70th Anniversary | 2016 | Volume 1

New Hampshire Ball Bearings, Inc.
A Minebea Company

inside track

nhbb.com

customer newsletter

Weitzel Named Operations Manager of Precision Division

David Weitzel assumed the role of Operations Manager of the Precision Division on April 1, 2016. He succeeds Paul Spencer, who held the position for 22 years before he announced his retirement at the end of 2016. Until then, Paul is staying on as a part-time Senior Advisor.

David Weitzel

"David Weitzel is a dedicated, knowledgeable, and experienced manager who has prepared himself well to succeed in his new role," said Jim Geary, NHBB's Executive Vice President. "Over the past several years, David has gained a thorough understanding of our business on many levels. As a leader, David possesses a keen awareness of NHBB's mission and is driven to achieve and sustain the highest levels of customer satisfaction."

Prior to his promotion, David was the Division's Manufacturing Engineering Manager, a position he held since 2006. In this role, David implemented various programs and technologies that have led to greater efficiencies and process improvements within the Manufacturing Engineering department and on the factory floor. He was also responsible for creating NHBB's engineering apprenticeship program for training mechanical engineers.

David joined NHBB and the Precision Division in 2003 as a Senior Manufacturing Engineer. He holds a BS in mechanical engineering from BYU and an MBA from Pepperdine.

NHBB Turns Seventy This Year
Its Thirty-First as a Minebea Company

This year marks the 70th anniversary of the founding of New Hampshire Ball Bearings, a remarkable accomplishment in today's manufacturing economy. Just as astonishing is the fact that NHBB has been a member of the Minebea Group of Companies for 31 years. This relationship has proven to be one of the most important reasons why NHBB remains such a vital enterprise today.

New Hampshire Ball Bearings, Inc. was started by Arthur N. Daniels and Pierre Wentworth, who set out to bring the production of miniature precision ball bearings, or micro bearings as they referred to them, into the Modern Era by adopting the latest manufacturing technology, machine tools, and methods.

Arthur N. Daniels, Founder

Daniels and Wentworth believed that a "micro" ball bearing could be fully ground and, as such, could deliver significant performance advantages over existing products. As the pioneers in fully ground miniature ball bearings, the two entrepreneurs had set the stage for steady growth and profitability for years to come. While this development was truly ground breaking and a market advantage, it is how they were able to sustain growth over a long period, and through difficult economic conditions, that highlight their foresight, know how, and resilience.

From the beginning, NHBB pursued a growth strategy with ongoing capital investment serving as a catalyst. Investments in new product development and additional manufacturing capabilities enabled the company to add new products to its mix. Repeated expansions of its manufacturing footprint allowed NHBB to keep up with demand for its products. Acquisitions, made it possible for the company to diversify into new product niches and new markets.

NHBB's original factory in downtown Peterborough, NH (1946)

These business strategies served NHBB well during its first thirty years of its existence. But starting in the late '70's through the mid '80's, the advantages brought about by steady growth were counteracted by a constant downward pressure on prices, which eroded NHBB's profitability and restrained its ability to invest in future growth. By 1985, the year NHBB was purchased by Minebea, NHBB had achieved sales in excess of $59 million and was employing just over 1,400 people, but its margins were eroding.

NHBB was still viewed as an attractive investment opportunity. The company remained a market leader in miniature precision ball bearings and rod end and spherical products. It had significant exposure to the commercial and military aerospace market. Its product engineering capabilities were considered the best in the industry. And it possessed vertically-integrated production environments and significant manufacturing capacity suitable for growth. It was for these reasons, along with a desire to add to its manufacturing footprint in North America, that the Japanese manufacturing conglomerate, Minebea, acquired NHBB in 1985.

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Also inside: NHBB unveils wear sensor technology

A Message From NHBB´s President

Dan Lemieux

I am honored to lead a company with such a rich and enduring history. As the article about NHBB's 70th anniversary illustrates, innovation, market leadership and investment in growth have been pillars to NHBB's business strategy since the beginning. It was largely because of these qualities, along with its manufacturing capabilities and position within the aerospace market, that Minebea chose to acquire NHBB back in 1985. For NHBB, the acquisition represented a tremendous opportunity for the company to reach its full potential as the leading bearing manufacturer in the markets it had served for decades.

