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The European magazine of Leroy-Somer N°9

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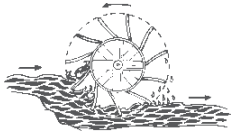
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What will be the future for small hydroelectric power stations?

Waterpower one of the oldest forms of energy remains one of the smallest contributors to electricity production in the industrialised world. Technically, hydroelectricity overall is extremely respectful of the environment, has a very long lifespan and incurs very little maintenance expense. Currently, as an electricity source, it represents by far the most significant (86%) amongst the renewable energy sources (SER) and accounts for 12% of the total production of electricity in Europe and 20 % in the world.

The principle

Movement of a mass of water running down natural slopes can provide hydroelectric energy. To transform it into usable energy, a concentration process is essential. If the natural reservoirs are not sufficient, a dam must be built to obtain a head of water sufficient for a flow to drive the small power station.

With a " high head ", the flow of water is collected by a pipe and forced into a turbine located below.

With a " low head ", the dam, which retains the water, gives a fraction of the flow through the turbines. Various methods are used (a water trap, a delivery channel, a force control and a recovery channel for the water supply) to provide sufficient flow, necessary to operate the installation.

The small hydroelectric power station (PCH) can be installed in a simple structure or a solid construction, housing the hydroelectric equipment necessary for power generation (turbines, generators, control system and regulation). Dependent on the flow and head of water, various types of turbines (vertical or horizontal axis) can be coupled to the alternators: Francis, Kaplan and Pelton.

An unexploited potential

In the EU, the technical and economic potential has been exploited for large power stations, unless from an environmental point of view, has not been exploitable. On the other hand, the small hydroelectric installations, whose capacity is lower than 10 MW, offer a true development potential, especially on sites

with a low head of water. Numbers of them can be made at very low cost.

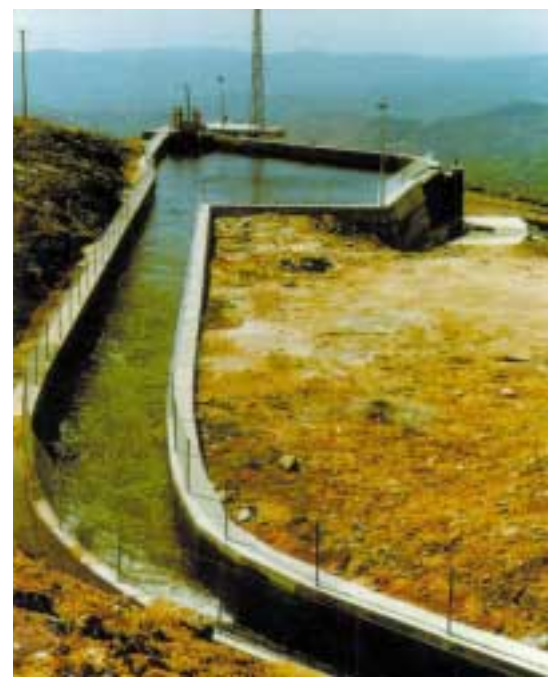
An often-neglected source (their current development is 20% of the potential), the PCH offers a source of energy, and from a local point of view, an economic solution for the private individual. It is also possible to derive a profit from the installation once the cost is recovered for reducing the energy requirements of small businesses. They are also an alternative for electrification of badly serviced or isolated sites.

In 1997, the installed capacity of small power stations in the EU was 9 705 MW compared with a total production of 38 287 GWh. The small hydroelectric power industry provides employment for approximately 10 000 people. For the European Commission, to increase the installed capacity by 4 500 MW by the year 2010 seems a realistic objective providing more favourable laws are put in place to assist it.

A difficult regulatory context

The development of the small hydroelectric power stations is prone to heavy administrative procedures and very diverse governmental regulations depending on the Member States of the EU. The principal barriers to successful development are economical (authority to generate electricity and the allowable tariffs for the sale of the electricity produced), technical (specifications allowing connection to the network) and procedural (permits for the utilisation of water, planning permission, installation and operation regulations).

Let us hope that total opening of the electricity market envisaged for 2003 for businesses and 2005 for consumers will allow the acceleration of this form of renewable energy.



