

" Gentlemen " Agreement

THE NISIKI MANAGEMENT STYLE

- 1) As per our credo "**People are more Important than Products**".
- 2) Nisiki **wish prosperity and happiness** to each of its members.
- 3) Nisiki within its **limited resources** has the responsibility to give **the best of opportunities to it's people**.
 - Products that are in long term demand in the industry.
 - **World class** manufacturing factories.
 - **Relationship with top class customers** in India market.
 - **Transparent management** committed to credo.

NISIKI members now have a reciprocal responsibility.

- a) Do keep looking out for opportunities **better than *NISIKI***.
- b) **Inform** HR (Dr. Uma Gholba) when you apply for this opportunity. This is **reciprocating transparency**.
- c) HR **can help** you with **leave, recommendation letter** etc, so that you can best seize the opportunity.
- d) Inform the outcome and developments of your new application to **HR**.
- e) In case you fail to make it, ***NISIKI* will never keep a grudge.**
You can continue to contribute to *NISIKI*.

The above transparency between ***NISIKI*** and People can thus be mutually **beneficial**. HR will have more time to make **alternative arrangements for smooth transition**.

Do write back to me if any of you differ from this "**gentlemen**" agreement.

Ladies are also included in this agreement.

With Warm Regards.

SHRIKANT GHOLBA
Director.

VISIT REPORTS WHY ? & HOW ?

1. Each customer visit is an financial investment of the company.

The company has right to expect a return on the investment in the form of Visit Report.

2. The return on investment is worthy if the Visit Report is ON TIME.

3. Customer situation is dynamic. If Visit Report is late the situation has changed. The investment has lost it's value.

4. Incase of urgent situation, inform immediately to your Boss about the situation by evening call / Fax and document it by a Visit Report.

5. The Visit Report is a First information Report (FIR) from our customer in accordance with the CBI Role.

6. Fill Visit Report within 24 hours after your finish your visit to customer.

7. EM'S to put their comments in remark column before EDP.

8. It is hoped that this minimum duty of a sales man towards the company will be done with honesty and sincerity.

“ Localised – 6- Services ”

ETD – Priority Order

1. Application Engineering Service :

For communicating the logic of price v / s performance benefits ratio of NISIKI supplied product.

2. Field Technical Service :

For routine maintenance, failure analysis, education of operators.

3. Quality assurance Service :

For reliability of product performance.

4. Design & Development Service :

For new improvements in price / performance benefits ratio.

5. Materials Planning Service :

For Just-in-time supply of products.

6. Logistics Service :

For quotations, negotiations and physical supply of product material @ lowest prices.

Mission 2004 : All NISIKI offices to be capable to deliver the 6 services locally.

MECHANICAL BUSINESS – SALES ARGUMENTS.

Product promotion will be a verbal argument between NISIKI salesman and customer's Purchase Manager. It is important that NISIKI salesman emerges the winner and customer shows inclination to do business with us.

SKF, FAG and Chinese Traders will be the big obstacles and hurdles.

This is an attempt to familiarise Nisiki salesmen with the unique benefits that NISIKI ENGINEERING LIMITED can offer to customers.

CREATING INTEREST IN NISIKI :

- 1) Highlight when presenting your visiting card that as the company name suggests, NISIKI in an "**Engineering**" company.
- 2) Inform that you are an "engineer "**First**". A bearing supplier status is secondary to you.
- 3) **NISIKI** in its supply will **never compromise on engineering values.**

This is our 10 yrs track record.

- 4) **NISIKI** supplies are always "application specific". Bearings are not supposed to be general – purpose supply. They have to be specific to meet application requirements. This is the international trend.
- 5) Worldwide bearing supply is divided into **OEM** channel and Replacement market channel.
- 6) A bearing supplier specializes in **OEM** or Replacement Market.
- 7) India prior to liberalization in 1992 was license – raj market. Only SKF and FAG due to the local factories were the main players in India.
- 8) SKF and FAG in the world market is Replacement market player. Even in the biggest automobile bearings markets, **SKF** is a replacement player.