Today, the advantages bestowed upon NHBB through Minebea's continued support are vital to NHBB's growth and sustainability, the most significant of which are the synergies fostered between NHBB and other Minebea businesses. Whether it's working closely with myonic GmbH to deliver highly engineered solutions to the medical, dental and other high tech markets, or with CEROBEAR to bring advance materials, ceramic technology, and highly complex products to the aero engine market, or with Minebea's R&S manufacturing divisions to offer diverse technologies to the major aircraft OEM's, these partnerships are formed and sustained in order to create added value for our customers. While these partnerships provide a solid foundation for growth, each one is further enhanced by Minebea's own unique capabilities as a global manufacturer, including its ultra precision manufacturing technologies, strategic long term vision, and strong financial position.

As today's initiatives mature and NHBB continues to evolve, the focus on building synergies among other Minebea businesses will remain a priority. I am confident that such partnerships—coupled with the enduring strengths of Minebea—will lead to expanded products and solutions and increased production capabilities that will enable NHBB to achieve its most important objective, that of serving the needs of our customers for the next 70 years.

NHBB Awarded PMA by the FAA for More Boeing Spare Parts

Since November of 2015, The Federal Aviation Administration (FAA) has awarded NHBB with Parts Manufacturing Approval (PMA) for approximately 190 Boeing-licensed spare parts. This authorizes NHBB to manufacture and sell these Boeing airframe control bearings as spare parts on Boeing type-certificated aircraft. Boeing PMA parts manufactured by NHBB are sold to the MRO market through NHBB's Authorized Distributors.

These recent PMA's pertain to Boeing airframe control bearings (BACB) manufactured by the Precision Division in Chatsworth, California and the HiTech Division in Peterborough, NH. The Precision Division obtained PMA approval in October for 49 Boeing-licensed part numbers. HiTech received four separate PMAs in November, December and February for 138 Boeing part numbers.

NHBB's list of PMA parts is expected to grow substantially during the next six to twelve months, as all three of NHBB's manufacturing divisions are pursuing additional approvals for hundreds more Boeing-licensed part numbers.

For more information about NHBB's expanding list of FAA PMA Boeing replacement parts, including model eligibility, visit www.airweb.faa.gov and click on the link for *Parts Manufacturer Approvals*.

Airframe Control Bearings

MRO facilities interested in ordering Boeing-licensed PMA parts are encouraged to contact one of NHBB's Authorized Distributors, which are listed on our website, nhbb.com.

myonic Named One of Germany´s Best Employers

Bernhard Böck (Managing Director, middle), Astrid Gemeiner (Head of HR, right) and Julia Mischke (Corporate Communications, left) receive the award.

myonic, a Minebea Group company and close business partner to NHBB, has been selected as one of the best employers in all of Germany. The award was announced on March 16, 2016 at a gala event in Berlin sponsored by the renowned Great Place to Work® competition, "Germany's Best Employers 2016". In the category of 50 to 500 employees, myonic was ranked 54th out of 100.

After ranking 4th in the state competition *Best Employer in Baden Wuerttemberg 2016* and receiving the bronze award in the regional competition *Best Employer Allgäu 2014*, the nationwide award is something very special for myonic.

