

## NTN ENGINEERING SERVICES

### Up Close and Personal with NTN Canada's Engineering Department



NTN Employees Volunteer to  
Restore La Ruelle d'Hochelaga  
Pediatrics Centre

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NTN Delivers the Ultimate  
Bearing Experience for Paper  
Manufacturer on Thermal Roll  
Application

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Join NTN's Jean Drive and  
Give Your Jeans a Second Life

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**PRODUCT PROFILE**  
MEGA0HM™ 7MC3 Series  
Ceramic Insulated Ball  
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## NTN ENGINEERING SERVICES

# Up Close and Personal with NTN Canada's Engineering Department

## DELIVERING THE ULTIMATE BEARING EXPERIENCE

### A true learning organization where employees embrace the opportunity to lead positive change

As a company dedicated to "providing the Ultimate Bearing Customer Experience (UBE)", NTN BEARING CORP. OF CANADA has remained steadfast in providing the highest level of engineering service despite COVID challenges. The concept of UBE focuses on the mindset of SERVICE. NTN Canada ensures that everything that is said and done for the bearing customer is done with the intent to give the customer extraordinary service by anticipating their needs and creating solutions to support their success. This situation has made our team realize how important it is to be comfortable with change and willing to shift gears when necessary.

### Introducing TRIAGE Engineering Solutions

Our employees have embraced an innovation mindset, challenging the norm to navigate through COVID-19 as an "Immediate Transformation Opportunity for Improvement." A recent transformation example is NTN Canada's launch of remote service solutions, known as "TRIAGE Engineering Solutions", for troubleshooting bearing

**Mr. Marcus Wickert**  
Director of Engineering,  
NBCC



## Supporting customers by tapping into the combined experience of the NTN Engineering Department

“ NTN appreciates that when equipment is down, the most important thing is to get back up and running. NTN's TRIAGE Engineering Solutions powered by INSYNC Remote Diagnostics improves on our existing collaboration tools, allowing us to work more efficiently with our industry partners all while significantly reducing travel time. NTN's remote engineers can see issues and opportunities first-hand and find solutions much quicker than through traditional on-site visits by providing the opportunity for better and more effective collaboration. NTN's TRIAGE approach further improves collaboration by enabling more people to participate in troubleshooting problems, as a whole team of NTN experts can help the on-site plant technician solve the bearing problem.

”



equipment used in aftermarket applications.

In Canada, the company depends on its team of engineers, with over 300 years of combined bearing experience in the marketplace, to support end users at manufacturing facilities with complex bearing applications. NTN Canada's innovative TRIAGE Engineering Solutions platform offers a systematic approach to defining bearing troubleshooting requirements to support maintenance professionals. Combining HI (Human Intelligence) with AR (Assisted Reality), the state-of-the-art system allows NTN experts to send precise visual instructions remotely to maintenance technicians at any manufacturing facility to ensure bearing maintenance issues can be fixed as efficiently as possible, minimizing downtime.

If maintenance technicians face complex or unusual servicing points, they can use NTN's INSYNC remote collaboration technology to connect directly with NTN Canada's Engineering Department located in Mississauga, Ontario. The NTN expert is then able to support the field technician through the diagnosis and bearing repair by augmenting images, diagrams and adding repair suggestions into their view.

NTN Canada will continue to provide superior bearing products and engineering services to deliver the Ultimate Bearing Experience to its customers, ensuring they receive the answers and support they need as efficiently as possible.



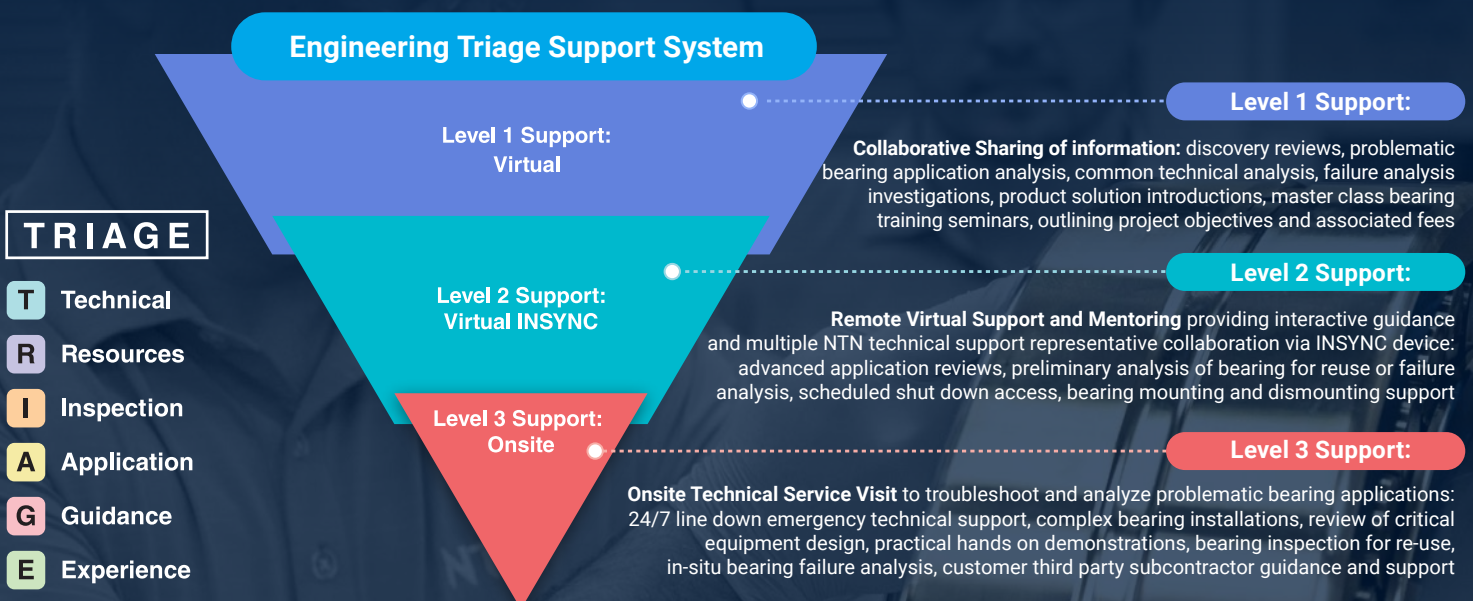
Through remote collaboration, technicians can share bearing application details to receive support from NTN