Show copy of SKF web site which clearly states its focus on replacement markets.

9) SKF produces general – purpose bearings for replacement market.

Show copy of " S " V / s NISIKI supply of 628. Emphasize the noise, ball dimensions, and tolerances.

10) SKF supply strength is 10,000 dealers who have to carry general purpose bearings to meet many applications. Hence SKF will have a general bearing for textile, Power tools, automobile, and conveyer applications.

11) But the present age is of specialization. Generalisation is limited business scope.

Give the Bata v / s Nike shoe example.

Some years back an Indian buyer felt that if he wore a Bata Ambassador shoe he was wearing the best in the world. He had no exposure to Nike Adidas, and Reebok.

What is the truth ? Bata also makes shoes world wide but they are general purpose. But people like Nike make shoes for Athletics, Basketball, Football, jogging, walking each a special application. This is reason that Nike is a winner. You cannot win a international game in Bata made shoes !!!

Hence to make international quality you need application specific bearings and this is the market vacuum that NISIKI has filled since 1992.

In all the above arguments our idea is not to mean that SKF is a inferior supplier. Our idea is to inform that SKF strength is replacement Market with its 10,000 dealers. Hence a customer needs to reconsider if he wish to try the OEM marketing route.

DEFENDING PRICE

Having created interest in NISIKI the next issue is of price. The customer starts telling you that your price compare to Chinese is so high !!! This is how you can proceed.

- 1) A bearing is used to provide precision movements, reduce friction, reduce noise and increase life. These are very basic purposes of ball bearings. If your application does not have the above requirement use a bush bearing that is 5% of cost of bearings.
- 2) Bearing has 3 components that make up major manufacturing cost.
- 3) Inner ring and outer ring that undergo turning, heat treatment, grinding and honing. There are 8 passes during honing operations of the ball tracks. The honing is the most expensive and time consuming manufacturing process for the rings.

If you skip honing or just make 1 or 2 pass your costs come down drastically. It is direct reduction of 20%.

But can a bearing with improper honing meet OEM requirements? The ball track is the hidden area in the bearing, which you cannot check.

- 4) A ball goes thru forging, heat treatment, grinding, lapping.

Again lapping is a time consuming and expensive process. The cheap bearings skip and manipulate the process to save the costs.

NISIKI must highlight that since it is hidden areas of a bearing, the users is not in a position to detect it with naked eye. A grinding finish also looks like a super finish to a naked eye.

NISIKI is of view that such cost reductions are breach of engineering values. It is wrong way to cost reductions. It defeats the basic purpose to use bearings.

Hence NISIKI OEM supply is 100% noise tested.

A noise test is like a **Agni-Pariksha**. To pass the test you cannot compromise on the manufacturing process. There are no short cuts. The bearings have to compulsorily go thru best of honing and lapping process.

Show the Anderon noise testing picture for NISIKI bearings.

A proof of this is that no local manufacturer in India including **SKF, FAG** has a on-line noise testing machine. They is no 100% noise check.

The above must help you to **differentiate** the **NISIKI OEM** supply from genera-purpose cheap supply.

NISIKI SALES SERVICES :

- 1) Unlike traders who give low costs bearings **NISIKI** has a team of sales and service engineers to back the supply. **NISIKI** is fully confident of the supply.
- 2) **NISIKI** can train and educate your operators to make best use of bearings. This ensures reliability of bearing performance.

The above 3 are the USP (Unique Selling Proposition) of NISIKI.

The above arguments should help a NISIKI salesman to reach a sample order stage. Surely once proven customer will stick to NISIKI. The simple reason is that NISIKI has best and true capabilities for OEM supply in India.

MB sales are requested to go over these 4 pages before visiting customer so that you can pass the sales-man test and emerge winner.

Make sure you carry NISIKI samples and show to customer.

