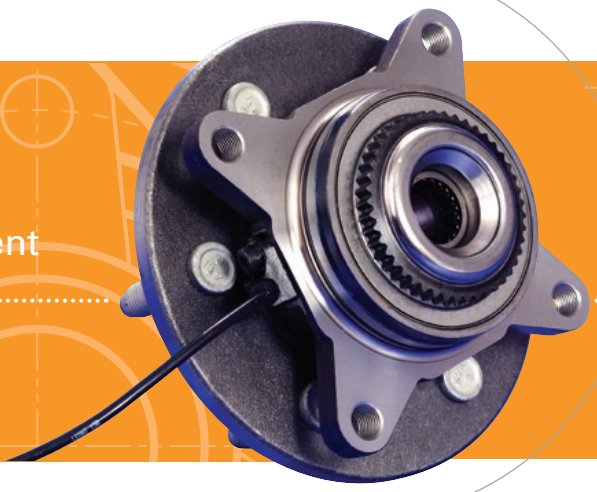
TIMKEN

Where You Turn

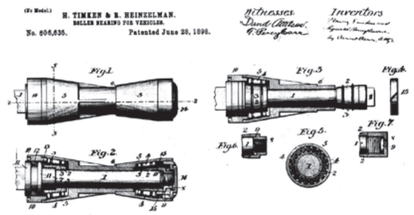
At The Center Of
The Hub Evolution



We Didn't Reinvent
The Wheel

But We Did
Make It Better.

MAKING THE WHEEL BETTER THROUGH INNOVATIVE DESIGN TIMKEN'S CONTRIBUTIONS TO HUB EVOLUTION



Original Tapered Roller Bearing Design

Look and then look again at the drawing of the original Timken tapered roller bearing. The 1898 tapered roller bearing was designed for a hub. Although not known as a hub 100 years ago, this design reflects how The Timken Company was there at the start. Our bearing knowledge began more than 100 years ago and continues to evolve with the demands of the markets we serve.

The St. Louis was the first automobile to use Timken tapered roller bearings. The package bearing used in the St. Louis was similar in design to the company's modern UNIPAC™ bearing.

Timken has been at the forefront of wheel-end bearing technology since the development of the single row tapered (TS) bearing in 1924. From this knowledge of wheel-end bearings, Timken continued to develop products for original equipment (OE) customers, including the UNIPAC™ and UNIPAC-PLUS™, SENSOR-PAC™ bearings and FORMED HUB wheel-end systems. The latest addition is the FORMED HUB with the Generation III integrated bearing package used in 2002 and later Dodge Ram 1500 Series trucks.

Extensive product development keeps Timken at the center of the hub evolution for OE manufacturers. Because of this, Timken is a leader in the automotive aftermarket for hubs. Whether the hub is used with sensored or non-sensored bearings, Timken has the product for the light- and medium-duty aftermarkets.

As the technology evolved, there are three phases to note in the evolution to today's products. These are the development of UNIT-BEARING™, SENSOR-PAC, and FORMED HUB bearings.

UNIT-BEARING™ AND UNIPAC™ Bearings

Phase One: Manual Adjustment Eliminated

Introduced in 1967 for the passenger and light truck market, the UNIT-BEARING does not require manual adjustment. The bearing is manufactured with the cup and rib bonded together with an adhesive to facilitate bearing handling and installation of these wheel-end bearings.

In 1979, Timken introduced the UNIPAC bearing. It answered the need for a preset, pre-greased and pre-sealed bearing for an independently sprung driving wheel. Axially and radially compact, the UNIPAC bearing reduces vehicle weight. Close tolerances are maintained using automated techniques in manufacturing, resulting in a closely controlled setting range for the UNIPAC bearing.

In the 1980s Timken brought the UNIPAC-PLUS™ bearing to market. The UNIPAC-PLUS bearing extended the capabilities of the UNIPAC bearing to include elements of the hub function. This bearing is a bolt-on package which is pre-sealed, pre-lubricated and preset. Reduction in bearing size and weight are apparent.

SENSOR-PAC™ Bearing

Phase Two: Sensored Hub Technology

With the introduction of the SENSOR-PAC bearing in the 1990s, Timken entered the next phase of hub technology. Now, the bearing had a sensor for automotive traction control systems.

In the SENSOR-PAC bearing, the sensor is located in the flanged outer race (cup) of the bearing. It detects the rotational speed of a target wheel which is integrated within the bearing. The sensor produces an output signal proportional to wheel speed, which can be "read" by electronic traction control and anti-lock braking systems and by other vehicle systems.

The advantages of the Timken design are numerous. The sensors and target wheels are protected from water, road, chemicals and stone impact. They can be made to fit in the original wheel bearing envelopes.

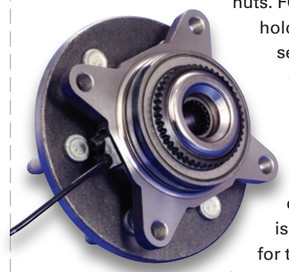
SENSOR-PAC bearings eliminate the need for assembly and adjustment by vehicle manufacturers. And, they allow close control of the critical air-gap dimension between the sensor and target wheel to preserve signal integrity.