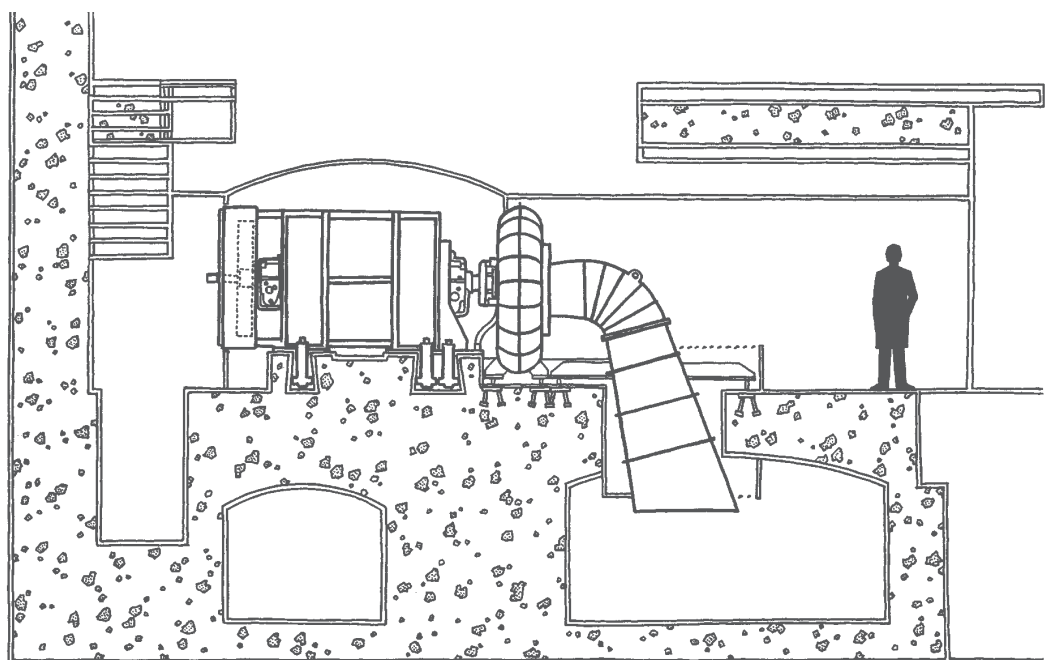


The Leroy-Somer range for hydroelectric applications

Leroy-Somer has developed over several years, a range of alternators specifically dedicated to water turbine drives. The company has specialised in the small hydro electrics sector with turbine power units of 1 to 15MW. Over the past 13 years, it installed more than 700MW.

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Each installation will have specific characteristics for example, over speed up to 2.8 times nominal speed in the event of disconnection from the network, axial and/or radial induced loads by the turbine, type of construction. The driven alternator will, almost without exception, have a precise schedule of operating conditions defined by the customer. Moreover, Leroy-Somer is able to respond to the market trends with increasing inte-



gration of various special functions:

- Assembly of the turbines cantilevered to the alternator shaft, general use of sleeve bearings (autonomous, water-cooled or with oil circulation from central lubrication systems) allowing induced thrust from the turbines to be accepted.
- Integration of inertia wheels (limitation of the rate of rise of speed in overspeed conditions and regulation of speed)
- Integration of a brake to allow a ramp down of the shaft speed and providing a parking brake.
- Shaft speed measurement (measurement (inductive sensor / dynamo or tachometric generator / mechanical system).



Specifications of the range :

Power : from 0.2 to 17MW
 Speed : from 333 to 1500 rpm
 Tension : up to 15KV
 Protection : IP21 to IP55
 Construction : horizontal or vertical.



Wood driers: extreme conditions for motors

After trees have been cut wood requires seasoning or drying, this is an essential stage before it can be used for any purpose. Depending on the use, the moisture content must be lower than 13-15%. In order to dry the wood, there are two possible options: either it is left to dry naturally, which is a particularly long process, or artificial drying, which is much faster and efficient.



An aggressive environment

There is either a stainless steel or aluminium structure into which the wood is placed and a powerful fan is used to guarantee a homogenous mixture of air. In general, the manufacturers and the users of sawmills and the manufacturers of parquet floors have only found fan units available, powered by standard "de-rated" motors which, under the extreme operating conditions, have a particularly short lifespan, of a few months.

In fact, these fan units operate in ambient temperatures up to 135° and a relative humidity of 100% with an aggressive vapour depending on the level of turpentine in the wood.