**REPORT ON BEARING TRAINING PROGRAMME FROM MR. SHANTANU
BHOSALE – PUNE**

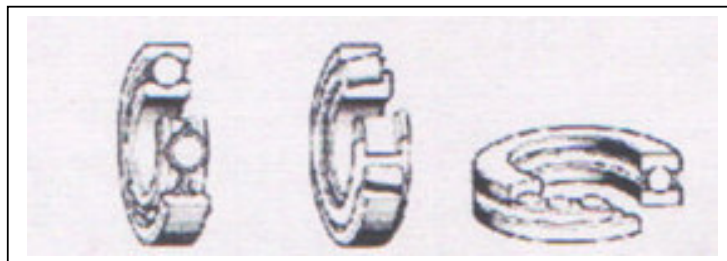
VENUE – METS OFFICE.

The first bearing, was used by Leonardo D Vinci in his ship. The bearing was a thrust bearing and was used in the steering of the ship. The basic function of the bearing is to reduce the friction between the rotating parts and to increase the life.

Basic Component of bearing are :

1. Outer Ring.
2. Inner Ring.
3. Cage.
4. Rolling Element.
5. Shields.
6. Snap Ring.

Below is a view of different bearing :



There are different type of bearing used for wide applications. The commonly used material is of SAE 52100. For high carbon chrome bearing steel the chemical composition is :

Standard code	Chemical composition						
	C	Si	Mn	P	S	Cr	Mo
SAE 52100	0.98-1.10	0.15-0.35	0.25-0.45	Not More Than 0.025	Not More Than 0.025	1.30-1.60	Not More Than 0.10

In bearing the rolling elements are harder than the cages and the rings, that's because the whole load is taken up by the rolling elements. The HRC for the rolling element

ranges from 62 – 64. The bearing cages, rings the HRC from 58 – 64. The cages are of soft material compared to the rolling element.

Bearings are classified as miniature & Industrial bearing having diameter less than 10mm ID and the Industrial bearing size above 10mm.

Bearings are manufactured with great precision and accuracy.

Manufacturing of Bearing – Right from the raw material to the finished goods the automatic machines do all the processing and in no part of the process is human touch.

Process of hard machining is done to get a fine finishing. The grinding and the fine finishing of the inner ring and the outer ring. After every stage there is an inspection of the tolerance and the dimension of the bearing parts. A very high accuracy of the rolling element is kept. A proper lubrication of bearing is done at each stage.

The assembly of the bearing is also done on the machines with high accuracy. The final inspection is done and the bearings are send for a wash and then it's lubricated before it is sent for packing. Before packing the bearings are tested like for noise level, lubrication, dimensional check.

The load carry capacity depends on the rolling element of the bearing. Different load acting on the bearing are :

1. Radial Load.
2. Axial Load.

In radial load the load acts perpendicular to the shaft and in axial load the load acts parallel to the shaft.

Bearings are classified according to the load acting on it like the Radial bearing and Thrust bearings. Radial bearing take radial load and thrust bearing take axial load.

Radial Bearing.

1. Deep Grove Ball bearing.
2. Angular Contact Ball Bearing.
3. Four Point Contact Bearing.
4. Self – Aligned Ball Bearing
5. Cylindrical Roller Bearing.
6. Needle Roller Bearing.
7. Tapered Roller Bearing.
8. Spherical Roller Bearing.

Thrust Bearing.

1. Thrust Ball Bearing.
2. Angular Contact Thrust Ball Bearing.
3. Cylindrical Roller Thrust Ball Bearing.
4. Needle Roller Thrust Ball Bearing.

5. Tapered Roller Thrust Ball Bearing.
6. Spherical Thrust Roller Bearing.

DEEP GROVE BALL BEARING (DGBB)

This is most widely used ball bearing in various applications. The load acts on it is the radially and the axially. DGBB can take up one fifth of axial load compared to radial load.. The ball has a point contact with the raceways so it takes up radial load in a better way. The cyclic load acts on the rolling element. One half of the bearing there is a maximum load acting and the ball passes through this load area, where the point contact of the ball and the raceways helps the ball to revolve and not to slide because sliding leads to friction and wearing of the raceways take place.

