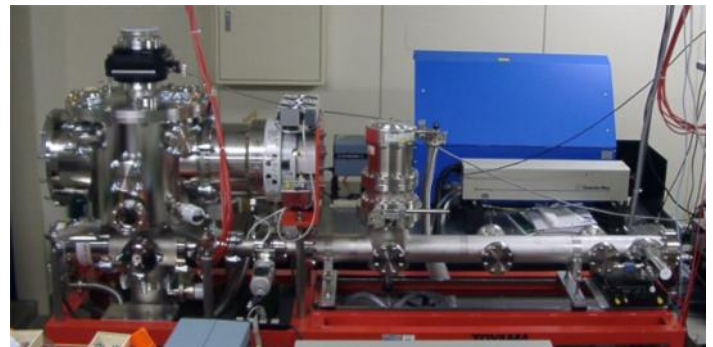
The Focused Ion Beam Time-of-Flight Secondary Ion Mass Spectrometer (FIB-TOF-SIMS) sets the standard for TOFSIMS ion imaging of surfaces. The system can produce ion images with 30nm lateral resolution. The focused ion beam source can also be used to prepare samples by ion milling.

The addition of laser post-ionisation allows detailed analysis of neutrals and organic species. The system can also be fitted with a 10 nm resolution electron column to provide high resolution SEM imaging.

Control of the instrument is through a Windows-based user interface gives complete control of all instrument parameters.



Inserting a sample for analysis



Jet-REMPI mass spectrometer

Thin Film Deposition

Toyama has built a number of thin film deposition systems ranging from research systems to industrial deposition tools; we can provide customised coating systems using a range of different deposition techniques. Examples include specialist facing target sputtering systems capable of depositing high precision multilayers on substrates with arbitrary shapes using the five axis attitude control system.



Research sputter deposition system

History

Toyama's history is strongly linked to the development of cutting edge science in Japan. The founder, Motomasa Endo first established the Endo Factory in 1954 manufacturing experimental apparatus for physics and chemistry. It also supported the development and prototyping of the high quality Miranda 35mm single-lens reflex camera.

The company became Toyama Seiki Ltd. in 1956 and started producing vacuum components for the Japan Atomic Energy Research Institute, the Proton Synchrotron (KEK) and the Photon Factory.

Toyama moved to its present location in 1986 and invested in new plant and equipment to support the growing synchrotron business. The company has continually invested in new design and manufacturing tools to support the growth of the business.

Having built a strong reputation for innovation, performance and quality in Japan, Toyama took its first major steps into export markets in the year 2000. Our overseas project team is made up from experts from our technical sales and engineering departments, and Toyama is now achieving success in the worldwide synchrotron market.

Toyama remains a family firm with a highly skilled and dedicated workforce. Katsumi Endo, son of the founder, is now CEO of the company.



Motomasa Endo, founder, 1919-2009



Katsumi Endo, CEO Toyama



Toyama was involved in the pre-production manufacture of the first Miranda 35mm SLR cameras. Subsequently a range of over 30 models were produced by Miranda through to 1978. Many had advanced or sophisticated features for their day



Miichi Goto joined Toyama in 1957 and still employed today, seen here operating one of Toyama's original precision lathes. Mr Goto now passes on his experience to a new generation of Toyama graduate employees

Our Company Goal

If you have a new concept that needs to be developed, then Toyama is the place to come. We have the technology and experience to turn your ideas into reality. We look forward to working with you.

Recent Projects

The projects listed below represent examples of work that is currently ongoing or has been recently completed:

- NSLS-II In-vacuum magnetic measurement system
- INDUS-2 X-ray scanner
- ALBA Complete soft x-ray beamline: BOREAS
- SSRF Two mirror bending systems
- SPring-8 Three hard X-ray monochromators
- SACLA Beamline components for the XFEL
- Chubu Six complete beamlines



Handover of x-ray scanner at the Indus-2 synchrotron

TOYAMA

Pioneering New Horizons in Science

Headquarters and Plant

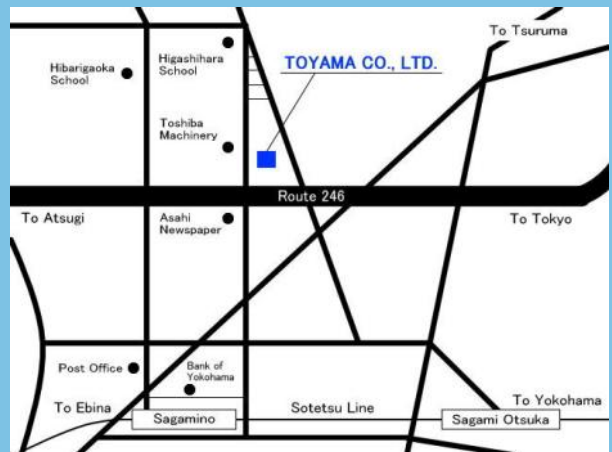
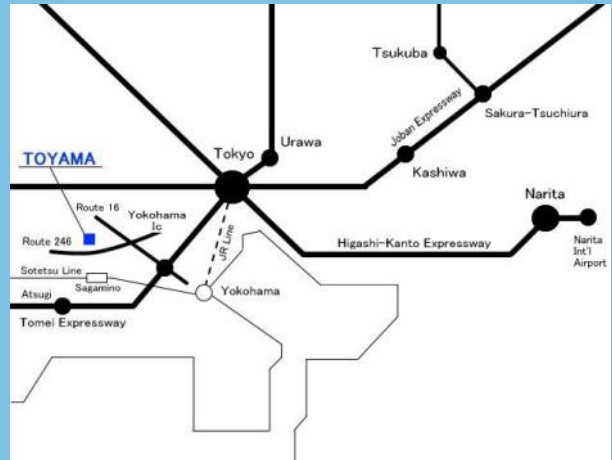
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ISO 14001:2004
Environmental Management

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