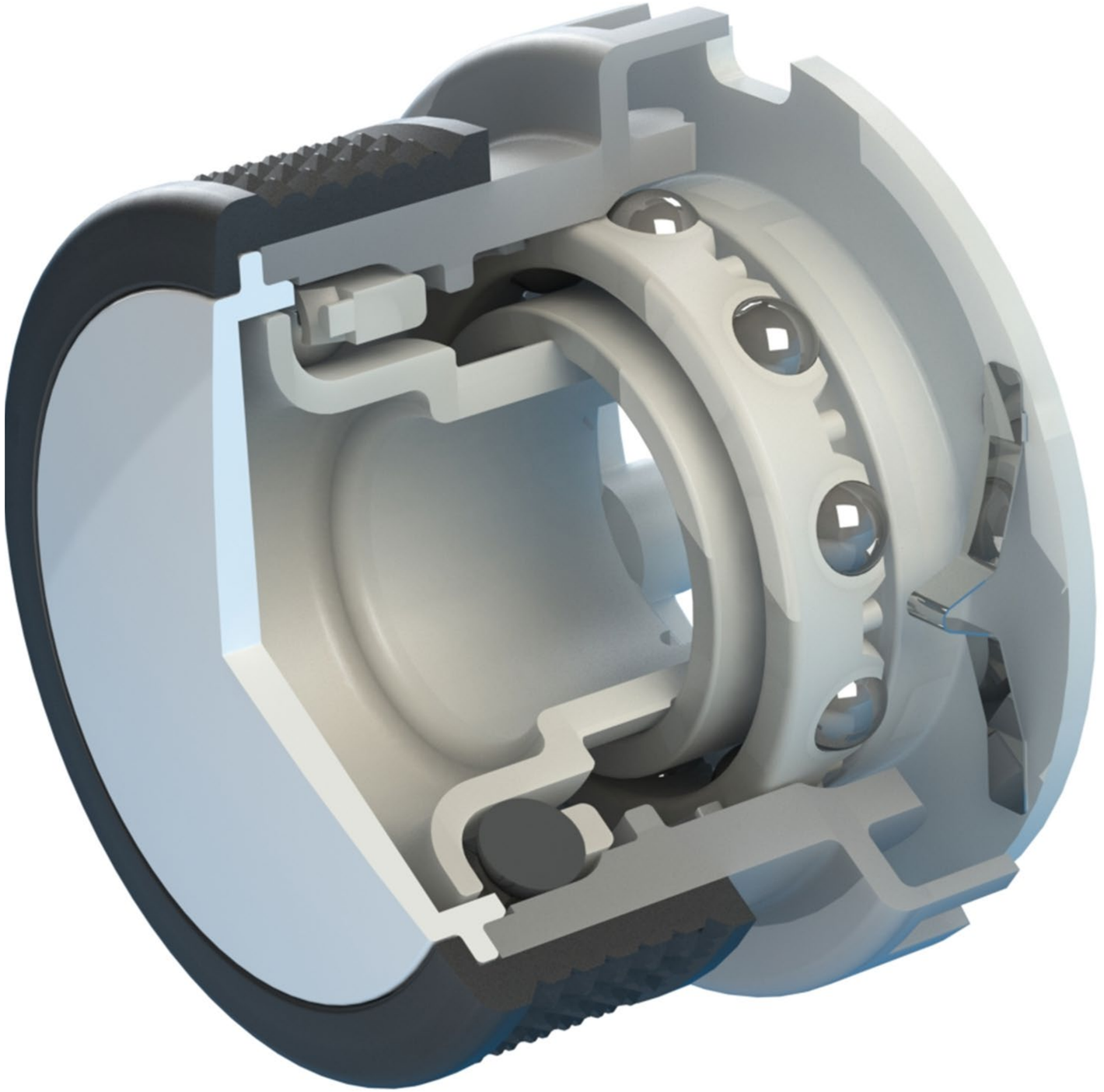
BNL Company Overview

About BNL

- Who we are
- What we do
- History
- Synnovia plc
- Locations
- Markets
- Capabilities

‘Bearings Non -Lubricated’

BNL is the world leader in the design and manufacture of integrated plastic bearing solutions



1978

BNL's first overseas subsidiary established in the USA - BNL (USA) Inc.

1970

BNL founded in the UK

1986

BNL has held automotive quality certification since 1986
(e.g. QS9000/TS16949/ IATF16949)

2000

BNL (Japan) Inc. established in Tokyo, Japan

2003

BNL first achieves ISO 14001 & ISO 9001 certification and continues to hold these today

2005

PECOS joins BNL as sole agent in Korea. Acquisition of BNL by Synnovia plc

2008

BNL (Thailand) manufacturing facility established in Rayong

2010

BNL celebrates 40 years of successful business

2011

New BNL office opens in China

2012

BNL (Thailand) achieves ISO 14001 & ISO 9001 certification and continues to hold these today

2013

New China manufacturing facility opens in Shanghai

2014

BNL (Thailand) achieves ISO/TS 16949 certification and upgrades it to the standard IATF in 2018

2019

BNL Thailand doubles it's manufacturing capacity

2020

BNL celebrates it's half century

Synnovia plc

BNL (UK) Limited is owned by UK-based Synnovia plc, who acquired BNL in December 2005.

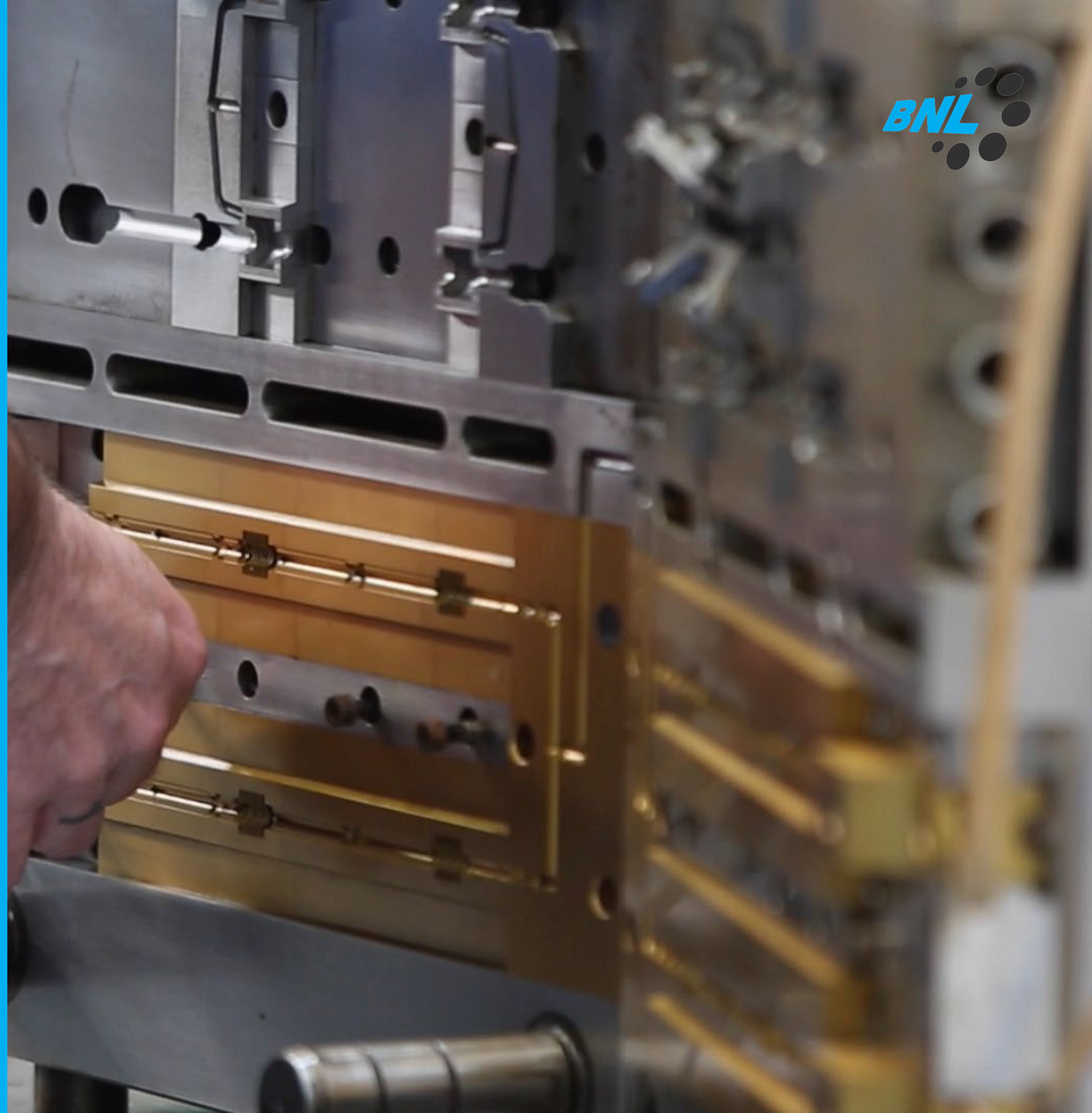
- Synnovia is a niche manufacturer of specialist plastic products, operating through 6 UK based operating subsidiaries including BNL
- Annual sales exceed $102m
- Products include packaging for food manufacturing and distribution, hydraulic and industrial rubber hose manufacture and plastic creasing matrices for cardboard box manufacture