A team of NTN experts help the plant technician at the end user's manufacturing facility solve the bearing problem remotely



## Overview of NTN Canada's Engineering TRIAGE Support System:

A three level collaboration process to service aftermarket customers safely and instantly



# Interviews with NTN Engineering Colleagues!

## HOW DO YOU DESCRIBE YOUR WORKPLACE?

**Mario Borsella**  
Manager, Field Service  
Engineering Group



It is a great place to work with very talented people. We are able to collaborate on many different and challenging projects. We are a small team that care and are passionate about what we do.

**Amjad Ramadan**  
Applications Engineer



Our workplace is a second home for everyone where we all feel important and work towards the same goal.

**Shreyans Dedhiya**  
Service Engineer



A collaborative environment that helps to exercise everyday challenges while adding fun with constant innovation.

## WHAT DO YOU VALUE, OR PLACE IMPORTANCE ON WHEN WORKING?

**Marcus Wickert**  
Director of Engineering



There are always challenges that will arise, but it is essential to work as a group to overcome and understand them together to develop a solution. Even if you are not successful the first time, reconsider your approach, and never give up finding a solution if it is important to you.

**James Hassan**  
Applications Engineering



I value finding solutions for a customer or colleague, whether it is a product, process, or ideology that I am able to provide. I also value having good relationships with customers and colleagues, many colleagues of which I have contact with beyond the workplace.

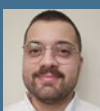
**Al Rudaitis**  
Senior Applications  
Engineer



Our group of engineers and service technicians, I believe, are the best in our industry in Canada. We are motivated to provide "UBE" - the "Ultimate Bearing Experience" to our customers in all that we do.

## WHAT KIND OF TRANSFORMATION ARE YOU WORKING ON IN YOUR JOB?

**Christian Borsella**  
Applications Engineering



A change in the way of thinking that I have worked on for my job is to try and see the bigger picture of a project. When working on an inspection or any other kind of project, seeing the bigger picture and understanding what the customers intentions are will allow you to better understand what really must be done to find a solution or complete the project.

**Jean-François Doucet**  
Ingénieur de service  
(Service Engineer)



Not being able to go meet customers in person have forced me to communicate more effectively over the phone and through web meetings. I have discovered that a lot can be achieved remotely by asking the right questions and using the proper technological tools.

**Joseph Antony**  
Engineering Project  
Coordinator



I try to apply the "Project Management" principles to all the tasks that are assigned to me. Prioritizing the tasks at hand, setting timelines and keeping my calendar up to date has helped me to meet the deadlines and to complete all the projects on time.

## WHAT DO YOU ENJOY ABOUT YOUR WORK?

**Chris Rempel**  
Engineering Manager



The best part of my job is collaborating with customers, finding solutions to problems with their rotating equipment. It is especially rewarding to see a solution alleviate the pain of reoccurring bearing failures or poor machine performance.

**Mathew Meo**  
Technical Service  
Specialist



What makes me the happiest is being part of a solution focused team that strives to provide the Ultimate Customer Service Experience at all times.





## NTN JEAN DRIVE FOR HAPPIER SMILES & HAPPIER FACES

# Give YOUR JEANS A SECOND LIFE

Give your jeans a second life for 'Happier Smiles, Happier Faces'! Join NTN's Jean Drive for Haven Toronto by donating new or clean/gently used jeans and track pants for families experiencing homelessness. For those in shelters, jeans are one of the most requested items. You can drop off your jeans at our contact-less donation location at the NTN Canada Headquarters at 305 Courtneypark Drive West, Mississauga, Ontario L5W 1Y4. We'll deliver them to the Haven Toronto Shelter on December 21st as part of our Holiday Lunch for men, women, and children experiencing poverty and homelessness.

