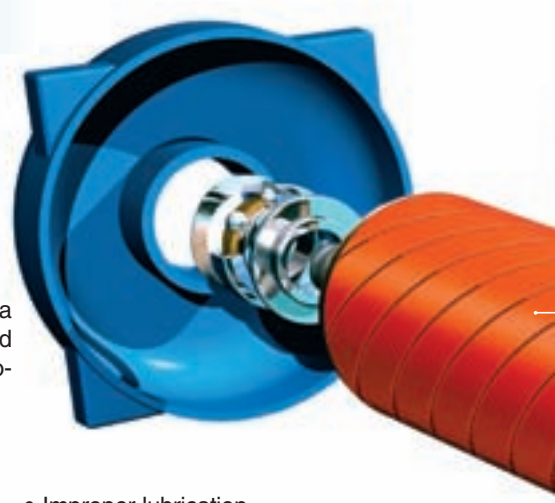
Electric motors:

SNR: Bearing solutions tailored to your specific requirements

SNR - Industry

SNR INDUSTRY

The energy to stand the test



Any automated movement requires a motor.

A motor converts electrical energy into mechanical energy. Connecting a motor to a battery or other electrical supply source causes the shaft to turn. Some motors are supplied by direct current (DC) e.g. a battery, and others by alternating current (AC). Although different designs of motors exist, the general principle remains the same for all of them.

How does a motor work?

A rotating coil is supplied with an electrical current. As a result, the coil is subject to an electro-magnetic field and starts to turn, due to the force that the electrons produce on a plane perpendicular to the windings.

Bearing challenges:

- False brinelling problems
- Poor balancing leading to vibrations
- Impacts during installation
- Humidity, contamination
- Shaft mis-alignment
- Improper lubrication
- Noise level restrictions
- High and/or low temperatures
- High speeds
- Thrust overload

Technical features of the different groups of motors

Type	Power and speed range	Features	Applications
Asynchronous	- Fractional to 13,000 hp - Speed ⩽ 3,000 rpm with 50 Hz network - Up to 10,000 rpm with electronic supply	- Simple and durable - Low maintenance - High efficiency - High start-up and running torque - Low manufacturing cost	- Industrial environment, pump driving, fan systems, compressors, conveyors
Direct current	- Fractional to 13,000 hp and higher - From 0 to more than 10,000 rpm	- High, stable torque values - Moderate efficiency - Flexible usage - Generally requires two direct supplies - Gradual brush wear requires regular maintenance	- Rail - Rolling machine - Machine tools - Automotive - Hoisting mechanisms - Energy recycling system
Step motor	- Fractional to approx. 15 hp - From 10 to 3,000 rpm	- High torque value at low speed - Can be used in open loop - Moderate efficiency - Torque not controlled	- Small industrial machines and general applications - Labelling machine - Printers, scanners - Automotive
Synchronous brushless servomotor	- Fractional to approx. 250 hp - From 0 to 3,000 rpm	- High efficiency - Good torque and speed stability - High torque values possible	- Robotics - Machine tools - Packaging machines - Special machines - Wood-working machines - Dynamic applications

SNR Bearings:
the answer to your requirements

BEARINGS

Comply with noise limitation requirements.

• **Ball bearings**
- **TOPLINE**
High and low temperatures and high speeds, the TOPLINE range has the most demanding applications covered.
e.g.: with a standard 6206 bearing: 10,000 rpm / with a high precision HV bearing: 15,000 rpm.

- **Radial contact ball bearings:** 62.. and 63.. series.
High precision rotation, specific bore tolerances, polyamide cage possible, optimized internal radial clearance to reduce sound level.

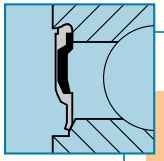
• **Cylindrical roller bearings**
NU,NJ,N and NUP in series 200 and 300 (available in bronze cage for larger dimensions).

SNR recommends:
- Large size bearings: require bronze cage.
- Large motors: SNR bearings are available with J30 increased internal clearance
- Small motors: double sealing may be useful (EE)

• Various instrument bearing solutions adapted to every application (SL and SLE range): speed, rotation direction, temperature, acceleration or deceleration amplitude, relative position sensors.