FORMED HUB Wheel-End System

Phase Three: Integrated Bearing Packages

When Timken began the FORMED HUB wheel-end system program in 1997, it was the start of integrating the bearing and hub. The FORMED HUB can incorporate a SENSOR-PAC or UNIPAC-PLUS bearing into the design. By integrating the bearing with a wheel hub and designing them together as a system, Timken has minimized the weight, space and tolerances of the assembly. This reduces the weight of the vehicle and improves braking performance.

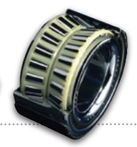
FORMED HUB is a single integrated unit that can be bolted directly onto passenger car or light truck wheel corners, eliminating the need for conventional components like washers, spacers and nuts. FORMED HUB holds bearing setting more consistently, because, unlike a traditional thread and nut design, there is no chance for the nut to loosen and back off.



In 2001, Timken expanded the program to incorporate an integrated wheel-end system using the FORMED HUB. This addition allows a four-wheel drive system to disconnect from the front wheels during normal driving, improving fuel economy.

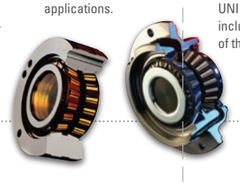
1924 Single Row Tapered Roller (TS) Bearings designed.

1967 UNIT-BEARING™ developed for automotive use.



1979 First UNIPAC™ bearing sold for automotive wheel applications. Double cup with integrated mounting flange. Built on unit.

1982 Introduction of WHEEL-PAC™ bearings for heavy-duty truck applications.



1988 New UNIPAC-PLUS™ bearing extends the capabilities of the UNIPAC bearing to include elements of the hub function.

1990 PINION-PAC™ automotive driveline system introduced. A preset, pre-sealed tapered roller bearing unit that speeds axle assembly and improves performance.

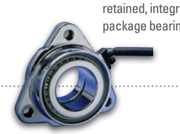
1992 SENSOR-PAC™ bearing introduced for use with anti-lock braking systems.

1995 SENSOR-PAC™ bearing used on GM 4x4 Pickup 1500, Suburban, Tahoe and Yukon and Ford 4x4 Explorer and Mountaineer.

1997 Formed Hub wheel-end system program begins. With formed hubs, conventional parts like washers, spacers and nuts are eliminated.

1998 SENSOR-PAC™ bearing used on Dodge 4x4 Ram Pickup.

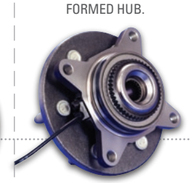
1999 UNIT-BEARING™ introduced for rear disc brake vehicles.



2000 Generation III integrated bearing package developed. Features active and passive sensing technology in a self-retained, integrated package bearing.

2001 Generation III integrated bearing package in the 2002 Dodge Ram 1500 Series.

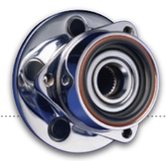
2001 Launched integrated wheel-end system using FORMED HUB.



2002 Timken introduces Generation II bearings. It is a Timken package bearing with a flange that can include a SENSOR-PAC bearing or UNIPAC-PLUS bearing.

2002 Generation II hub and bearing package in rear steer for GM light trucks.

2003 Generation II hub and bearing packages in Ford Expedition.



The Timken Quality Story

For more than a century, the familiar Timken brand has delivered unsurpassed quality and reliability. Now Timken brings the market a comprehensive line of hub components. Timken's hub offering is a complete line of aftermarket products, backed by a trusted global brand and the logistics, customer service and technical support only Timken can deliver.

Top Hub Assemblies

TIMKEN #	APPLICATIONS
513137	Chevy/GMC Pass 05-98 (FW Hub)
513124	Chevy/GMC 4WD/AWD Trk 05-97 (FW Hub)
513121	Chevy/GMC Pass 06-96 (FW Hub)
513100	Ford/Lincoln/Mercury Pass 05-95 (FW Hub)
513017K	Chevy/GMC Pass 05-84 (FW Hub)
SP550304	Chevy/GMC 4WD/AWD Trk 05-99 (FW Hub)
513087	GMC Pass, Trk 99-92 (FW Hub)
SP450200	Ford Explorer 4WD 02-95 (FW Hub)
513098	Honda 97-90, Acura 99-97 (FW Hub)
513138	Chrysler/Dodge/Plymouth 06-95 (FW Hub) Chrysler 04-99 (RW Hub)
513089	Chrysler 04-93, Eagle 97-93 (FW Hub)
SP450301	Chevy/GMC 2WD Trk 06-05 (FW Hub)
513179	Chevy/GMC Pass 05-96 (FW Hub)
513084	Jeep Trk 00-90 (Frt Dr Ax, FW Hub), Mazda 02-00 (RW Hub)
513123	Chrysler/Dodge Minivan 06-96 (FW Hub), Prowler (FW Hub)
515006	Dodge 4WD/AWD Trk 99-94 (FW Hub)
513044	Chevy Pass 01-90 (FW Hub), GMC Pass 96-88 (FW Hub)
512156	Chrysler/Dodge/Plymouth Minivan 00-96 (RW Hub)
513157	Chrysler/Dodge/Mitsubishi 06-95 (FW Hub)
513156	Ford Lt Trk, Minivan 03-99 (FW Hub)

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