DGBB starts with the bearing series of 6xxx with suffix indicating the sealed, shield, expect for some diameter like 10,12, 15 and 17.

They are commonly used for front and rear wheel, transmission shaft, IC engines, automobiles, electric motors, and power tools.

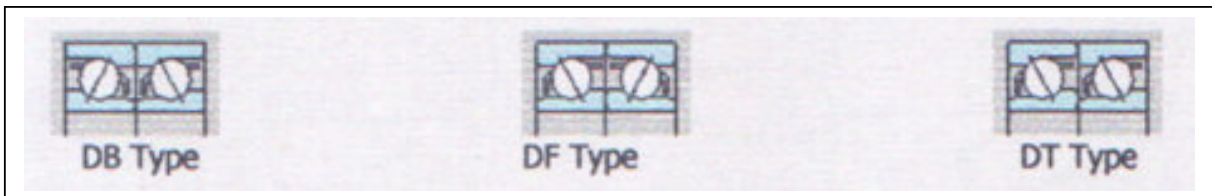


Angular Contact Ball Bearing (ACBB)

The ACBB starts with series 7xxx.

The different type of ACBB are :

1. Back - To - Back arrangement – DB
2. Face – To Face arrangement – DF
3. tandem type arrangement – DT.



The load acting on the DB and the DF type arrangement is generally the radial load. In back to back the mounting and dismounting of bearing becomes easy. The DT type arrangement can take up axial load. SRACBB can take up radial load and axial load in one direction only.

In ACBB both the side surface are provided with G. i.e. grounded surface, so it is easy to match the bearings into sets. The bearing rings and ball posses their own contact angle.

The different type of contact angles are :

Contact Angle	Supplementary Code
15 degrees	C
20 degrees	CA
25 degrees	AC
30 degrees	A (Omitted)
35 degrees	E
40 degrees	B

Larger the contact angle greater the resistance to axial load is there. They are used in large & Medium size motors, traction motors, machine tool spindles and other industrial equipment.

Self – Aligning Ball Bearing (SABB)

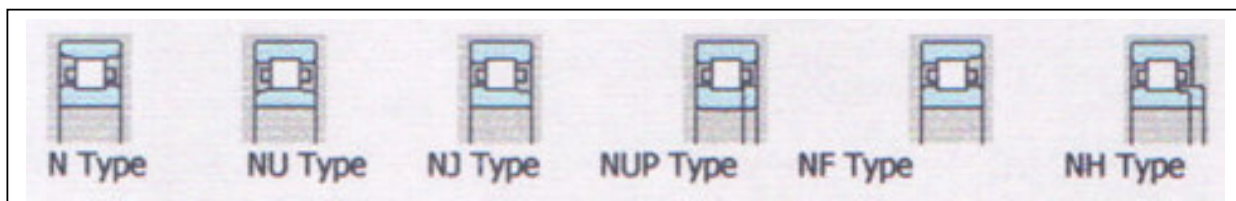
This bearing are used where there is a change of misalignment of the shaft. The SABB can resist the misalignment up to 3 degrees. In SABB the outer ring raceway is single cylindrical whereas the inner ring raceway is divided into two so that the ball can get adjusted from the upper ring and doesn't get slipped. SABB the designation with K have a taper bore with a taper of 1:12 and K 30 taper of about 1:30.



The SABB are starting with series 1 and 2. This is used where long shafts are used. They are used in power transmission. Shaft of woodworking, Plummer blocks, rolling mills, machine tools etc.

Cylindrical Roller Bearing (CRB)

This are used where the rolling element is the roller instead of the ball. The roller has a line contact with the raceways so they carry more loads because of the line contact. This can take up better radial load and also axial load. N, NU, NJ, NF, NUP are the different types of CRB. In the N Type the outer ring is separable separated the mounting of the bearing becomes too easy in some complicated application like the gearboxes. CRB starts with prefix N, NU, NJ, NNU and then the series 22xx, 32xx i.e. NU 22xx, NNU30xx. In NH type thrust collar is provided which can be easily removed during the mounting.