LUBRICATION

• Standard applications: SNRLUB **EP** (-20 to +230 °F)
• High speed and low temperatures: SNRLUB **GV+** (-60 to +250 °F, N.Dm>100,000)
• High and very high temperatures: SNRLUB **HT** (-20 to +265 °F / -5 to +300 °F) and SNRLUB **THT** (-5 to +360 °F)
• Vibrating applications: SNRLUB **VX** (-5 to +265 °F), high adhesion grease (grade 2)
• If the bearing is not delivered pre-greased: SNR special bearing greasing gun particularly for cylindrical roller bearings.



SEALING

Be confident of good moisture and corrosion resistance.
• Double sealing (EE): preventing contamination, avoiding constant lubrication.
• Double shields (ZZ): providing adequate protection without additional torque.

• V-Ring seal,
Plays several roles depending on the application: expulsion seal, bearing protection, sealing ring or secondary seal, etc.

- Made of elastomer able to sustain temperatures between - 40 and +100°C (can be supplied in Viton® to sustain temperatures to +200°C)
- Can cope with misalignment or oval shapes
- Simple tool-less fitting
- Can easily be stretched or shaped to pass over struts or flanges etc.

INSTALLATION/REMOVAL

• **Fitting paste** (-50 to +300°F): installing and removing bearings, wheels, flanges, etc.

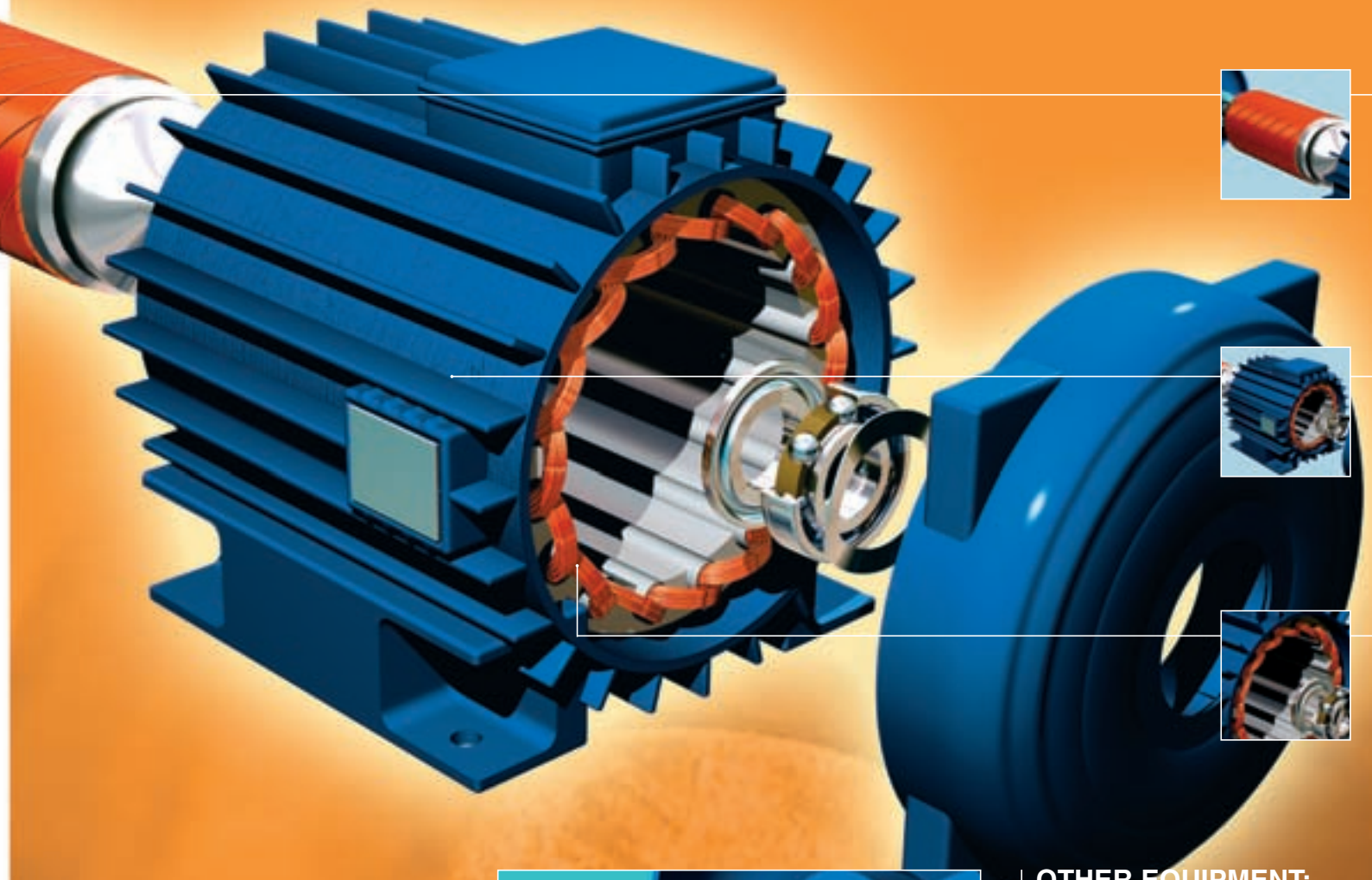
• **Induction heating equipment** (Fast Therm 20/35/150)
- Cleanliness (no oil, no waste) and operator safety (only the part to be heated undergoes high temperatures)
- Speedy operation with "Turbo-boost" function: heat the bearing in half the time.
- Automatic demagnetization: no risk of bearing deterioration