Our Locations

BNL (UK) Ltd

Our UK Headquarters and manufacturing site is in Knaresborough, North Yorkshire.

- Sales and Customer Services
- Design & Engineering
- R&D
- Materials Research
- Prototyping
- Project Management
- Tooling Manufacture & Maintenance
- Moulding
- Assembly / Auto-Assembly
- Testing
- Quality
- Supply Chain



BNL Thailand

Our second factory is in Rayong, Thailand, where we offer support and manufacture goods for customers based in Asia.

- Customer Services
- Prototyping
- Tooling Manufacture & Maintenance
- Moulding
- Assembly / Auto-Assembly
- Quality
- Supply Chain

Quality is Our Priority

We build quality into our product development process from start to finish and work in partnership at every step for the best value solution.

Our UK and Thailand factories are ISO 9001, ISO 14001 and IATF 16949 accredited.

Our Markets

- Customers
- Markets we serve
- Key markets & applications
- Industry standard bearings

Our Customers

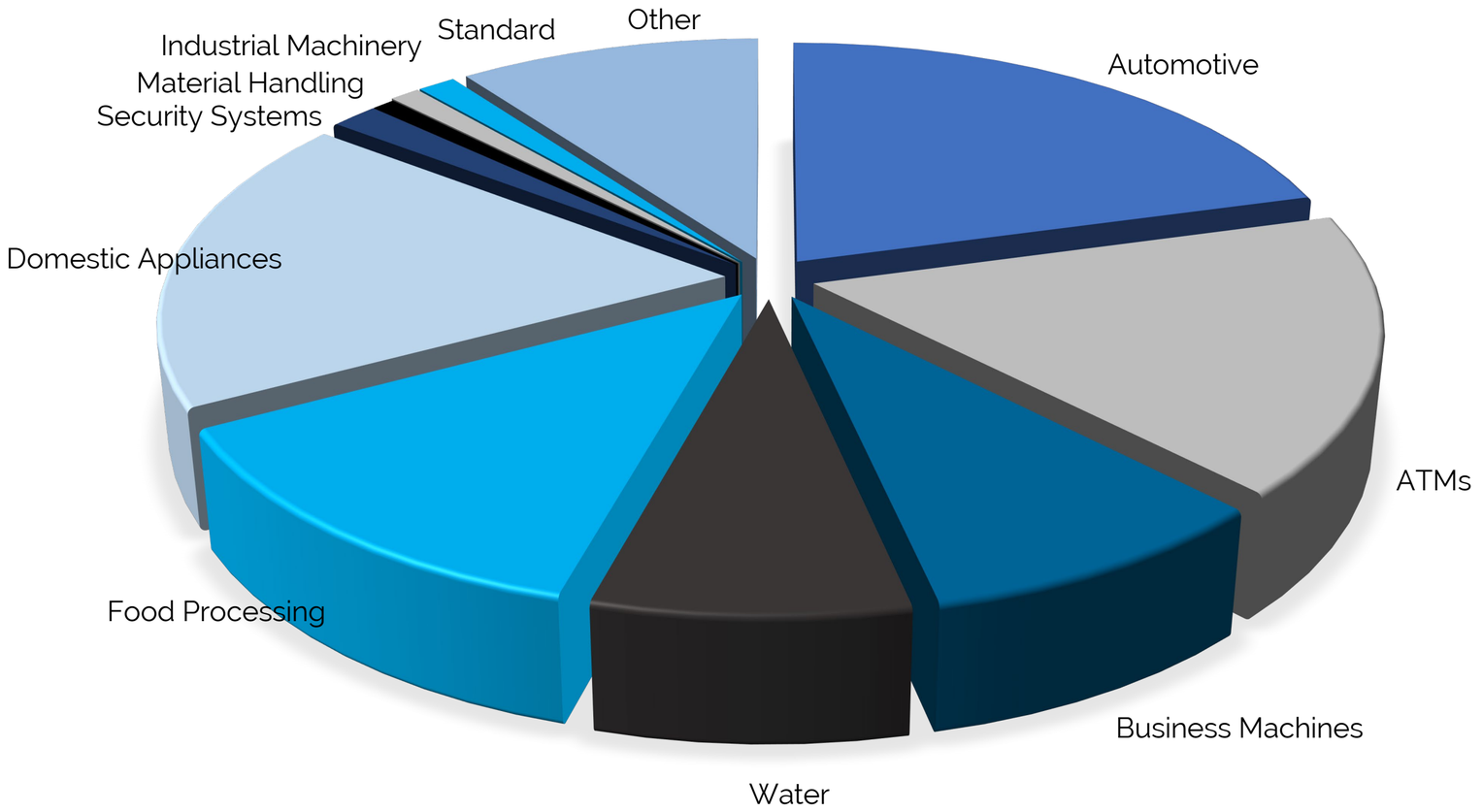
We work in partnership with a variety of blue-chip OEMs worldwide and these include many household names.

- Our facilities in the UK and Thailand are supported by sales and design offices in the USA, China and Japan, allowing BNL to provide a dedicated service from local bases
- We are committed to our customers and believe in promoting a true team approach, building strong, long-lasting relationships to deliver the best solutions in a timely and efficient manner

Market Sectors

Different applications present different design and manufacturing challenges.

There are many industries that benefit from BNL's plastic bearing technology.



Domestic Appliances

BNL have over 16 years' experience of designing and manufacturing solutions for the domestic appliance market.

Our bearings provide improved performance with lower friction under load, producing a smoother and easier operation and premium quality feel.

Integrated upper and lower dishwasher rack wheels, are designed to fit in the same space envelope as the existing solution, enabling fully interchangeable production on existing lines.