A perfectly targeted market

Over many years Leroy-Somer has become a specialist manufacturer of motors for the ventilation market both in the wood industry and its derivatives. Recently, in response to the request by the customers, French, Canadian, Scandinavian, Chilean and Brazilian, a study of this market was carried out. The sales network collected information defining the exact needs of the market, while the factory drew upon the competence and experience of the engineering network to define the parameters, mechanical and electrical characteristics of a product best adapted to meet the challenges of the application.

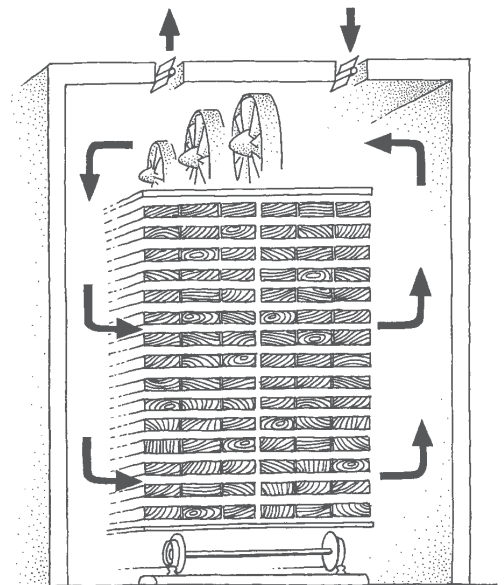
Motors «made to measure»

As a result of the study: Leroy-Somer developed two ranges of high temperature motors for continuous duty with a power range of 1,5 kW to 11 kW responding to the two principal drying cycles with temperatures from 85° up to 135° in S1 duty and a relative humidity of 100%.

The advantages of the motors defined by Leroy-Somer have been proven: an increased life cycle of several years with a vastly improved output. Moreover, the user benefits from a significant energy saving as the power developed by the motors matches perfectly the output required by the application.

Multiple applications

It has long been the strategy of Leroy-Somer to create modular products and components to exploit the markets. Currently, the various research and development teams are developing new products for other market sectors



where the operating conditions are similar (food, agriculture, brick, tile, ceramics, pulp paper or textile).



COMAS: Torsion gantry cranes

COMAS S.r.l. was founded at the beginning of the 1970's in the province of Treviso. The company was primarily involved in maintenance and service activities for machines and systems made by other manufacturers. Shortly after, in the mid-1980's, the position of the leading companies in the sector and the increasing demands made by customers caused COMAS to begin to design and construct its very first systems.

Over the years, COMAS S.r.l. has specialised in hoisting, primarily in the construction sector amongst many others and particularly overhead travelling cranes. It also began to gain greater respect from the market, thanks to its helpful attitude towards its customers and its constant research into quality and increasingly advanced technologies.

Today, the COMAS products are constructed, guaranteed, and certified according to the European Community Directive 89/392 and the successive amendments EEC 91/368, EEC 93/44 and EEC 93/68, known as the machinery directives. Furthermore, all COMAS products come complete with the full documentation, a declaration of CE conformity, and an installation, operating and maintenance manual.

COMAS is able to provide a vast range of products, such as:



Travelling bridge cranes with single and double beams in the standard or special versions; either single beam, double beam, asymmetrical, or torsion gantry cranes, in either standard or special versions; suspended bridge cranes; bridge cranes for iron metallurgy; jib slewing cranes with manual or electrical rotation for use in covered or exposed (outdoor) marine environments; shelf cranes, walking cranes, hoisting trucks and winch trucks for various services, and finally, monorails.

COMAS complete their line of products with a full range of accessories and services.

Each product has been created in order to best resolve the problems related to hoisting and transporting materials and merchandise within or outside the plant, including solutions designed specifically to suit customer requirements whilst taking full account of the safety requirements of the workplace.

Among the most important accomplishments, COMAS has recently constructed a torsion gantry crane for moving pre-fabricated pieces as detailed below:

Capacity	30 000 kg (15 000 for each winch)
Gauge	35 meters
Lateral arms	17.5 meters
Total length of girder	70 meters
Clearance from the ground	10.5 meters
Total height of crane	14 meters
Total weight of crane	110 000 kg

Based on the nominal statistics of the crane, the close collaboration between the technicians at COMAS and LEROY-SOMER has allowed both companies to fully optimise the motor gear reducers with the crane operation, for each of the drives required.