• **Installation kit:** 3 striking tubes, 33 plastic fittings, 1 bounce-free hammer

• **Hydraulic extractor:** for removal of complete bearings, bearing extraction either by the bore or by the outer diameter, 2 or 3 claws, light, 10-metric tons extraction force.

• LASERTEMP **thermometer**(non-contact laser sighting), to check bearing temperatures and temperatures of other moving parts.

SNR Bearings, partners of
your electrical applications



ROTOR:

Rotating part of the alternator consisting of a coil and pole shoes.
The rotor is comprised of a central coil with two opposite groups of pole shoes with interlocking prongs.

STATOR:

Fixed armature made of copper wire wound around the coils of a laminated iron collar.

COIL:

150 loops of copper wire insulated with varnish are wound about a core. The bare ends are wound around the pins for contacts. At start-up, the pins must be in contact with the brushes..

OTHER EQUIPMENT:

- Motor cover
- Elastic washers for flanges: washers for axial compensation
- Tolerance rings: fitting bearings in electrical motor housing
  - Avoids operational slipping of the bearing outer ring
  - Allows axial movement
  - Compensates for differential thermal expansion
  - Simple, proven, low cost.

Various stages of the motor repair process...

ELECTRICAL WINDING

Consists of wrapping wires, fibers or sheets of various materials (glass, boron, carbon, silica, synthetic materials) soaked in resin around a core in order to form, after polymerization, a covering that can bear high internal pressure.

e.g.: Rewinding of coiled stators and rotors for asynchronous motors Armatures and poles for direct current motors, dry transformers, etc.

• Winding process (Low Voltage Asynchronous):
- Separating stator from rotor and dismantling the shaft, bearings and housing
- Measuring shaft and housing dimensions (at several points, several directions)
- Measuring the bores and flanges
- Checking shaft concentricity
- Measuring shaft ends and coupling
- Preparing the stator, unwinding the stator
- Checking the magnetic circuit, insulation, performing winding
- Re-winding the stator
- Connections, setting, reinforcement
- Pressurized vacuum impregnation
- Polymerization
- Pressurized vacuum impregnation

1

MECHANICAL REPAIRS

More than 50 % of break-downs involving motors are caused by mechanical problems.

Most frequent machining operations:
- Re-fitting flanges
- Repairing rings and commutators
- Metal coating
- Making mechanical parts
- Replacing worn bearings

2

DYNAMIC BALANCING OF ROTATING PARTS

Avoids vibration problems and thus increases the motors life:
- Rotor
- Bearings
- Fan blades
- Pulleys
- Flywheels
- Brake drums

3

ELECTRICAL TESTING

• Vibratory analysis (front and rear bearings)
Vibratory measurements give a perfect reflection of the mechanical health of a machine. This technique, however, requires sophisticated equipment to be used by trained individuals to interpret the data. Vibratory analysis can highlight problems ranging from a simple unbalance to deformation of the components including alignment problems, whirl, the tightness of the bearings, interference etc.