Please donate by December 3, 2021 and ensure your garments are individually bagged and labelled to indicate size and gender. Contact us at today for more information on ways to donate your items to those in need of warm clothes through NTN Canada's 'Happier Smiles, Happier Faces' initiative, aimed at pioneering positive social changes in the communities where we work and live.



**NTN**

**HAVEN**  
TORONTO

**NTN JEAN  
DRIVE**



**HAPPIER SMILES  
HAPPIER FACES**



## SUCCESS REPORT

# NTN Extends Bearing Service Life on Thermal Rolls to Deliver the Ultimate Bearing Experience for Paper Manufacturer

### VALUE ADDED BREAKDOWN

Increased Productivity  
**\$324,000**

Increased Bearing Life  
**\$1,400,000**

Documented Cost Savings  
**\$1,724,000**

Annualized Cost Savings  
**\$944,000**

NTN strives to deliver the Ultimate Bearing Experience by being a world class bearing producer, supplier and by supporting the success of our customers. In this comprehensive case study, we look at how a major Canadian paper manufacturer benefited from a customized bearing solution tailored to their exact needs.

Rising competition can require today's pulp and paper manufacturers to push their machines to new limits. Incremental increases in load, speed and operating temperatures will often reveal the "weakest" link in equipment that is operating above and beyond original design parameters. Sometimes that weakest link may prove to be a rolling element bearing.

At first glance, the easiest solution to mitigating bearing failures due to excessive and/or adverse operating conditions may be to install a larger, higher capacity bearing. Unfortunately, this will not always address the root cause. Furthermore, the required modifications to the machine can be complex and cost prohibitive. In these circumstances, NTN's Engineering team will design and produce a custom bearing with advanced capabilities designed to perform effectively under specific operating conditions.

This was the case when a major Canadian paper manufacturer, Catalyst (a Paper Excellence Company), began to experience frequent, catastrophic bearing failures on the thermal rolls in the calendar section of two separate paper mills. NTN's engineering team worked closely with Catalyst to review the application and operating conditions. Applied Industrial Technologies, LP (AIT) and NTN Bearing Corporation of Canada partnered to provide a solution that resulted in over 1.7 million dollars of savings in parts accrual, repair costs and downtime for this manufacturer.



## Bearing Failure Investigation:

Catalyst began to experience frequent failures in the thermal roll at two separate mill locations. Both mills experienced unpredictable roller fractures in a competitor's large spherical roller bearing. Within 18 months, the combined mills experienced 11 catastrophic failures resulting in a cost of over 1 million dollars in unexpected costs.

Failure analysis and application reviews at the mills were led by Drew Monk, AIT Manager TSR Services for Catalyst and Chris Rempel, NTN Engineering Manager. "Our customer's success is intrinsically tied to our own. The magnitude of these failures made this issue a top priority for all three organizations," says Chris Rempel.

Roller fractures are relatively uncommon and when it occurs, it is often secondary to another failure process (i.e., cage failure and subsequent loss of roller guidance). Roller fractures may be associated with excessive shock load as well as poor roller dynamics. Additional contributing factors may include tolerance issues in mating components, excessive temperature fluctuations and hydrogen embrittlement.

## Ultimate Application Experience: designing a custom bearing solution to mitigate roller fractures

NTN, AIT and Catalyst collaborated to design and implement a custom bearing solution to mitigate roller fractures. As bearing failure costs were mounting quickly, a custom bearing was designed and produced in rapid fashion with an emphasis on reducing downtime.

Roller fractures were occurring with little to no additional failure symptoms and no warning, making the investigation difficult to diagnosis and predict. Although no definitive root cause could be assigned, several theories prevailed. A material enhancement was implemented that would mitigate the failure process. NTN, AIT and Catalyst worked to expedite bearing design, production, and implementation to stem the rapidly increasing cost of failures.

## THE SOLUTION:

### The Ultimate Bearing Experience leveraging the wide variety of NTN's material and heat treatment options

NTN's portfolio includes a wide variety of material and heat treatment options for rolling element bearings. In particular, NTN's capability to provide carburizing (case hardened) steel provided Catalyst with the opportunity to realize extended bearing service life. A custom case hardened, carburized bearing was designed and produced to mitigate roller fracture. Carburizing hardens the steel from the surface to the proper depth, leaving a relatively soft core. This provided hardness and toughness, making the material suitable for impact loads and resistance to fracture. Case carburized material offered significant advantages over standard bearing steel for this application. "We investigated many options and NTN was able to offer the most promising and robust solution" said Drew Monk, AIT Manager TSR Services, Catalyst.



## FAILURES IN THERMAL ROLL

Roller fractures may be associated with excessive shock load as well as poor roller dynamics, excessive temperature fluctuations and hydrogen embrittlement.