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Leroy Somer motors restore mobility to outdoor enthusiasts

For active people, used to spending their leisure time in the country, disability as a result of an accident or illness can be hard to adjust to. Now there is a solution with the introduction of 'Tramper', an outdoor activity buggy able to cope with a range of obstacles and tasks only restricted by the imagination and nerve of the driver!



Motive power for the Tramper is supplied by a high performance, Leroy Somer CbZ, 24 V DC motor. Its outstanding 95% efficiency and ability to withstand the rough service inherent in this unusual application, makes it an ideal choice.

The Leroy Somer CbZ range of motors is suitable for many applications in battery powered vehicles and portable machinery. Available with different gear ratios, it is designed to suit the individual driver weight; maximum speed regulations and minimum incline performance, as required by different European countries.

Its high torque and smooth acceleration allow obstacles to be tackled in complete safety, whilst providing a high level of comfort and control for the driver.

The range is rated to IP 40 and covers motors from 0.04 kW to 0.37 kW, with or without a brake. There are also versions rated at 0.37 and 0.55 kW with an integral transaxle. All are suitable for 12 to 48 volt operation.

Sarah Goddard of Beamer, the manufacturers of Tramper, told us, "The Tramper is designed to give the physically challenged access to the countryside and outdoor activities including fishing, shooting and exploring," she says. "Its strong, lightweight design, with front and rear suspension, allows the vehicle to tackle obstacles like fallen trees and ploughed fields. As with any innovative new vehicle, the development of the Tramper was not without its difficulties. The performance of the motor had to match the ability of the chassis and Leroy Somer

were presented with a number of challenges, some of which could not be resolved immediately."

The motor has lightweight aluminium

end shields and is flange mounted under the driver's seat away from mud and water. It drives through an integral reduction gearbox with helical, chrome molybdenum gears. A high efficiency transmission drives large diameter motorcycle wheels providing a high level of grip.

Two 73Ah GEL type batteries supply the motor through an electronic controller. This enables the speed and direction of the vehicle to be varied from a console on the dashboard. A sophisticated and highly accurate battery indicator allows the user to monitor the state of the batteries.

Sarah Goddard continues: "The ability of the Tramper chassis pushes the motor to the limit of its design envelope. Nevertheless, we continue to be





impressed by the reports we receive from our customers".

"For example, a Trampler is used with a trailer to deliver bales of hay to sheep. We even have one report of a Trampler used to pull a dinghy out of the water! We have now sold over 50 vehicles and many of them are used for activities we neconsidered". Ms Goddard concludes: "It is very satisfying for us to see the difference

the Trampler has made to so many peoples' lives. The performance of the Leroy Somer motor has helped to establish the Trampler as the best performing and most versatile vehicle in its class.



COMAS : Drive specifications

Long travel:

- Characteristics: speed at full power during travel: 60 m/min., Class ISO M7;
- Motor drives: four right angle geared motors by LEROY-SOMER type OT2703, coupled with 7.5 kW LSMV inverter series motors,



complete with FCO type DC brake. Driven by a single 30 kW inverter type UMV4301-40T, fitted with braking resistance for the controlled ramping down of the motors;



Cross travel:

- Characteristics: speed at full power during travel: 20 m/min., Class ISO M7;
- Motor drives: two shaft mounted geared motors by LEROY-SOMER type MUB2203, coupled with 0.75 kW LSMV inverter series

motors, complete with FCR J01 type DC brake and driven by a single 1.5 kW inverter type UMV4301-2.5T, fitted with braking resistance for the controlled ramping down of the motors;

Hoisting:

- Characteristics: speed at full power during hoisting: 8 m/min., Class ISO M7;
- Motor drives: one 22 kW LSMV inverter series motor, complete with encoder and driven by a UMV4301-33T type inverter, fitted with braking resistance and CAP UMV LVG option.