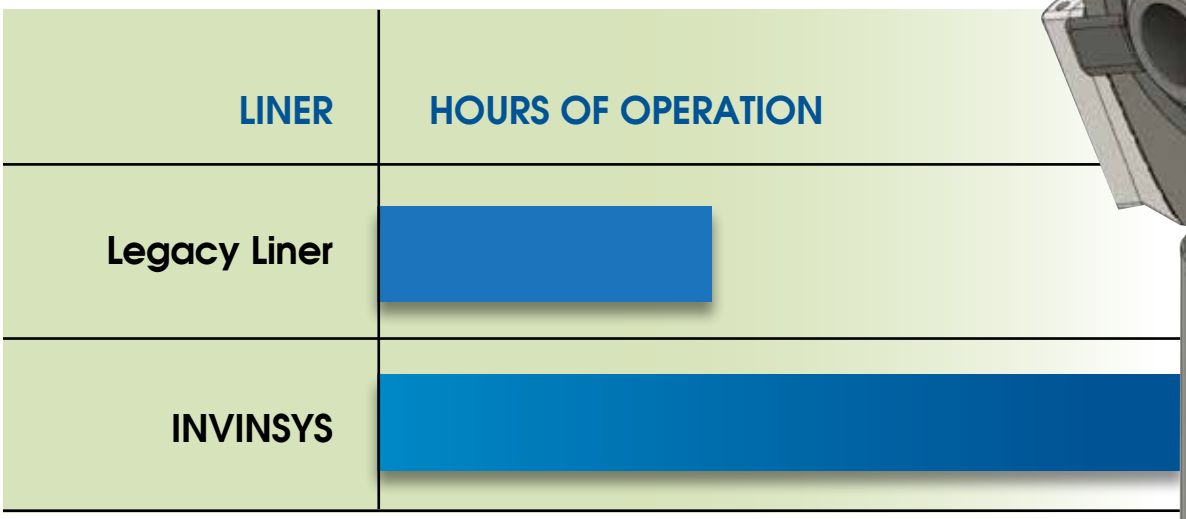
"We are incredibly proud of this ranking. It validates our dedication to being a great company to work for—myonic's success is based on the commitment and knowledge of our employees," says Managing Director Bernhard Böck. "Together, we can achieve the best results only if our employees feel comfortable in the company and like to come to work. The approval rating of the survey shows that our employees share this opinion: 89% of the participants agree that myonic is a fantastic place to work."

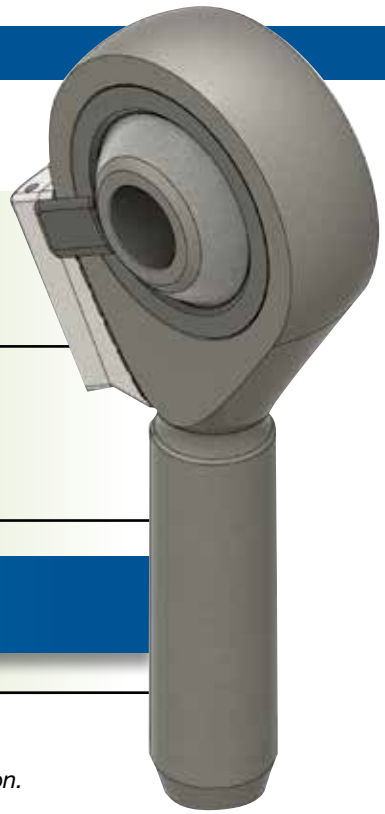
To overcome the challenges created by the demographic trends in Germany—especially that of full employment in the region—and improve myonic's image as an employer, the company established the strategic project "Exceptional Employer" five years ago. This effort has resulted in the implementation of new programs and innovations, such as preventive health management, new catering for the cafeteria, leadership training for supervisors and managers, introduction of new communication channels, and a special health care program.

INVINSYS® pitch link control bearings with NHBB´s patented wear sensor

Performance Comparison:

Legacy liner system vs. INVINSYS® with wear sensor





Results based on following test parameters:
AS81819/1-2 bearing, water contamination, reversing load, +/-2300 lbs, 300 cpm, +/- 10° oscillation.

NHBB Develops Wear Sensor for Flight-Critical Bearing System

NHBB has developed a wear sensor for the INVINSYS® brand of pitch link control bearings that will enable helicopter maintenance personnel to easily and quickly determine the operating status of these flight-critical bearings using a wireless scanner. The added value created by NHBB's patented wear sensor further establishes the INVINSYS brand as the leading bearing innovation within helicopter rotary systems.