## A SUCCESSFUL OUTCOME:

### The NTN solution has delivered the Ultimate Experience in Bearing Life

The NTN Spherical Roller Bearings have been in service for over 2 years and overall maintenance costs have been significantly reduced. The NTN solution has delivered the ultimate experience in bearing life, lasting over 6 times longer without any failures to date. The two mills have been completely satisfied with the new case hardened, bearing solution.

An increase in bearing life was confirmed as the mills went from replacing 11 bearings in just over a year to the custom solution, still in operation, generating a total cost savings of \$1,724,000 to date.

There were several theories as to the failure process. Unfortunately, as is sometimes the case with some extreme examples, no definitive root cause of failure could be determined. However, these high-performance bearings have extended maintenance intervals and maximized productivity.

## CONCLUSION:

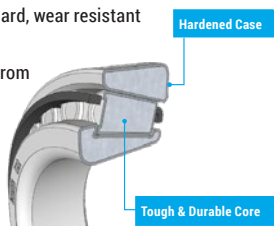
Rolling element bearings in complex operating conditions often require advanced features. In this scenario, NTN was able to optimize bearing design and provide a versatile drop-in solution to address adverse operating conditions, resolving uncertainty and boosting the customer's operating profit.

When designing custom solutions, the importance of collaboration with our business partners cannot be overstated. Catalyst, NTN and Applied Industrial Technologies were able to work collaboratively, interact and share ideas to develop a bearing solution that delivered a cost savings of 1.7 million dollars. Active continuous improvement and optimized collaborative activity enhanced productivity for Catalyst, helping to minimize operating costs for each mill site where these bearings were installed.

**A well-balanced combination of technology, expertise and the rewarding dedication of each industry partner greatly contributed to the project's success, delivering the Ultimate Bearing User Experience.**

### Case Carburization

- The case carburization process creates bearings with a hard, wear resistant outer shell and a tough, ductile core.
- The tough outer shell helps protect the rolling elements from debris, while the ductile core allows the bearing to both absorb increased shock loading and operate under misalignment without failing.
- These traits are critical in heavy duty applications, in which bearings are forced to operate in heavily contaminated environments.



### NTN SPHERICAL ROLLER BEARINGS ARE AVAILABLE IN OPEN & SEALED VARIETIES:

- Heavy duty cages available in either pressed steel or machined brass
- Up to  $\pm 2^\circ$  misalignment capability

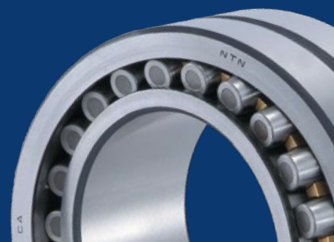
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NTN and AIT successfully implemented a solution to address the most plausible failure modes with case-hardened bearings. NTN's commitment to delivering superior state-of-the-art solutions mirrors our own core values of innovation and adaptability, enabling our mills to operate profitably and sustainably.

”

**Gerry Dube**, Paper Machine Supervisor,  
Catalyst Powell River Division

## SPHERICAL ROLLER BEARINGS





## Minimizing the carbon footprint of our products



NTN cares deeply about the environment and acts responsibly to avoid any negative environmental impact. As such, NTN has a strict paperless policy meaning we do not send paper to customers for marketing purposes and aim to reduce incoming paper to our offices to as close to zero as possible. With meaningful changes to our manufacturing and smarter product design, we are working to significantly reduce the impact our operations have on the environment.

### NTN PAPERLESS POLICY

#### NTN is a 100% Electronic Company

All documents produced while conducting our business are electronic.

Customer interaction is achieved through electronic mediums - all serviced through digital means where possible.

#### Paperless Office

We save resources and energy by avoiding printing and the associated postage

overheads, we ask all suppliers, vendors and customers who deal with us to interact with us in this manner where possible.

As well as environmental benefits, being paperless helps us keep streamline our organization. Our turnaround time when communicating and supporting our customers is very low as we have no paper overheads.

On the very rare occasions where

letters do need to be sent to us, once processed, any paper is securely destroyed or carefully recycled.

#### Low Carbon Emissions

NTN is a company that does business globally. To ensure that we keep our environmental footprint low, we take steps to ensure very low carbon emissions.

**NTN**®



## MBOT Radio Podcast featuring Paul Meo, CEO of NTN Canada

### “The Evolution of Manufacturing”

NTN Canada's President & CEO, Paul Meo, was a guest on MBOT's Radio Podcast with host David Wojcik, discussing how the face of manufacturing has changed over the years and the challenges that lie ahead. Paul has been with NTN for 37 years. He is also the Sector Leader for manufacturing on MBOT's Mississauga Economic Recovery Group. Thank you to MBOT for inviting Mr. Meo to the Evolution of Manufacturing podcast as a returning guest! Listen to the podcast here: <https://www.mbot.com/news/paul-meo-the-evolution-of-manufacturing-podcast/>



Host  
David Wojcik



## Frontline Interview with Paul Meo President of NTN Bearing Corporation of Canada

### What do you do as a President of NTN Bearing Corp. of Canada?

My role is to overlook the sales and manufacturing operations at NTN Canada, providing strategic, financial and operational leadership for the company in Canada while closely coordinating to execute NTN's global strategy. As CEO, I am also responsible for building and nurturing a growth minded, high-performing management team dedicated to "providing the Ultimate Bearing Experience" to our stakeholders. I am responsible for shaping our values and standards. I also inspire our staff to build a workplace culture where everybody can accomplish their goals and dreams, achieving their best every day.