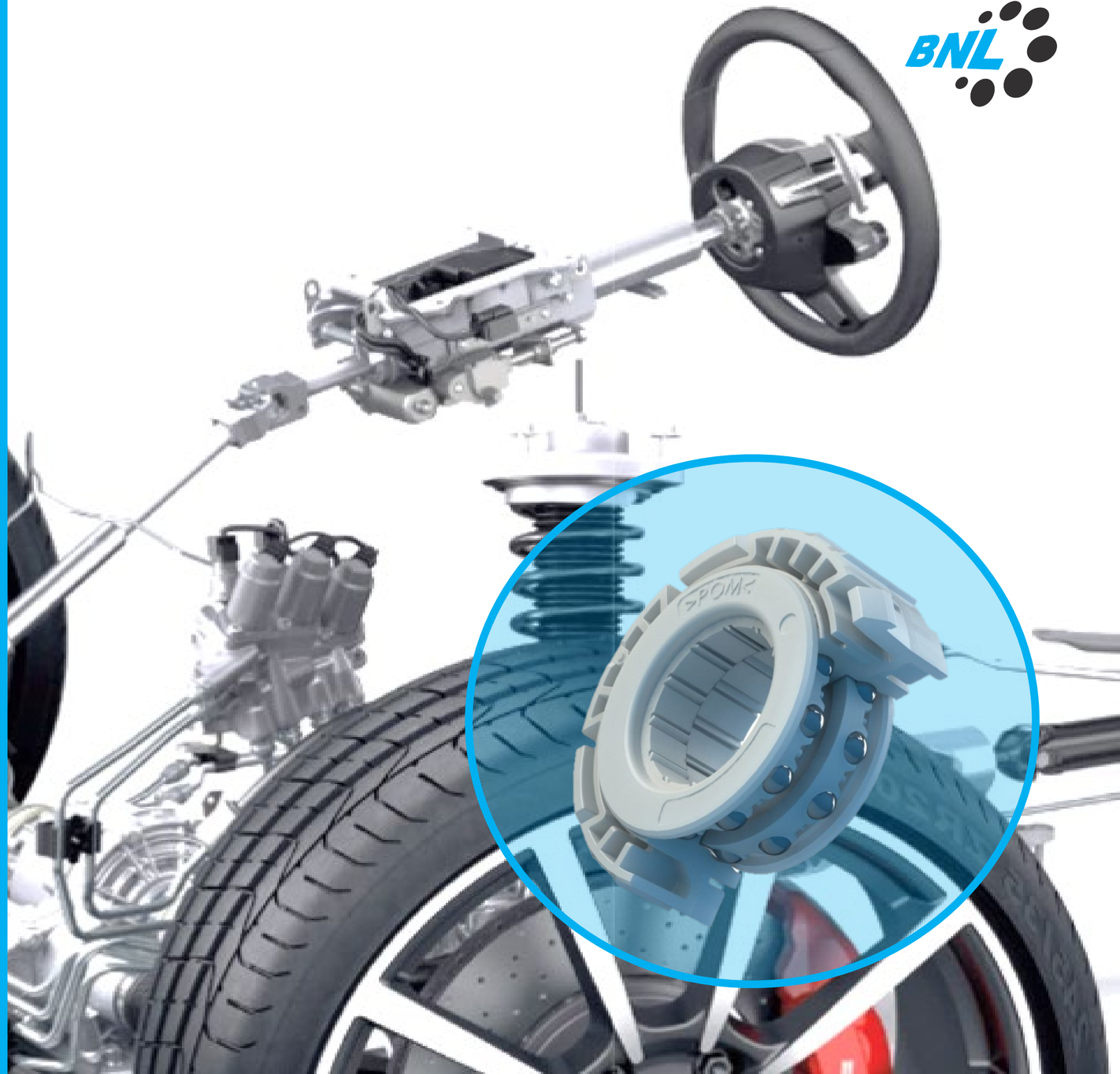
In vacuum cleaners, our bearings offer lower friction and smoother operation than a bush, with design innovation and added-value through feature integration.

Steering Columns

BNL have been designing and manufacturing plastic steering column bearings for world leading OEMs for 20 years. We are IATF16949 accredited across our moulding facilities globally.

BNL bearings are expertly moulded to achieve fit and function for a particular space without the need for additional heavy components such as adaptors.

Our integrated bearing designs contribute to the weight savings that encourage fuel efficiency and can be up to 50% lighter than an equivalent metal solution, with a third of the torque to rotate.



Automotive Controls

We replace unstable, multi component encoders with a plastic bearing that integrates both ‘push’ and ‘rotate’ functionality in one moulded product, reducing wobble and component count.

Our bearing technology underpins designs that operate touchscreen and touchpad controls, Head-Up displays (HUDs), volume and menu selectors, scrolling wheels and thermostats, in applications from in-car entertainment systems to domestic appliances.

Our signature custom-designed plastic bearings are especially suited to this market, serving the diverse requirements of Original Equipment Manufacturers (OEMs) who require stability plus different haptic feedback and product characteristics.

ATMs

ATM cash dispensers and high-speed banknote sorting and validating machines all benefit from BNL's integration of plastic bearings and shafts that result in lightweight, streamlined and cost effective sub-assemblies.

BNL combine shafts, rollers, brackets and pulleys to create bespoke paper handling solutions that have low friction, are non-magnetic, have low torque and excellent functional life.

Business Machines

Our lightweight and cost effective plastic bearing solutions include drive rollers, idler rollers, toothed pulleys and belt tension pulleys.

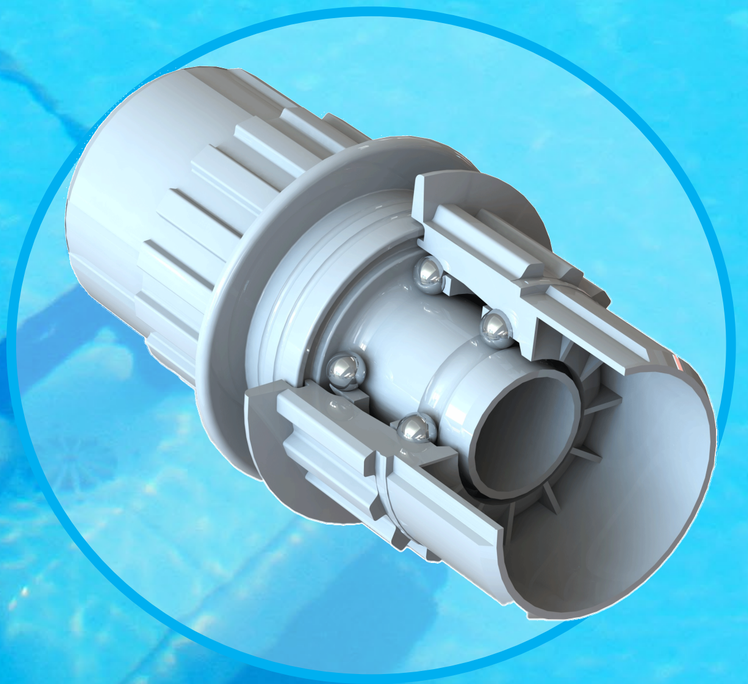
BNL works with the world's leading photocopier and mail handling manufacturers and has decades of experience supplying plastic bearings with integrated shafts, gears and other functional features to add value to the final product.

Water

BNL has extensive experience in providing plastic bearing solutions for different products that need a bearing that can operate effectively in water, such as spa jets, dishwashers, shower enclosures and pool cleaners.

Containing high concentrations of cleansing and sanitising agents, bearings in these applications are subjected to severe conditions.

BNL bearings are made from specially compounded thermoplastic materials that minimise water absorption, are chemical resistant and give exceptionally good wear properties.



Material Handling

BNL have 50 years' experience designing and manufacturing plastic bearings for material handling, food processing and industrial machinery systems.

Our conveyor system range includes end cap bearings, sealed end cap bearings, skate wheel bearings and wheels and rollers in speciality materials that can withstand harsh chemicals and extreme temperatures.