Designed specifically for main and tail rotor pitch control bearing applications, the INVINSYS brand of pitch link control bearings provides extremely low wear and lasts up to 2.5 times longer than preexisting products. The INVINSYS product with the embedded sensor provides the same performance as the sensor-less product—with the added benefits of bearing condition-signaling and part data storage. These added features support the shift to a condition-based maintenance plan for this critical bearing system, saving helicopter owners time and money in maintenance and repair activities.

This unique bearing monitoring system consists of a wear sensor embedded in the self-lubricating liner which is connected to a wireless transmitter mounted to the rod end body. The transmitter is a passive, ultra high frequency (UHF) RFID tag (Class 1 Gen2) that can be read from a distance of six inches to three feet using a remote radio frequency receiver or scanner.

Designed and engineered in accordance with the requirements of SAE AS5678 (Passive RFID Tags Intended for Aircraft Use), the sensor's primary purpose is to accurately signal the current operating condition of the INVINSYS pitch link control bearing whenever the tag is scanned.

A positive scan indicates the bearing is operating within the normal service life assigned to the bearing. A negative scan, or MAINTENANCE REQUIRED, indicates the bearing has passed the normal service threshold and is now operating within the bearing's reserve service life. At this stage, the bearing's condition necessitates further inspection and possibly replacement during the next maintenance interval.

The sensor will enable helicopter owners to extend maintenance intervals on these flight-critical parts, as it reduces the need to adhere to a rigid scheduled maintenance plan, which often leads to the replacement of good bearings on too short a timetable. With the sensor, maintenance techs need only to replace worn out parts. The longer term impact on maintenance budgets could be significant.

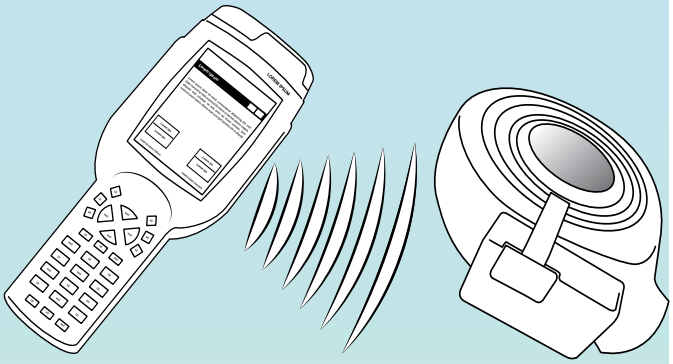
The second task the wear sensor is capable of performing is that of part identification. The RFID tag is designed to ATA Spec 2000 (Gen2), the standard which details the asset tracking and management of products, parts and property owned by the aerospace industry. The sensor's data format is compliant with electronic product code (EPC), which will allow maintenance techs to scan and download the product information stored on the tag.

The wear sensor is a development of the New Product Development Center (NPDC) in Laconia, NH. After conducting in-house testing on various prototypes, the NPDC is working closely with a customer to perform in-flight and field testing of the patented technology in order to validate the sensor's performance in actual flying conditions. Flight testing is scheduled for the spring of 2016.

For more information about NHBB's patented wear sensor technology, please contact the NHBB Astro Division.

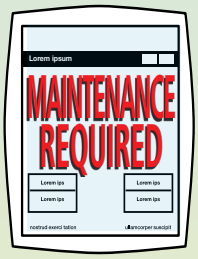
How the wear sensor works:

1. A maintenance tech points a wireless RFID tag scanner at the INVINSYS bearing with wear sensor. The signal can be read from a distance of six inches to three feet.