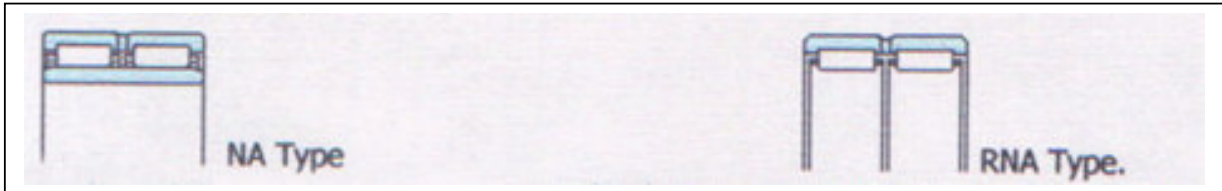


CRB are used in medium and large size electric motors, generator, gearbox, machine tools.

Needle Roller Bearing (NRB) The NRB is similar to the CRB but the rolling element is elongated. The rolling elements are known as needles. In NRB the needles have a maximum line contact with the raceways.



Na and RNA are different types of NRB. In NA the Inner ring is present and in the RNA the inner ring is absent.



Bearings with no inner rings function using heat – treated and ground shafts as their raceways surfaces. The NRB are used in machine tools in automobiles for transmission. The NRB starts with Prefix NA 48xx, RNA 59xx.

Tapered Roller Bearing (TRB)

This type is also known as the cup and cone assembly. Where the cup is the outer ring and the cone is the inner ring. The cup and cone are easily disassembled. This helps for easy mounting of the bearing where complicated mounting is there.



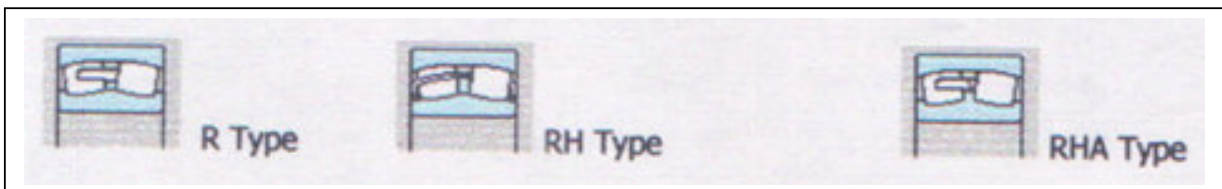
The raceway surfaces of cone and cup and the rolling contact surface of rollers are designed in such a way that the respective apexes converge at a point on the bearing centerline. This type of bearing is suitable for use under heavy load or the impact load. Bearings with suffix "J" are interchangeable internationally. These bearings are used in heavy – duty automobiles construction equipments, machine tools etc. TRB starts with the five digits series 32xxx, 33xxx.

Spherical Roller Bearing (SRB)

This type of bearing is also known as housing and sleeve assembly. This bearing comprises of barrel shaped convex rollers, double row inner ring. The outer ring is classified into four types " R, RH, RHA and SR " according to internal structure. This bearing can take up both radial and axial load in both the direction, which makes it suitable for application in heavy and impact loading. The tapered roller bearing can be easily mounted and dismounted by using an adapter or withdrawal sleeve.

Tapered bores are of two types :

K having a taper bore with a taper of 1:12 and K30 having a taper of about 1:30. Lubrication groove can be provided on the inner and the outer ring. SRB series starts with five digit numbers 2xxxx. This is used in paper mills, speed reducers, and rolling mills.