### What do you value in your daily work? Do you have a personal motto?

"Plan Better, Be Flexible and Improve, a little bit each day". Use the PDCA (Plan, Do, Check, Act) cycle. I'm here to support my team to deliver greater impact and lead my people to flourish, both professionally and personally. It is my job to help them succeed. I encourage our staff to

constantly reflect on how they do their job and make their own improvements to gain their own higher job satisfaction. My employees are my consultants, they know how to fix their problems, and they know how to make their job more rewarding. It is my job to listen, change, adapt, while leading them through adversity so we achieve prosperity as one team. Leading an organization is a privilege, which I have never taken for granted. Each day, we are increasing the confidence of our staff to do business in a new and ever-changing virtual environment. This approach has increased brand confidence enabling NTN's team to build trustworthy relationships with customers.

### Looking back on your career, are there some experiences that you feel have helped you grow?

Despite COVID challenges, we learned to embrace an innovation mindset and navigate through Covid-19 as an "Immediate Transformation Opportunity". As a result of the hard work of our team, we launched a new Engineering Solutions platform, called TRIAGE, which offers a systematic approach to defining bearing troubleshooting requirements to support maintenance professionals in aftermarket



applications. The most important lesson I learned from this experience is that a successful project always starts with a great team that's truly motivated to solve problems. Even in a complex environment where it's impossible to predict all the challenges, a high performing team will be able to adapt, experiment and learn to overcome obstacles, and I see that on a daily basis at NTN Canada.



### How would you like to change your company?


At NTN Canada, our goal is to continue to be a diverse, fair, and inclusive workplace to help foster an open-minded, progressive, growth-oriented company culture. We strive to

seek out new perspectives and ideas from our employees and customers. Colleagues from different cultures may take a different approach to business issues, offering valuable insights gained through a wealth of diverse life experiences. We have viewed the pandemic not as a disadvantage, but as an opportunity for business reflection and transformation. We have proven that with a positive attitude towards change and a solid strategy for continuous improvement in all areas of our business, we can use new business technology tools at a much lower cost to yield the highest employee and customer satisfaction – UBE “The Ultimate Bearing Experience”.



“Plan better, be flexible and improve a little bit each day.”