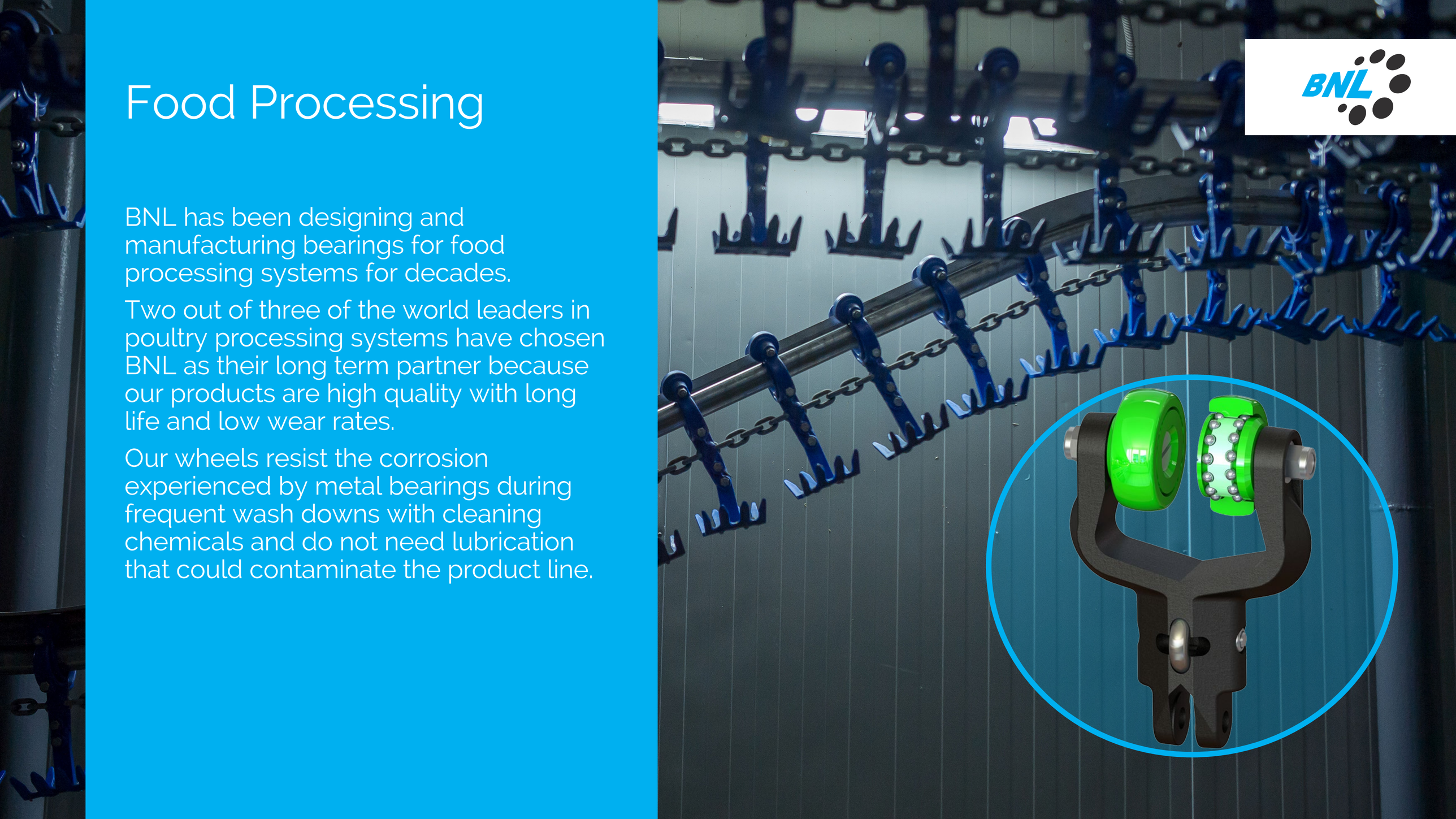
We also design and manufacture custom bearings for our customers' proprietary systems - to extend load capability, for bespoke belts, or to include features such as gear teeth, sprockets or pulley profiles.

Food Processing

BNL has been designing and manufacturing bearings for food processing systems for decades.

Two out of three of the world leaders in poultry processing systems have chosen BNL as their long term partner because our products are high quality with long life and low wear rates.

Our wheels resist the corrosion experienced by metal bearings during frequent wash downs with cleaning chemicals and do not need lubrication that could contaminate the product line.



Security Systems

BNL's PTZ bearing mechanisms are recognised by market leading OEMs for the advantages of combined components and functions for weight and cost efficiencies.

BNL design and manufacture bespoke, moulded CCTV PTZ bearings, which integrate features and functions for air management, snap-fit ability, cable management, PCB board fitting, slip rings and drive systems.

Our innovative PTZ designs have allowed our customers to develop compact, lightweight products that are custom-designed to their individual requirements and save time and money.

Industry Standard

BNL's range of industry standard bearings are specially designed and manufactured for improved load carrying, wear rates and feel – giving an overall 80% increase in performance over standard machined bearings.

We use our expertise in tool design and plastics processing to manufacture bearings with moulded raceways, which outperform machined equivalent products and deliver longer life.

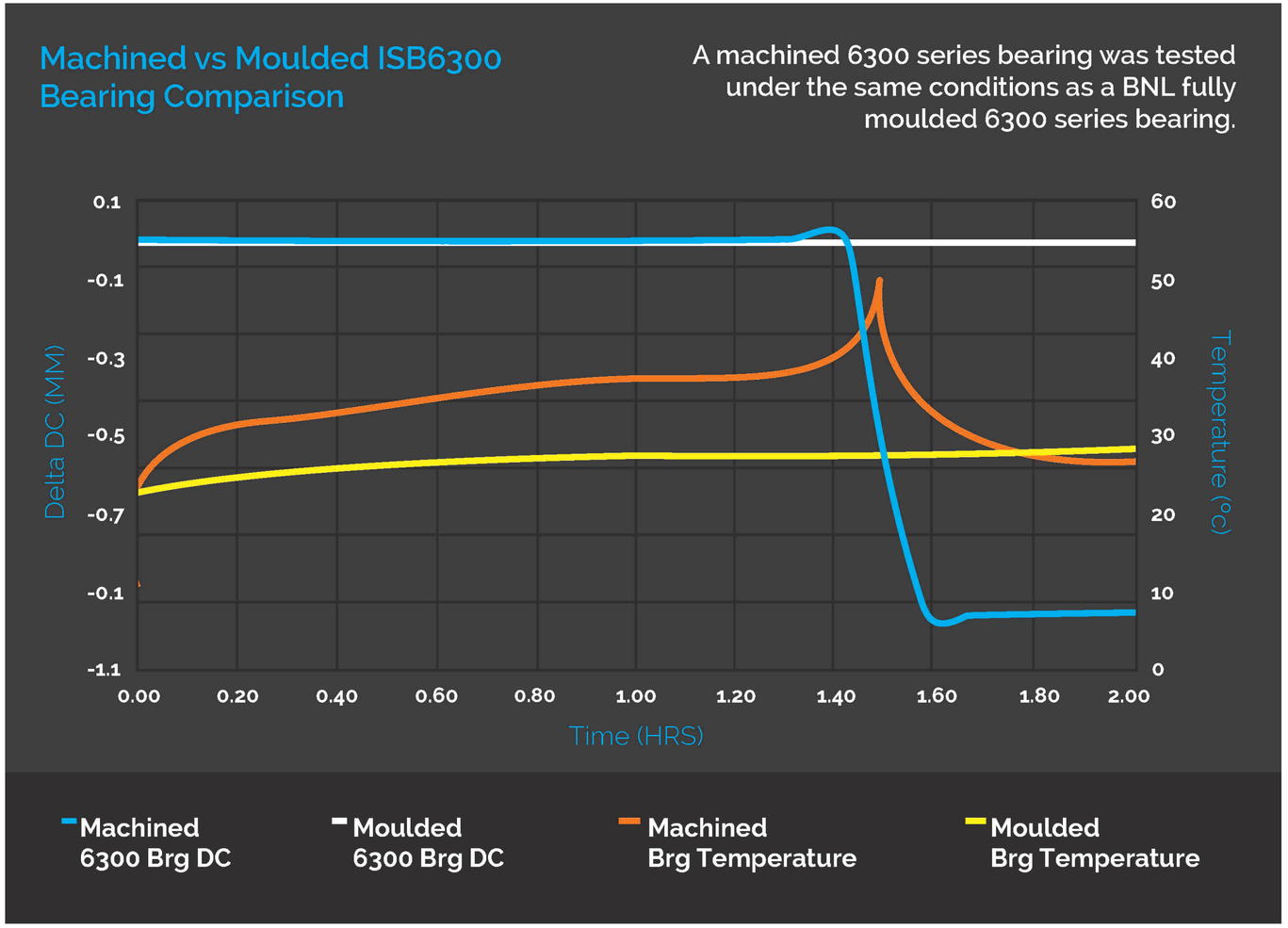
Our Capabilities

- Moulded v machined
- Prototyping
- Plastic v steel
- Integration of features
- Integration of gears
- ‘Machine Tear Down’