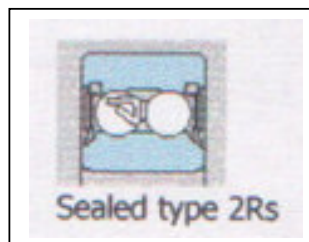


Thrust Ball Bearing (TBB)

This type of bearing comprises washer – shaped ring with raceway groove. Washers to be mounted on shafts are called shaft washers (or inner rings) & washers to be mounted into housings are housing washers (Outer rings). Single direction bearing accommodate axial load in one direction, and double direction bearings accommodate axial load in both directions. They are 5 digit numbers starting with number 5xxxx. They are used in automatic king pins, machine tool spindles. The important part of the bearing is holding the rolling element firmly so that the rolling element doesn't slip away the cages are use gives a certain guide way to the rolling element between the two raceways. The cages are of different type like the pressed cage, machined cage and the polyamides resin cage. The pressed cage is like the ribbon type, crown type or the H type cage and the reverted cage. The pressed type cage is of brass or the steel.

SEALS & SHEELDS

The bearing is of open type and the closed type in close type they are covered by seals or the shields. RS designates rubber seals and Z.



Are the metallic shields? RS is with one side sealed and 2RS is with both sides sealed. Same way ZZ is both side shield and Z is one side shield. Seals are generally used for low speeds or medium speeds as they cannot constraint the high speed, whereas the shield Z can bear the high speed easily. The Z and the H type seals are the non – contact type metal shields where the shields do not touch the land area of the bearing. In this case there is always a chance of the entrance of foreign material in the bearing, which may damage the bearing. But the seal RS type bearing is the contact type bearing where there is no chance of entrance of the dirt or dust into the bearing. The RU is non – contact type seal, whereas the RD is a slightly contact type seal.

CLEARANCE

Internal Clearance is defined as the total distance either inner ring or the outer ring can be moved when the other ring is fixed. If the movement is in radial direction it is known as radial clearance and if the movement is in axial direction then it is known as axial clearance. This clearance is provided in each and every bearing because bearing performance depends on it. Improper clearance results in failure of the bearing. This is provided because during high speed rotation to rolling element gets enlarged due to high temperature, so if no clearance is provided there will be no space for the expansion of the rolling element and the rolling element will get jammed and the bearing will fail. During mounting the inner ring or the outer ring gets moved with respect to the other ring there is slight clearance provided may be in microns is left. C2, standard, C3, C4, C5 are the different clearance. Tolerance should always be in negative side.

PRELOAD

It is defined as a process of ensuring contact of the rolling element with the raceways. In preload there the bearings are operated with certain amount of proper clearance. In some application the bearings are mounted with such axial load that the clearance will be negative. The preload is generally done in ACBB or TRB so there is contact between the rolling element and the raceways. Preloading increases the life of the bearing and the noise level is also reduced. Preload is done :

1. To improve running accuracy.
2. To improve gear engagement in automobiles.
3. To improve smearing by eliminating sliding in high rotational ACBB.
4. To keep rolling element in right position.

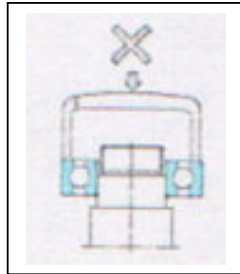
PACKING & STORAGE

The packing of the bearings also plays an important role. The packing and the storage area should be very clean and dust free. According to the humidity the temperature should be adjusted. Humidity with more than 80% the bearing catches rust. Water initials can make the bearing to rust within 10 minutes. The temperature of the storage room should be kept under control. There should be no human touch to the bearing because a small touch will also lead to the removal of the lubricate from the surface and it leads to the corrosion on that touched surface. So there should be a great care taken about the handling of the bearing.

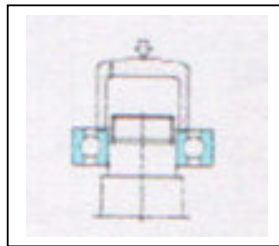
In shipping bearings, since they are covered with proper anti – corrosion oil and are wrapped in ant tarnish paper, the quality of the bearings is guaranteed as long as the wrapping paper is not damaged. Avoid storage of the bearing in places exposed directly to the sunrays or placing boxes of bearing against cold walls.