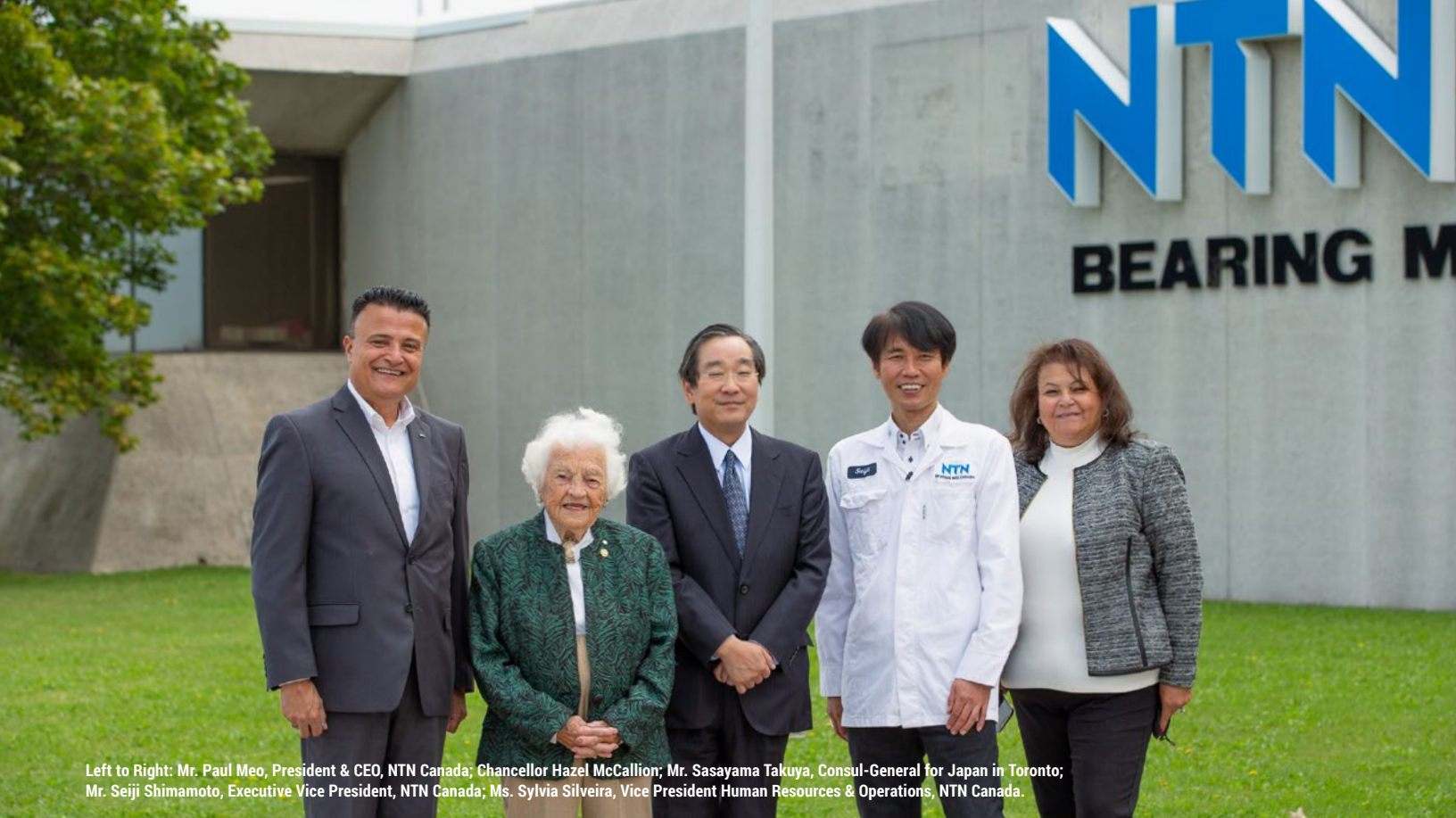
## Paul Meo

President & CEO  
NTN Bearing Corporation Of Canada Ltd

Mr. Paul Meo joined NTN Canada in 1981. In 2001, he was appointed Vice President of Sales & Marketing. Since 2014, Mr. Meo has served as President & Chief Executive Officer of NTN Canada.

He enjoys reading, camping, flying and holds a private pilot's license. His favourite pastime is volunteering and fundraising for social causes. He continues to serve as a volunteer executive of many boards and committees: [Humber College](#) Board of Directors for the Digital Business Management Program, [Haven Toronto Homeless Shelter](#), [Good Shepherd Toronto](#), and [the Mississauga Board of Trade](#).





Left to Right: Mr. Paul Meo, President & CEO, NTN Canada; Chancellor Hazel McCallion; Mr. Sasayama Takuya, Consul-General for Japan in Toronto; Mr. Seiji Shimamoto, Executive Vice President, NTN Canada; Ms. Sylvia Silveira, Vice President Human Resources & Operations, NTN Canada.

# Mr. Sasayama Takuya, Consul-General for Japan in Toronto visits NTN Bearing Manufacturing Canada

NTN Canada was honoured to welcome the Consul-General for Japan in Toronto, Mr. Sasayama Takuya, for a tour of our bearing manufacturing facility, research lab and distribution centre in Mississauga. Consul-General Takuya and his delegation, which included Mr. Suzuki Tokiya, The Consul for Economic Affairs and Mr. Daniel Swayze, Economic and Cultural Affairs Aide at Consulate General of Japan in Toronto, were greeted by NTN's senior management staff headed by Mr. Paul Meo, the President and CEO of NTN Canada. During the tour a number of discussions about the local market situation and the position that NTN bearings occupy in Canada took place. NTN is thankful for the continuous support provided by the Japanese Consulate to develop closer ties between Japan and Canada, and to search for new ways to harness support to serve our local economy.





TEAM MEMBER SPOTLIGHT

# John Burns

Inventory Planner IAM / AAM

NTN



NTN congratulates John Burns, Inventory Planner, on his recent retirement after 38 years of dedicated service. John was a stellar employee, delivering the “Ultimate Bearing Customer Experience” keeping bearing orders moving through NTN’s national headquarters and distribution facility in Canada.

According to Paul Meo, President and CEO of NTN Bearing Corporation of Canada, “John possesses a gracious personality that enabled him to build strong relationships and loyal customers”. He adds, “Our purchasing team has learned a lot from John over the years and we going to miss him as a colleague and friend.”

John contributed to all aspects of the purchasing department through strategy, forecasting, production planning and inventory management. As a procurement specialist, his passion and knowledge of bearings has been incredibly valuable. Anyone who worked with John was witness to his warmth, enthusiasm, and go-getter attitude. John had a key role in designing many complex purchasing systems the company provided to the Canadian industrial marketplace over the past three decades. His skills, experience, and passion for excellence will be greatly missed by his coworkers.

The entire NTN family wishes John a happy and healthy, well-earned retirement. We are thankful for the knowledge and invaluable support he imparted to the team over the years.





# NTN Employees Volunteer to Restore La Ruelle d'Hochelaga Pediatrics Centre

NTN Canada congratulates its Quebec regional sales team for volunteering to repaint La Ruelle d'Hochelaga Pediatrics Centre. Their hard work has contributed to the refurbishment of this important resource centre for behavioural and professional support services for children and teens in Montreal. In difficult times, it is the small things that make life easier.