• Technical checks
Electrical measurements before, during and after repair enable the technician to ensure:
- that the coiled parts of the motor are fully compliant,
- that the mass is sufficiently insulated.

4

IMPLEMENTATION OF ON-SITE PREVENTIVE MAINTENANCE * *(continuous or periodic)*

This includes all corrective and repair work, foreseen and triggered by the significant parameters of the relevant equipment.
- Selecting the operational parameters, alert and breakdown thresholds
- Monitoring changes in these parameters
- Detecting a fault as soon as it appears
- Diagnosing fault and analyzing its effect over time
- Taking corrective action

• Thermal parameters (or temperature readings):
- The various bearings, stator

• **Electrical parameters:**
- Insulation- Polarization index - Complete electrical tests (power, voltage, intensity)
- Brush wear

• **Mechanical parameters:**
- Vibratory diagnosis and analysis- Checking bearings - Checking alignment
- Laser alignment - On-site balancing

5

*Services realized by SNR in collaboration with our partner 01dB

Europe

FRANCE

SNR Paris
40, rue Jean Bleuzen
B.P. 49
92174 Vanves Cedex
Tél. 01 40 93 66 00
Fax. 01 40 93 66 10

SNR Lyon Europe*
Le Florentin - 71, chemin du Moulin Carron - B.P. 8
69570 Dardilly
Tél. 04 78 66 68 00
Fax. 04 78 66 68 20

DEUTSCHLAND

SNR WÄLZLAGER GMBH
www.snr.de

40472 Düsseldorf
Wahlerstraße 6
40437 Düsseldorf
Postfach 33 04 10
Tel. (0211) 6 58 06-0
Fax. (0211) 6 58 88 86

33719 Bielefeld
Friedrich-Hagemann-Str.66
33701 Bielefeld
Postfach 17 01 45
Tel. (0521) 9 24 00-0
Fax. (0521) 9 24 00 90

70597 Stuttgart
Tränkestraße 7
70574 Stuttgart
Postfach 70 04 16
Tel. (0711) 9 00 64-0
Fax. (0711) 9 00 64 99

ITALIA

SNR Italia SpA

Milano
Via Keplero, 5
20019 Settimo Milanese (MI)
Tel. (02) 33 55 21
Fax (02) 33 50 06 56

ESPAÑA - PORTUGAL

SNR Rodamientos Ibérica S.A.

Madrid
C/ Llanos de Jerez, 22
Polígono Industrial
28820 Coslada
Tél. 91 671 89 13
Fax. 91 673 65 48

***EUROPA** (Subsidiaries excepted)
SNR Nancy - Europe : Benelux - Suisse - Autriche - UK
SNR Lyon - Europe : Other Countries Fax. 04 78 66 68 21

Ameriques / Americas

USA

SNR Bearings USA
www.snr-bearings.com

Atlanta
4600 K Highlands Pkwy
Smyrna, G.A. 30082
Tel. (770) 435-2818
(800) 232-1717
Fax. (800) 742-5215

AMERICA LATINA

SNR Argentina

Buenos-Aires
Viamonte 1145 - Piso 11
1053 Buenos-Aires
Tel. (54) 11-4 372-1272
Fax. (54) 11-4 372-0088

Autres pays / Other countries

SNR Intermondial (Overseas)

Annecy
1, rue des Usines
BP 2017
74010 Annecy cedex
France
Tél. (33) 4 50 65 93 60
Fax. (33) 4 50 65 93 75
Fax. (33) 4 50 65 93 76

MAROC

SNR Maroc
e-mail : info@snr.ma

Casablanca
73, bd Moulay Slimane
Ain Sebaâ Casablanca
B.P 15873 Casa-Principal
Tél. (212) 22 66 76 80
Fax. (212) 22 66 51 66

SNR INDUSTRY