

KISTLER

measure. analyze. innovate.



THE EVOLUTION OF THE TOOL HOLDER

NIKKEN's NC tooling systems: a story of continuous innovation with support from Kistler



R&D workstation at NIKKEN headquarters with machining cell, including the 9255C dynamometer from Kistler (in the background)

Japanese tool holder specialist NIKKEN relies on accurate measurements and comprehensive cutting force data from a Kistler dynamometer to advance its solutions for demanding machining applications, both in Japan and Europe. Among NIKKEN's recent innovations is a new dynamic double face contact tooling system that was honored with a JSPE Technology Award in 2022.

NIKKEN KOSAKUSHO WORKS, LTD. manufactures high-performance tool holders, CNC rotary tables, reamers, and a range of other cutting-edge technological solutions for high-level machining applications in many diverse industrial sectors. NIKKEN was founded in 1958 at Osaka, where its headquarters is still located today. In the intervening years, the company has evolved into a global network with over 750 employees working in Japan and locations in more than 15 overseas countries worldwide. Industries supplied by NIKKEN include aerospace, healthcare, motorsport, power engineering, molding and die casting, as well as the energy sector.

Although NIKKEN's presence in Europe dates back as far as 1973, the company marked a milestone in 2015 by opening the NIKKEN Innovation Centre Europe – or NICE – at Rotherham in the UK. This flagship facility is equipped with eight state-of-the-art machining centers for full-scale research and development work on machining applications. "That was also when we started working with Kistler measurement technology, and we've continued to do so successfully ever since then," according to Susumu Mikado, Senior Managing Director at NIKKEN. NICE is located near the University of Sheffield Advanced Manufacturing Research Centre (AMRC), a renowned hub dedicated to high-level research and development with a special focus on aerospace applications.

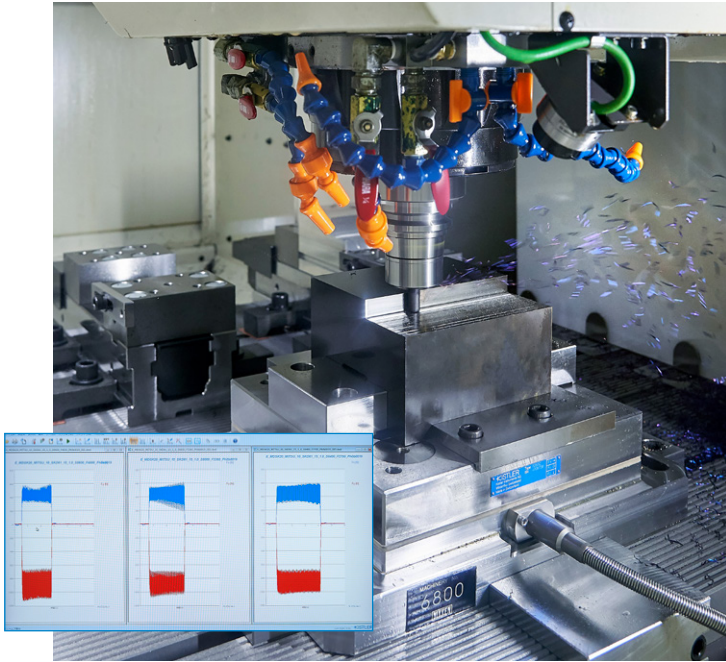
Cutting force measurements – with utmost precision

"The objectives in R&D are to correlate all data on cutting forces X, Y, and Z with parameters such as the velocity command and torque command of the 3-axis servo motor, the spindle torque, and the accuracy and stability of the cutting surface, and to comprehensively evaluate this data," Mikado explains. "The Kistler system enabled us to accurately measure all the cutting forces needed for a new series of tool holders, and also to compare the process performance for all the tool holders."

"Thanks to Kistler's help, we were able to standardize our process and method for the original workpiece, which measured 150 x 150 x 100 mm."

Susumu Mikado, Senior Managing Director at NIKKEN

NIKKEN originally developed the products in its X-Treme CHUCK series for demanding aerospace and energy applications. They provide high repeatable accuracy and excellent runout characteristics – combined with complete elimination and prevention of absolutely any movement or 'pulling-out' of the end mill. Tool holder development and testing made use of a 9255C dynamometer from Kistler. Thanks to its high rigidity and natural frequency, this piezoelectric sensor array (comprising four 3-axis force sensors) measures the cutting forces and moments in the three orthogonal axes with utmost precision. Another benefit of the 9255C dynamometer is its high resolution, so it can capture the smallest dynamic changes – even when large forces are involved. Features such as a wide measuring range (Fx, Fy: ± 30 kN, Fz: -10 to 60 kN), ground-isolation sensor integration, and protection class IP67 make the 9255C ideal for heavy-duty applications in R&D as well as production.