Left to Right: Francois Pellerin, Inside Sales Associate, NTN Canada;  
Giovanna Sacco, Territory Project Manager (IAM), NTN Canada;  
Sean Barron, Sales Manager Quebec (IAM), NTN Canada;  
Luc Bergeron, Territory Manager (IAM), NTN Canada;  
Jean-François Doucet, Field Service Engineer (IOE, IAM), NTN Canada.



If you would like to donate to this refurbishment effort, please click here:  
[fondationdrjulien.org/en/donate/](https://fondationdrjulien.org/en/donate/)





# NTN Community Garden Donation to Haven Toronto



Being homeless is a struggle enough. When you have dietary restrictions, it's an added challenge. This is particularly prevalent in men over 50. NTN Canada is proud to have donated vegetables from its community garden this past summer to the Haven Toronto Shelter. The dietary team at Haven Toronto used the donated food to prepare healthy dishes such as this healthy kale, tomato, cucumber, roasted squash, and green bean salad. NTN is pleased to have helped contribute to making these delicious and nutritious meal options possible for those in need at Haven Toronto, many of whom suffer from diabetes, heart disease, and other conditions. Thank you to the NTN volunteers on their successful summer harvest and for their work towards a healthier community. We strongly believe that together we can make a difference!





**ELECTRIC MOTORS**

# MEGAOHM™ 7MC3 Series

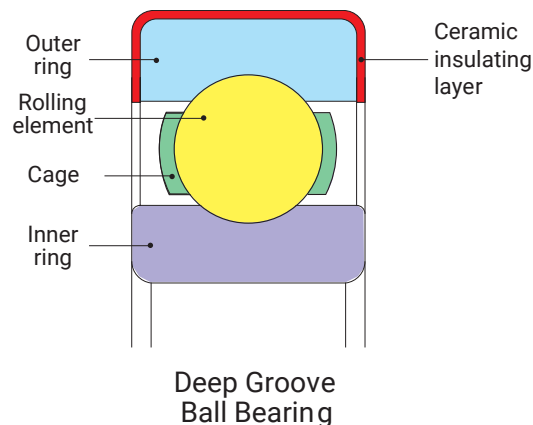
## Ceramic Insulated Ball Bearings



The increase in volume of variable frequency drive (VFD) electric motors as well as other machines where electrical currents are present has demanded the need for insulated bearings. Electrical currents can flow through the bearing causing electrical arcing damage to the rolling contact surfaces, ultimately leading to bearing failure. Electrical pitting and fluting can be prevented with ceramic coated bearings.

### COATED BEARINGS

NTN's MEGAOHM 7MC3 Series of insulated bearings has been specifically designed to prevent electrical arcing in a variety of applications. Coating the bearing's outer ring provides an insulating barrier against any stray currents that would pass through it.



### TRUSTED BY OEMS

MEGAOHM 7MC3 Series insulated bearings are designed to resist electric current damage and offer protection to costly equipment which is why they are used by OEMs for wind turbine generators, traction motors, paper and textile rolls, VFD and other electric motors used across many industrial applications.

### MEGAOHM 7MC3 SERIES ADVANTAGES

- Ceramic coated for electrical insulation that prevents electrical pitting and fluting
- Drop-in replacement for standard bearings
- Cost-effective solution to combat stray electric currents

### MEGAOHM 7MC3 SERIES VS. THE COMPETITION

	NTN 7MC3	Leading Competitor
Coating Thickness	0.2 mm	0.1 mm
Electrical Resistance at 500 V (DC)	> 2,000 MΩ	> 100 MΩ
Voltage Resistance	> 3 kV	< 3 kV
Chipping (Drop test up to 0.8 m)	0 of 8 chipped	3 of 8 chipped





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Continuously striving to provide the highest quality is what drives our business day in and day out. Receiving this honor from GM for the third time in as many years is a proud moment for the entire organization and would not be possible without the diligent efforts of our employees.

”

## NTN Driveshaft, Inc. Recognized by General Motors Company for Third Consecutive Year

NTN is pleased to announce that its manufacturing facility, NTN Driveshaft, Inc., has been awarded General Motors Company's Supplier Quality Excellence Award for the 2020 calendar year. This marks the third consecutive year that NDI has been presented with the illustrious honor, a feat managed by fewer than 3% of GM's suppliers.

In order to qualify for the award, suppliers must meet or exceeded a very stringent set of quality performance criteria and achieve the cross-functional support of the entire GM organization.

"I speak for everyone at NTN when I say it is an honor to once again be recognized by GM for the quality of our parts," said Jim Riggs, President and CEO, NTN Driveshaft, Inc. "Continuously striving to provide the highest quality is what drives our business day in and day out. Receiving this honor from GM for the third time in as many years is a proud moment for the entire organization and would not be possible without the diligent efforts of our employees."