Moulded v Machined

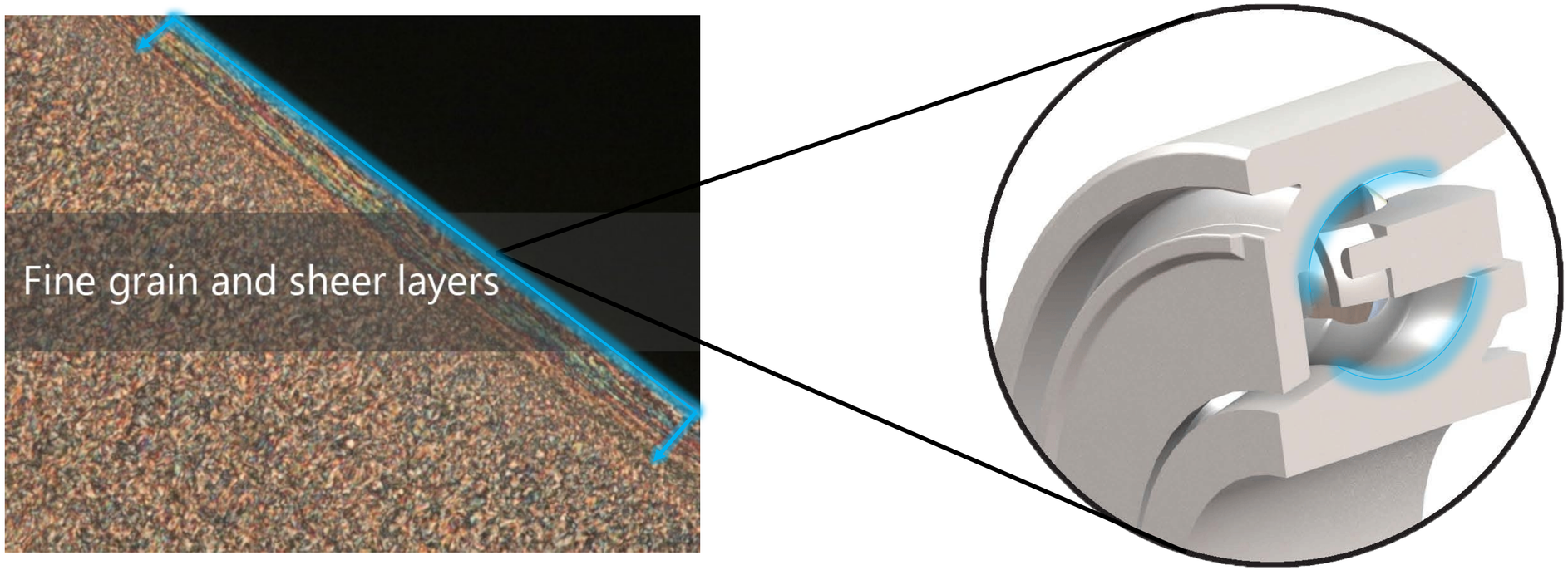
A machined 6300 series bearing was tested under the same conditions as a BNL fully moulded 6300 series bearing.

- BNL's moulded bearing remained at a constant temperature and DC (Diametric Clearance)
- The machined bearing began to generate increasing heat
- After 1.5 hours and 90,000 revolutions the inner raceway of the machined plastic bearing melted and the bearing failed
- BNL's moulded bearing completed the test



Speed 1000 rpm - Load 20Kg - Duration 1 million revolutions

Moulded v Machined

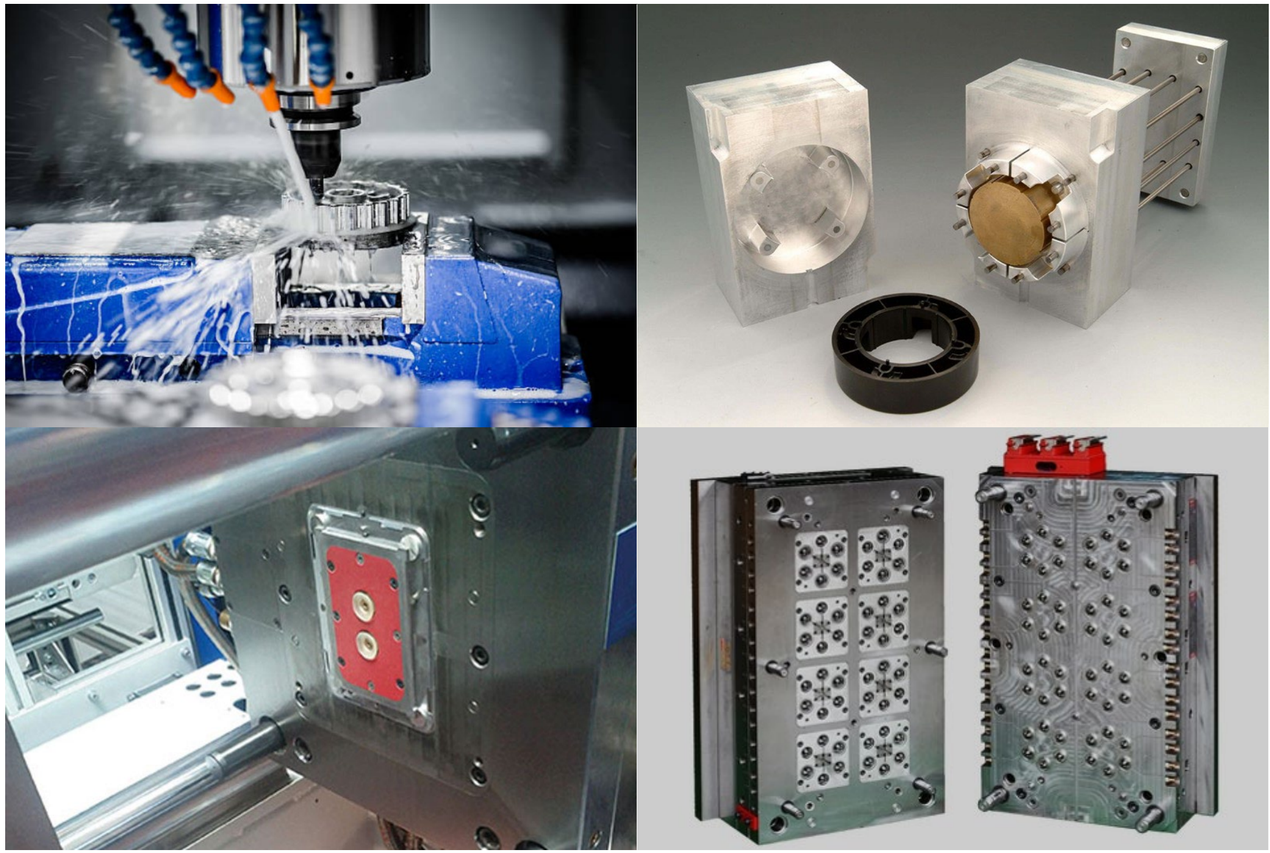


- The moulding process creates sheer and fine grain layers, under a ‘skin’. These layers have been shown to give our bearings excellent wear rates.
- Machining plastic bearings, or even moulding the raceways and machining tracks after, removes these layers. The bearing wears faster and has a shorter life.