MOUNTING

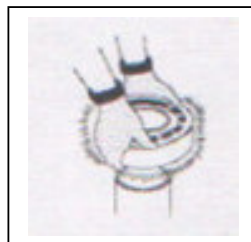
The bearing mounting is the important in the functioning of the bearing. Improper mounting will damage the bearing and will lead to improper functioning. While mounting the bearing the pressure should never be exerted on the outer rings as shown below :



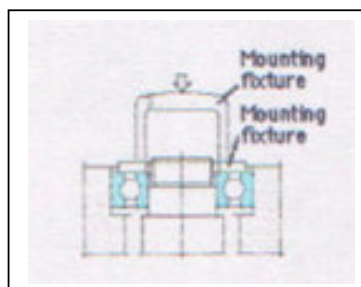
That will lead to the sliding of the outer ring and this will lead to the malfunction of the bearing. So while mounting the bearing on the shaft the pressure should be exerted on the inner ring as shown below



The other best way of mounting is of heating the bearing to some extent and then by applying some oil on the shaft and mounting the hot bearing on the shaft. This method is the best and will not damage the bearing at all.



While mounting bearings on shafts, locknuts are generally used. Special spanners are used to tighten them.



Even mounting fixtures are used as shown above.

LUBRICATION

Lubrication is most important factors determining bearing performance.

Function of bearings :

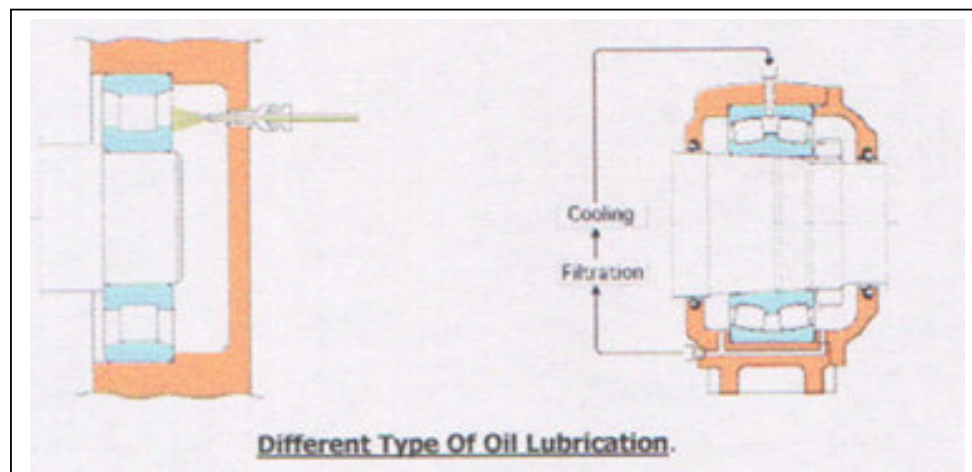
1. To lubricate each part of the bearing.
2. To reduce friction and wear.
3. To carry away heat generated inside bearing due to friction and other causes.
4. To cover rolling contact rolling contact surface with the proper oil film in order to prolong bearing fatigue.
5. To prevent corrosion and contamination by dirt.

Bearing lubrication is classified in two types oil and grease. In grease the oil is about 10% and the remaining 90% is grease. So when bearing gets heated the oil gets extracted from grease and forms an oil film in the bearing and the grease gets collected on the raceway thus the bearing cooling is taken by the grease. The oil film takes up the load in the bearing. The oil film is of 0.8 to 1.5 microns. Grease should fill approximately one – third to one – half the inside space, because excessive grease will generate heat when churned this will damage the bearing.

Oil lubrication – Oil lubrication is usable even at high rotational speed and somewhat high temperature & is effective in reducing bearing vibration and noise.

There different type of oil lubrication :

1. Oil bath
2. Oil drip
3. Oil splash
4. Forced oil circulation
5. Oil jet lubrication
6. Oil mist Lubrication.



Most greases use metallic soap base such as lithium, sodium, or calcium as thickeners. For some applications non-soap base thickeners are used. In general the thickener determines the mechanical stability, bearing operating temperature range, water resistance, and other characteristics of grease.

Mixing of different greases changes their properties so grease of different brand should never be mixed.