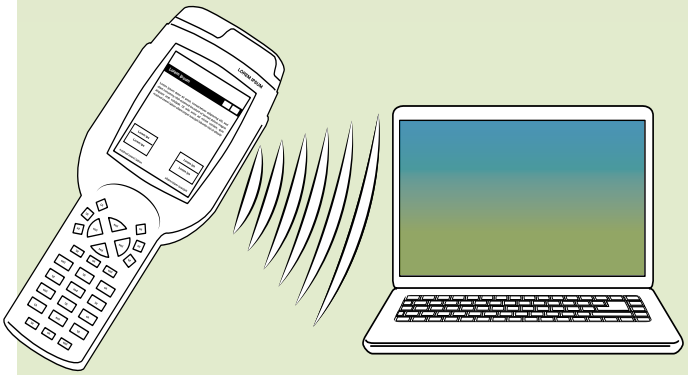


2. The sensor uses the RF energy from the scanner to check the status of the bearing's self-lubricating liner and transmits the results back to the scanner.

3. The sensor signals OK when the bearing wear is within the normal operating range.



4. The sensor returns a MAINTENANCE REQUIRED signal when the bearing is within the reserve operating range.



5. A maintenance tech is able to download this information, along with the product information contained on the RFID tag, to a PC.

Seven Significant Events in NHBB's History

NHBB's original factory in downtown Peterborough, NH (1946)

MAY 1946

Manufacturing operations commence in Peterborough, NH with the objective of producing the world's first fully ground precision miniature ball bearing.

NHBB's second location, Guernsey Office Building, aka "Cow Palace", in downtown Peterborough (1950)

JULY 1957

NHBB moves its headquarters and a majority of its manufacturing operations in Peterborough to a newly built plant located south of town at 175 Jaffrey Road, Peterborough, NH.

SEPTEMBER 1964

NHBB acquires the Astro Bearing Corporation based in Los Angeles, California, a manufacturer of rod end and spherical bearings.

NOVEMBER 1967

After several years of solid growth, the Astro Division is relocated to Laconia, NH in order to expand manufacturing operations and keep up with demand.

NHBB Astro Division, Laconia, NH (1967)

MARCH 1985

NHBB is acquired by the Minebea Group of Companies, which initiates another long period of growth via the expansion of the company's products, capabilities, and capacity. NMB's division in Chatsworth, CA is renamed and incorporated into NHBB.

Minebea
Passion to Exceed Precision

MARCH 2009

Minebea acquires myonic GmbH of Leutkirch, Germany, a specialized manufacturer of precision miniature ball bearings, and forms the NHBB/myonic Business Unit.

myonic

JULY 2013

NHBB acquires CEROBEAR GmbH of Herzogenrath, Germany, a leading innovator in the development and production of hybrid- and all-ceramic precision ball and roller bearings.

CEROBEAR
ceramic bearing technology

NHBB Turns Seventy This Year *continued*

NHBB's acquisition by Minebea was the start of another long period of sustained growth spurred by Minebea's investment in NHBB, which has risen to over $300 million during its thirty-one years as NHBB's owner. This steady flow of capital, proprietary manufacturing technology, and know how enabled NHBB to continue with its plans to modernize production capabilities and expand capacity, enter new product niches and introduce new products to market, acquire companies with unique core competencies, and penetrate further into European and Asian markets.

NHBB's third location (current location of HiTech Division and Corporate HQ), 175 Jaffrey Rd., Peterborough (1957)

One of the most significant investments was at the HiTech Division in Peterborough, where NHBB added the capability to manufacture cylindrical roller bearings for aero engines. The growth in sales of cylindrical roller bearings has continually exceeded expectations since the first shipment in 1994, making it one of the most successful launches in the company's history.

The Astro Division has utilized investments by Minebea to implement advanced machining technology and production processes and assume a leadership role within the company as a practitioner of Lean and Continuous Improvement. It has expanded its R&S product offering to include next-up assemblies and machined parts and launched three new products in the past five years alone.

NHBB's Precision Division leveraged investments by Minebea to solidify its reputation as the highest performing supplier of precision miniature and instrument ball bearings in North America and steadily expanded its production capabilities to include precision ball bearings up to 3.00 in. OD.