Prototype Manufacturing Options

Selecting the correct prototype method may vary depending on the complexity of the bearing and the challenges of the application, BNL offer several services in house and with sub contractors

- CNC Machining – good for dimensionally accurate low volume prototypes, adapted from a moulded product design. High part cost, fast turnaround 3 to 5 days from planned start of machining. Batches of 10 to 20 - 80% accurate to final design.
- Aluminium soft mould tooling – good accurate moulding representations of the final design. Medium cost, fast turnaround 3 to 5 weeks. Moulds good for 50,000 shots, but requires a degree of post machining good indication of final design, recommended batches under 1000. - 90% accurate to final design.
- Single cavity family hard tool (for low volume production or best-case prototyping)



Plastic v Metal

No lubrication needed

Weight Saving

Low Torque

Non-Magnetic

Corrosion Resistant

Design Flexibility

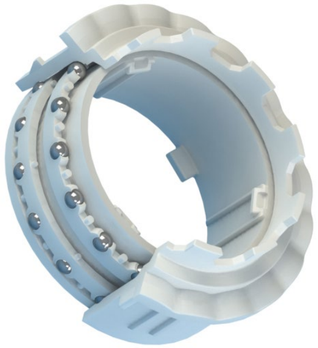
Comparison with Metal Bearing	Metal	Metal Bearing in Plastic Housing	Plastic
Torque to Rotate (Maximum)	.0175 Nm	.0175 Nm	.0055 Nm
Mass	86.06 g	52.78 g	48.24 g

Steel v BNL Plastic Bespoke Design

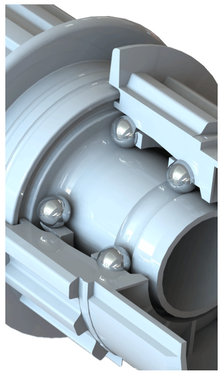
	GM Specification	Branded Steel Bearing 6205ZZ	BNL Bespoke Plastic Bearing
Construction	N/A	Deep groove single row	Deep groove double row
Ultimate load	7.1kN crash test	10.8kN	12kN
Static load	3kN running	7.85kN	3kN
Limiting speed	60rpm	13000 rpm	1200rpm
Mass	N/A	0.130kg	0.038kg
Torque to rotate	0.1Nm	0.303Nm	0.015Nm
Radial deflection	0.30mm	0.076mm	0.012mm
Housing insertion force (32mm stroke)	300 – 2000N	1,700N	1100N – Integrated crush ribs
Shaft insertion force (45mm stroke)	150 – 500N	291N	195N – Integrated flexible fingers
Extraction force	6kN (min)	0.183kN (requires location plate)	6.5kN
Misalignment	N/A	±2˚	±3˚
Fit concentricity (housing and shaft)	±0.025mm	±0.025mm	±0.100mm
Diametrical Clearance (including axial clearance)	0.010 / 0.20mm	0.043 / 0.066mm	0.01 / 0.11mm
Greased	N/A	Yes	Yes – noise reduction / non silicon -40 to +95 temp range grease
Assembly cost	N/A	High	Low