Established in 1989, NTN Driveshaft, Inc., is a 120-acre

campus located in Columbus, Indiana that contains over 1.2 millions square feet of manufacturing space, making it one of the largest constant velocity joint manufacturing facilities in the world.



# Making the World Run Smoothly

## WE SUPPORT



The NTN Group endorses the United Nations Global Compact, thus declaring its commitment to respect and endorse the 10 universally recognized principles of human rights, labour standards, the environment and anti-corruption. NTN strives to bring these principles to life through concrete initiatives and to promote them among its partners. Our NTN Spirit Tree philosophy shapes our commitment to a sustainable future and infuses everything we do. Through our partnerships with local organizations, we continue to build vibrant communities where we live and work, and our "can do" attitude inspires top performance from everyone by encouraging collaboration and commitment and by embracing challenge.

## SDGs

NTN supports and endorses the 17 goals and 169 targets of the UN's Sustainable Development Goals (SDGs) that came into effect in January 2016. This collection of 17 interlinked

global goals are designed to be a "blueprint to achieve a better and more sustainable future for all".

## SUSTAINABLE DEVELOPMENT GOALS





# The Ten Principles of the UN Global Compact

## Human Rights

- **Principle 1:** Businesses should support and respect the protection of internationally proclaimed human rights; and
- **Principle 2:** make sure that they are not complicit in human rights abuses.

## Labour

- **Principle 3:** Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;
- **Principle 4:** the elimination of all forms of forced and compulsory labour;
- **Principle 5:** the effective abolition of child labour; and

- **Principle 6:** the elimination of discrimination in respect of employment and occupation.

## Environment

- **Principle 7:** Businesses should support a precautionary approach to environmental challenges;
- **Principle 8:** undertake initiatives to promote greater environmental responsibility; and
- **Principle 9:** encourage the development and diffusion of environmentally friendly technologies.

## Anti-Corruption

- **Principle 10:** Businesses should work against corruption in all its forms, including extortion and bribery

## Make the World NAMERAKA

### The NTN Spirit Tree and our Corporate Philosophy

We aim to contribute to a "**NAMERAKA**" world with the NTN Spirit Tree as our guiding philosophy. "**NAMERAKA**" means "smooth" in Japanese. Keeping in line with our Spirit Tree philosophy, we conduct our business with high respect and regard for the environment and the communities we serve.

Our corporate philosophy — "We shall contribute to international society by creating new technologies and developing new products" — influences everything we do: research and development of our products; relationships with our customers and our colleagues; and resources for our community and environmental initiatives.

NTN's brand statement "Make the World NAMERAKA" reinforces NTN's commitment to realizing a sustainable society, where people can easily lead a secure and fulfilling life in harmony with nature.



## Our Values

Through challenge, collaboration and commitment and a focus on success, we have created a vibrant company culture where ideas can blossom, people can thrive and success can flourish.

### › Challenge

- We are passionate about our business and our brands.
- We enrich our lives by challenging passionately, acting with initiative and continuing to grow.
- We promote and implement creative and innovative ideas and solutions.

### › Collaboration

- We show respect for and value all individuals for their diverse backgrounds, experiences, styles, approaches and ideas.
- We listen to others for understanding and demonstrate a commitment to integrity and ethics.
- We take care of the natural environment and maintain coexistence with the local community.

### › Commitment

- We strive to delight and serve our customers through the high quality of our products and services.
- We improve the lives of people around the world through our work.
- Our varied competencies and business lines are the founding richness of our company.



## PROVEN RELIABILITY FOR LONGER LASTING PERFORMANCE



### PRODUCTS

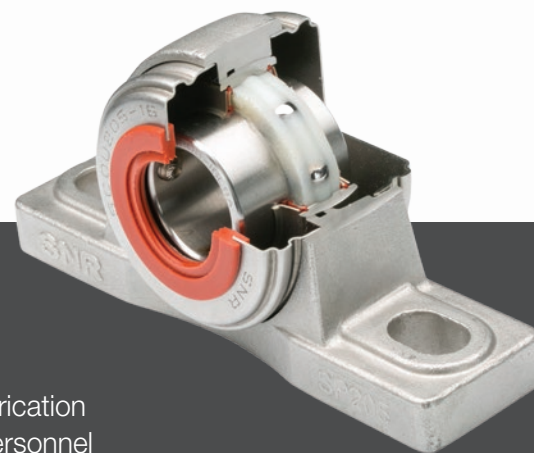
- Sentinel Series Maintenance-Free Washdown Bearings
- ULTRA CLASS Bearing Units

### ENGINEERING SERVICE

- Dedicated applications engineering team
- Remote service solutions
- Bearing failure analysis

### ADVANTAGES

- Maintenance free solid lubrication
- Optimum sealing from contaminants
- Verified Value Added Savings



### LATEST INNOVATIONS

- Sentinel Series range:
  - 100% stainless steel bearings are corrosion resistant
  - NTN food-grade solid lubricant provides permanent bearing lubrication
  - Protective covers provide additional protection and safety for personnel



Stay Connected