Investment in NHBB's new product development capabilities led to the establishment of the New Product Development Center (NPDC) in 2011. The NPDC's first step was to launch new innovations in self-lubricating liner technology in support of Astro's customers. In the past couple of years, it has built a platform for supporting the new product development needs of customers in the aero engine market.

continued on back page

Precision Chooses New Supervisor of Applications Engineering


Adam Van Wagner

Adam Van Wagner has been promoted to Supervisor of Precision's Applications Engineering department, effective December 1, 2015. He succeeds Alex Garcia, who joined NHBB's Field Sales team as a member of the Aerospace and Defense Group.

Adam supervises bearing design activities, part number interchange (PIC) maintenance, engineering systems upgrades, and database and ETF processing, plus he continues to work with customers on new applications. He has worked in the department since joining the company in 2011.

Prior to NHBB, Adam spent seven years gaining valuable experience as a machine programmer, design engineer, and mechanical engineer primarily in the musical instrument manufacturing industry. He earned his BS in mechanical engineering from the University of Massachusetts–Lowell in May of 2002.

Precision´s Alex Garcia Joins Field Sales *Al Kerestes Retires*

Alex Garcia has completed his transition from Manager of Applications and Design Engineering for the Precision Division to Field Sales Engineer with NHBB's Aerospace and Defense group. In his new role, Alex is responsible for supporting customers in northern and southern California and Arizona. He succeeds Al Kerestes, who retired in January after 36 years of distinguished service with NHBB.

Alex brings to the field superb product design, engineering, and customer support skills, which he developed over sixteen years as an engineer with NHBB. Alex joined the Precision Division as an Application Engineer in October 1999 and, in 2007, he was promoted to Manager of Applications and Design Engineering. Alex holds a BS in mechanical engineering from the University of California – Irvine.

Al Kerestes joined NHBB in 1979 as a Sales Engineer in Los Angeles, managing accounts in southern California and Arizona. An outstanding sales professional, Al is a three-time recipient of NHBB's Sales Engineer of the Year award. Before joining NHBB, Al served in the Marine Corps and earned his undergraduate degree from SUNY in Buffalo NY and graduate degree in Geology from S.U.C. Fredonia.

NHBB Turns Seventy This Year *continued from page 5*

More recently, Minebea and NHBB have collaborated on identifying acquisitions that provide new growth opportunities. The most significant purchases include myonic GmbH, a precision miniature bearing manufacturer, and CEROBEAR GmbH, a leading innovator in the development and production of hybrid- and all-ceramic precision ball and roller bearings. Both companies are technology leaders in their respective markets and they add significant value to NHBB's customers through their complementary product offerings.

New Hampshire Ball Bearings has proven to be a sound investment for Minebea, rewarding it with solid growth for much of its thirty-one years as a subsidiary. NHBB has increased its annual sales significantly since the acquisition. The common thread connecting NHBB's distant past as an independent company and the current era is its strategy of investing in growth. What's unique about NHBB today is the pace of change and the amount of growth that has resulted from its partnership with Minebea. The size and scope of Minebea's investments have turned a small domestic producer into a resilient global manufacturer.


Precision Division, Chatsworth, CA (photo from 2007)

HiTech Hosts Work-Site Learning Experience for Area HS Students

As part of NHBB's workforce development initiative, HiTech has partnered with Conval High School in Peterborough, NH to host a class on manufacturing. Called Manufacturing Principles and Processes, the course is open to high school juniors and seniors who are interested in exploring career opportunities in manufacturing. Nine students are enrolled in the program this semester, which began in February and will end in June. Students attend classes at the High School (three days each week) and at NHBB (two days). The curriculum is being taught by the Physics and Manufacturing Teacher at Conval and by NHBB manufacturing and engineering personnel. The subject matter includes such topics as manufacturing process flow, product design for manufacturability, documentation and quality, machining tolerances and measurement, work standards and safety practices, and employable skills.

Tradeshow Calendar

AHS International Forum 72	MD&M East 2016
May 17–19, 2016	June 14–16, 2016
West Palm Beach, Florida	New York City
NHBB – Booth #810	NHBB/myonic
CEROBEAR – Booth #809	Booth #1349