Some of Our Integration Capabilities

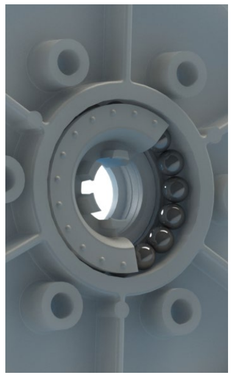
Crush Ribs



Custom DC



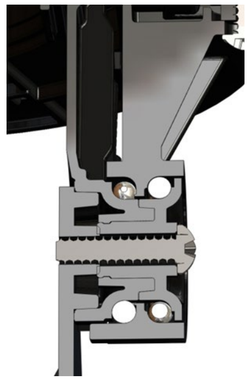
Double Row



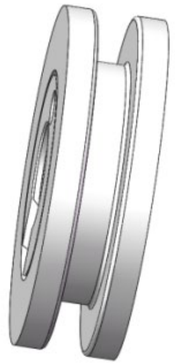
Full Complement

Gear Teeth

Haptics

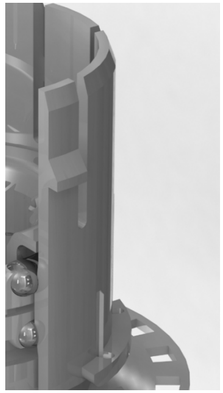


Integrated Raceways

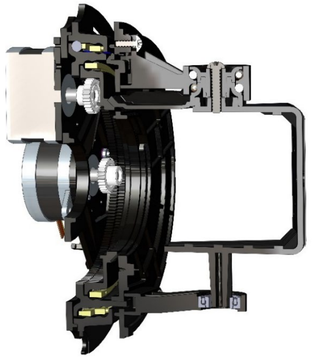


Pulley Forms

Shaft Integration



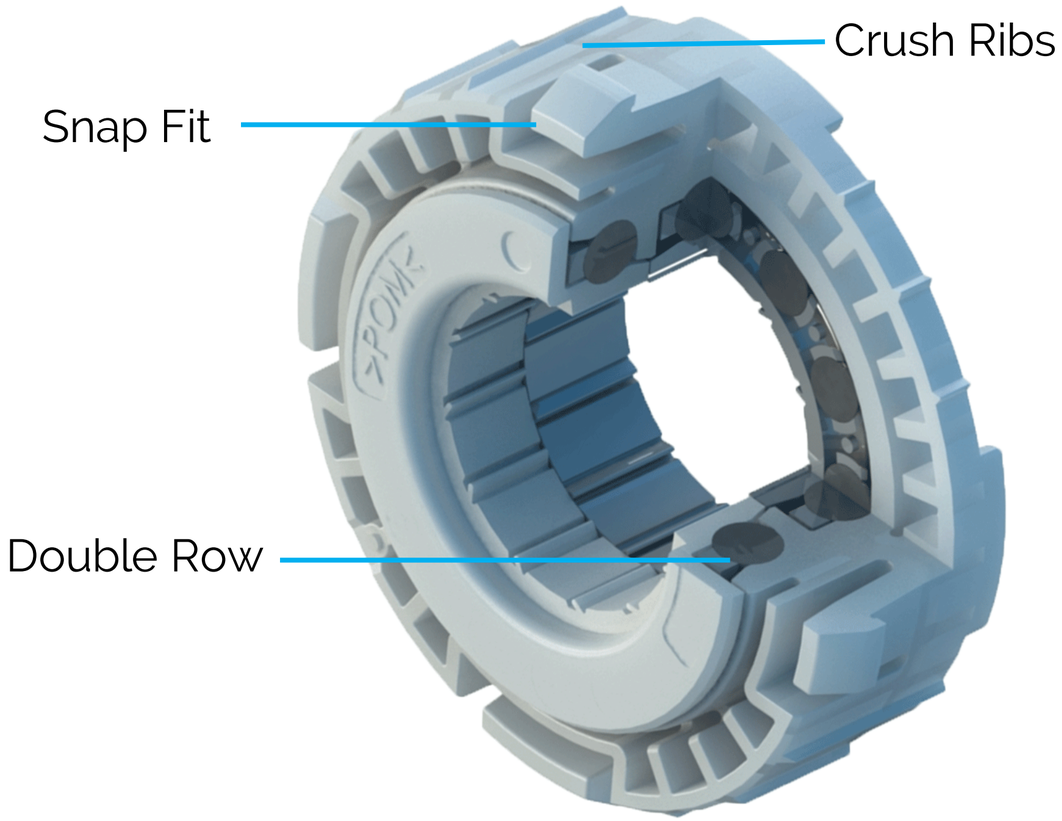
Snap Fit

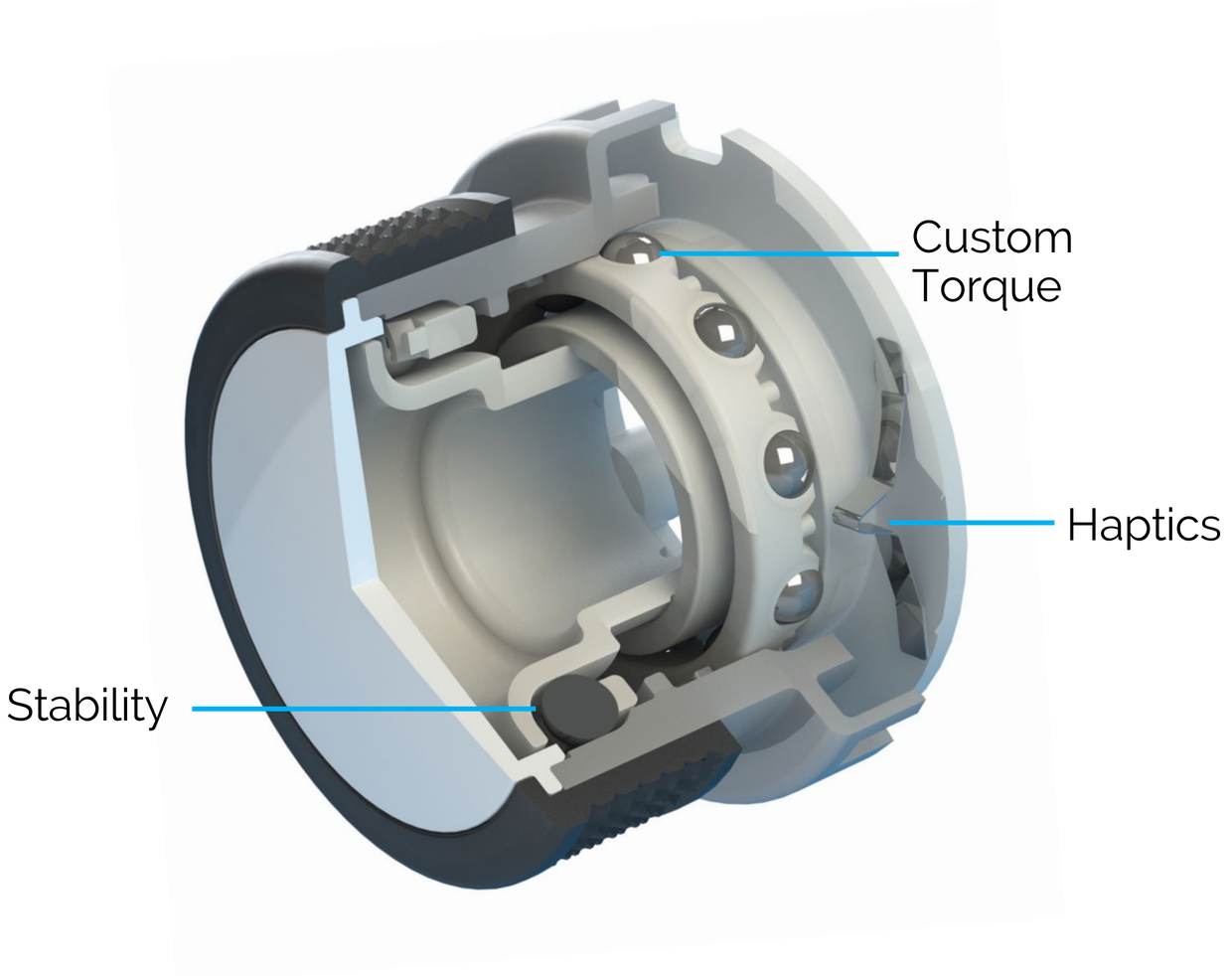


Space Saving

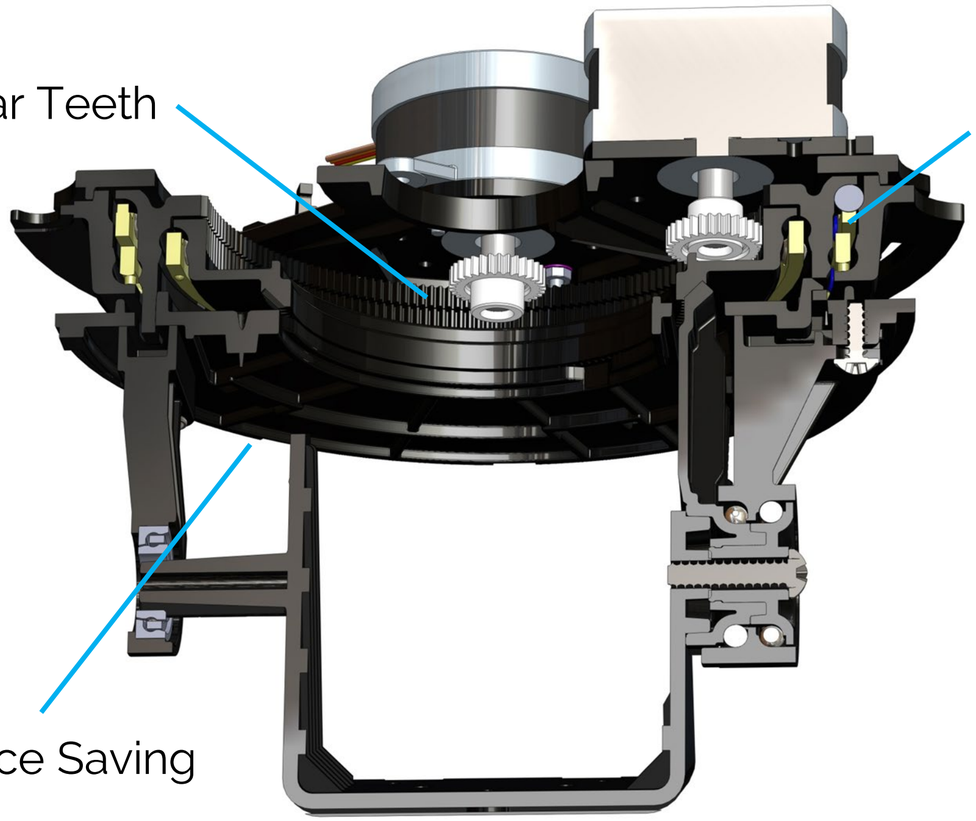
Stability

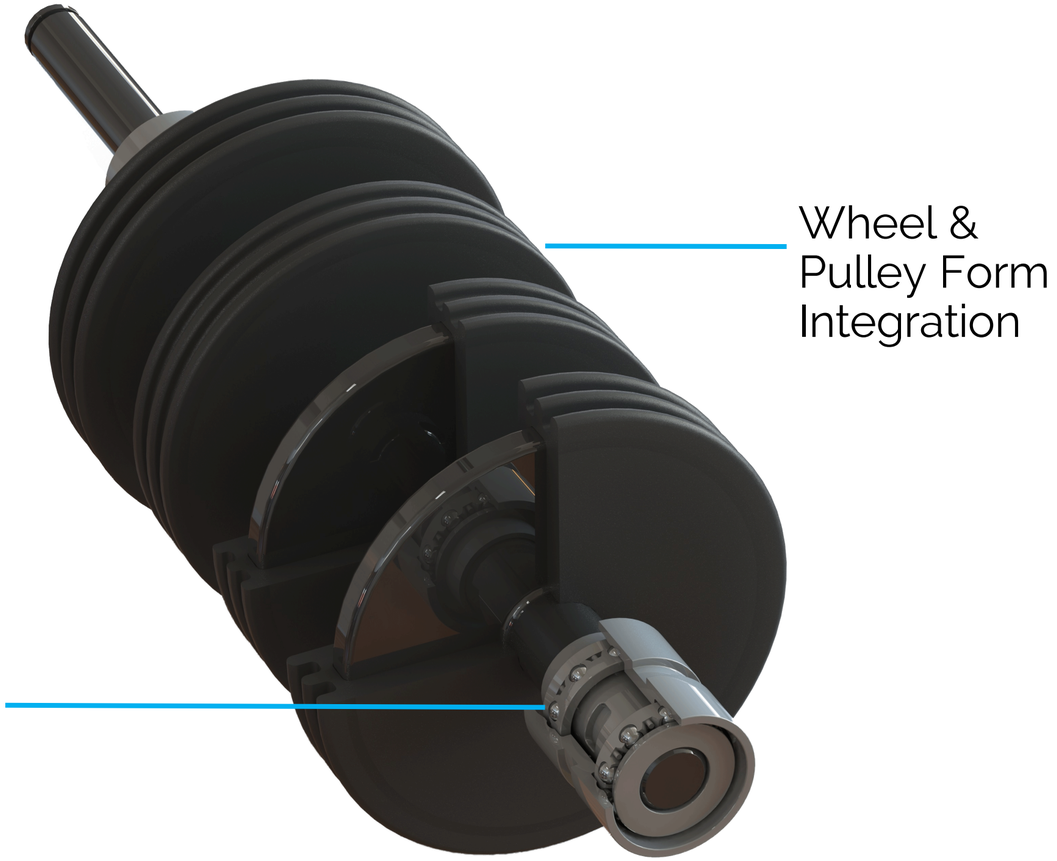
Some of Our Integration Capabilities





Some of Our Integration Capabilities

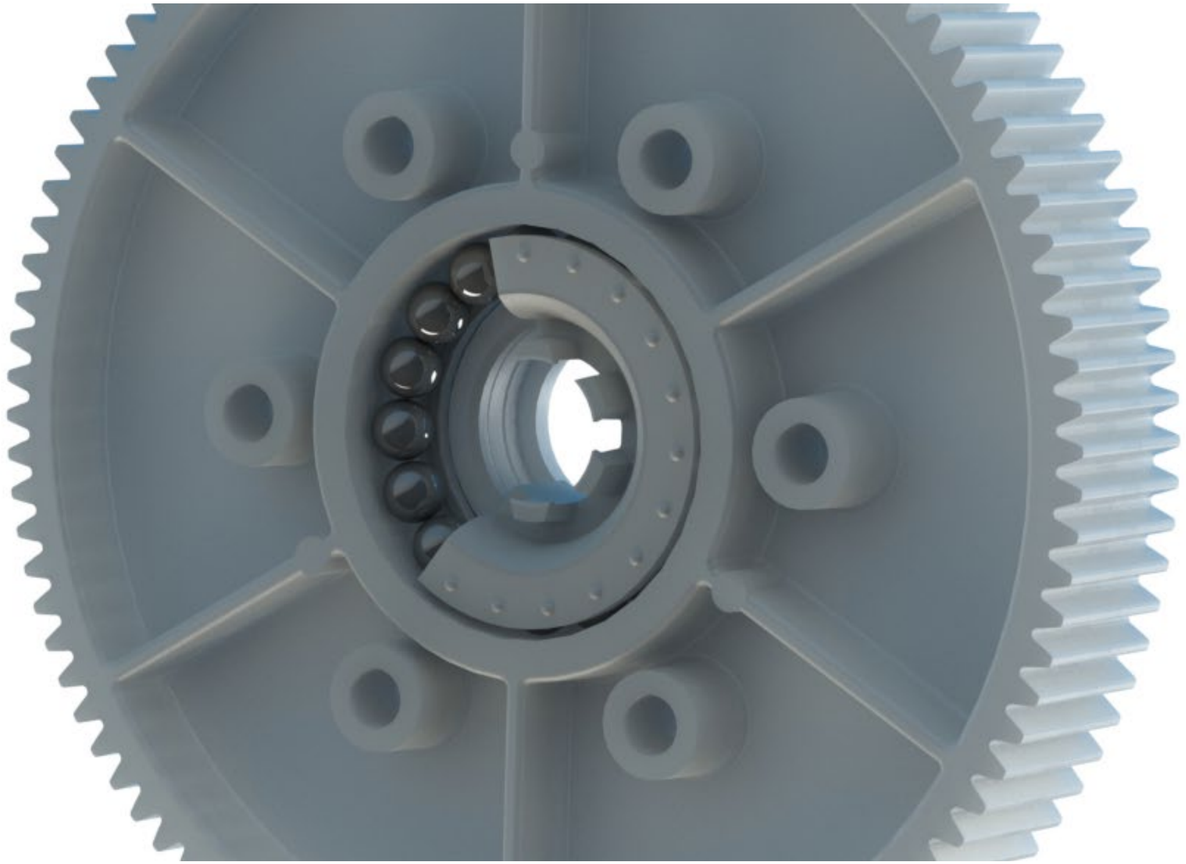




Gears with Integrated Bearings

BNL uses proprietary software to create solid models of gear and pulley forms. The software can create involute spur, helical, bevel gears and also pulley forms to recognised standards.

The solid model of the desired gear or pulley form is used to integrate other features to form the final design and simplify assembly.



Developing Our Capabilities

We are proactive in developing services we offer to the customers we collaborate with:

- Established a new Research & Development department – 2015
- Removed design constraints & encouraged the team to dare to innovate - 2015/16
- Knowledge Transfer Partnership with the University of Bradford Polymer Industrial Research Centre – 2016/18
- Improved test centre and now with full FEA from 2018