Comprehensive cutting force data provided by the 9255C dynamometer from Kistler helps NIKKEN to develop and refine its tool holder solutions for heavy-duty machining.

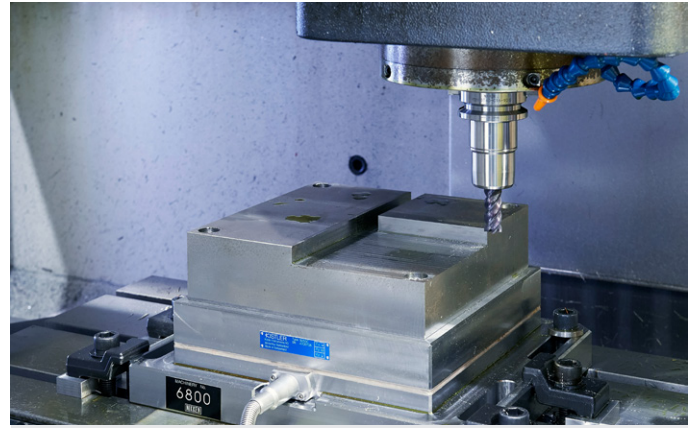
“Thanks to Kistler’s help, we were able to standardize our process and method for the original workpiece, which measured 150 x 150 x 100 mm. Our product was originally developed to manufacture jet engine components made of a special titanium alloy. The dynamometer’s great performance, ease of use and data quality – backed up by excellent service from Kistler – were major factors in the success of our project,” Mikado reports.

Driving technological evolution ahead

In 2020, NIKKEN built a new technical center at its headquarters in Japan, equipped with the latest machining technologies to achieve the highest possible accuracy. Mikado again: “In view of that, we moved the Kistler dynamometer to our new center. Since then, the 9255C has delivered an enormous volume of cutting data on different types of shanks and chucks – not only for basic evaluation, but also to support the specification of material characteristics.”

R&D efforts at the new technical center in Osaka culminated in the development of a dynamic double face contact tooling system. This NIKKEN innovation ultimately led to a new tool holder series with many different variants including the dynamic 2LOCK tooling system (BT double face contact), which won the 42nd Technical Award of the JSPE (Japan Society for Precision Engineering) in 2022. The new system delivers far better cutting performance in many respects: elimination of vibrations, smoothness, accuracy and tool life – and the improvements are achieved regardless of material type (e.g. for aluminum, steel, or alloys).

Mikado concludes: “The Kistler dynamometer has helped us to continue developing our solutions, and has even paved the way for some real innovations. The technical support we receive from Kistler Japan is also very good – not only for commissioning and basic knowledge exchange, but also when it comes to optimizing the measuring chain and the entire R&D system – including aspects such as interfaces and data processing.”



The 9255C dynamometer from Kistler is a multi-component force and moment sensor for robust and precise dynamic measurements in demanding applications such as machining R&D and production.

Measurement technology to ensure machining excellence

With its broad portfolio of piezoelectric dynamometers, Kistler can provide best-in-class solutions for applications such as milling, drilling, turning, grinding and many more – all the way from micro-machining to heavy-duty cutting. Highlights include:

- Stationary and rotary dynamometers
- High rigidity and natural frequency to enable high resolution
- Easy machine integration and handling
- Very robust and coolant-resistant (IP67)
- Very long service lifetimes
- New wireless RCD (rotating cutting dynamometer)

Dynamometers from Kistler are used in many R&D applications, and they also play a key part in optimizing production processes. For this purpose, Kistler offers integrated process monitoring with maXYmos – for increased productivity, lower TCO, and consistent quality over the long term.



At its headquarters in Osaka (Japan), NIKKEN KOSAKUSHO WORKS, LTD. relies on Kistler measurement technology for its development of high-performance tool holders.

Would you like to learn
more about our applications?

Explore now:



www.kistler.com

Kistler Group
Eulachstrasse 22
8408 Winterthur
Switzerland
Tel. +41 52 224 11 11

Kistler Group products are protected by various intellectual property rights. For more details, visit www.kistler.com. The Kistler Group includes Kistler Holding AG and all its subsidiaries in Europe, Asia, the Americas and Australia.

Find your local contact at
www.kistler.com

KISTLER
measure. analyze. innovate.