- Partnerships and links with leading polymer research centres and service providers
- Expanded manufacturing space

GRANTA MATERIAL INTELLIGENCE

Operation Clean Sweep®

BNL

AUTODESK® MOLDFLOW®

BPF British Plastics Federation

Cimatron GROUP

3D SYSTEMS

SOLIDWORKS

ANSYS®

Moldex3D MOLDING INNOVATION

OneCNC

Knowledge Transfer Partnerships

polymer IRC

UNIVERSITY of BRADFORD

Innovate UK Knowledge Transfer Network

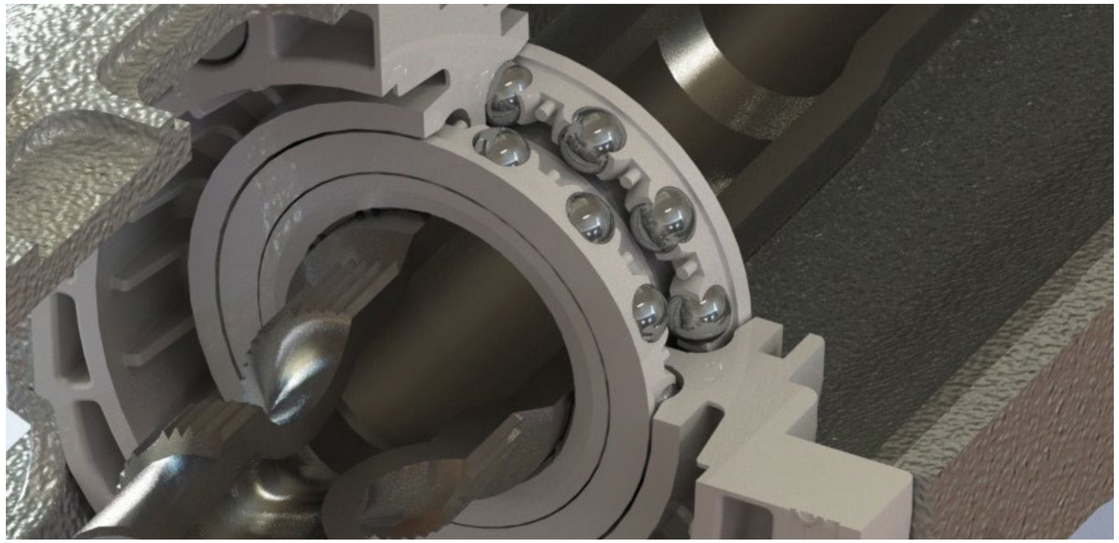
Durham University

The University Of Sheffield.

UNIVERSITY OF LEEDS

Machine Tear Down Service

BNL offer a Value Analysis and Value Engineering service involving the tear down of existing machines, or analysis of projects work, aimed at improving function, reducing costs or both.



- Significant savings achieved in both arenas (VA/VE)
- Conversion of complex multi-component metals and plastics assemblies to single piece integrated multi-function replacements
- Sharing of best practice and new technologies to extend the life of existing products
- Full life-cycle improvements made to your product in design and engineering, material selection, testing, manufacturing, assembly, installation, service, maintenance and recycling
- Component rationalisation where products have been developed under tight time constraints and a wide variety of parts and materials have been sourced and used
- Cost reduction opportunities based on ordering greater quantities and economies of scale

Thank You