LEROY-SOMER, with proven experience in the field of hoisting and maintenance and taking full advantage of the innovative UMV inverter, has created specially designed software. The simple addition of the CAP UMV LVG option, including a programme developed for the hoisting application, has enabled a simple parameter setting of the inverter, allowing for an optimal control of the motor and easy management of the safety features. In particular, the vector control in a closed loop configuration, created by COMAS, has guaranteed the best performance of the motor, especially at the high and low-end speeds. The direct control over the motor speed through the encoder



has allowed for safer management of the brake, both in the starting and stopping phases. Finally, the use of special routines implemented in the programming software for the add-on cards has made a series of additional controls possible. These intervene by failsafe stopping of the inverter when one of the following abnormal situations arises:

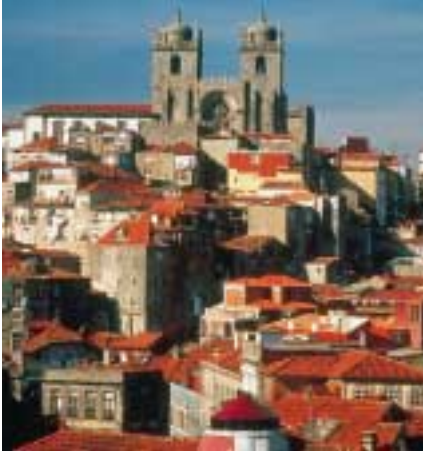
- A deviation in the speed (set by parameters) between the desired speed and the actual speed of the motor;
- Error detection in the direction of the rotation desired and the actual rotation of the motor;



- Encoder breakdown
- Speed limits exceeded;

Finally, there are some functions, not used in this application, which are integrated in the add-on card CAP UMV LVG

- Control of the limit switches;
- The possibility to program up to 7 pre-regulated speeds;
- The weighing function for applications involving elevated hoisting heights (i.e. construction cranes), pre-designed for select the optimal speed of hoisting.



Oporto a blend of the times

Preserved natural paradise, Oporto is the uncontested capital of Northern Portugal, peacefully situated on the northern bank of Douro close to its Atlantic estuary. Today it is the holder of the title European Capital of the Culture; it is engaged in an "irreversible transformation" to a city of culture, city of Europe.

Oporto 2001 is now the meeting place of the arts all year round: circus, theatre, dance, literature, music, cinema and multi-media.

It is a good bet for planning cultural programs, urban restorations, restorations and construction of parks or cultural facilities like the handing-over of the historical and commercial centre of Baixa and the new " Casa da Musica " which now houses the National Orchestra of Oporto. The heart of this adventure offers everyone a city of artistic worth with an improved appearance, its mobility and its

access.

Within the image of Portugal, Oporto conceals a singular European culture, nourished by 850 years of maritime epics to Africa, America and Asia, thanks to Prince Henri the Navigator, Vasco de Gama and Pedro Alvares Cabral and their discovery of gold in Brazil that fed the exuberance of the sumptuous Baroque style buildings and the splendour of ornate structures (churches of Clérigos and Sao Francisco in Oporto). There is a pride of the cultural inheritance carrying the marks of time and

styles, the Azulejos (small polished stones) that decorate edifices and facades, churches and palaces, decorative arts, the porcelain and goldleaf, which has kept the traces of the voyages to the Orient.

As for past culture this is also to be experienced in the passing of a plate, try a meal in one of the historic Pousadas like a prince in his palace or his castle. Will the flavours emanating from the earth and sea make you succumb to all temptations? Not forgetting of course the legendary wine of Oporto.



The legend of Port

It merges with the character a country of sun and light, Portugal.

There is also a character taken from the raw earth, the valley of Douro, which saw its birth, more than ten centuries ago. Centuries of unchanged tradition, gives Port, its subtle perfume, changing reflections and a wine with unceasing seductive quality. It is there, in this schist valley with its abrupt and rocky slopes, that this exceptional wine is born. Hard and wet winters, where the rain sweeps the gully and the slopes, wind storms and hail, torrid spring and summers and dust! The fight against the elements is everyday. Undoubtedly it is this exceptional nature of this area that gives the wine this particular flavour. Because nowhere else other than in the "pais do Vinho", at the strictly controlled borders, does one find the quality and the singular taste of these vintages, which alone are entitled to the name Port.

(Source: Porto Cruz)

Speed reducers – delivery and service guarantee

Manufacture of geared motors requires powerful and robust industrial tools. From the outset, Leroy-Somer followed a policy of vertical integration based on expert control of fundamental technology. Strong in the industrial sector, the company is in a position to offer a global solution where the concept of service has a new meaning. The latest development reflecting this know-how, is the CB 3000 range.

Adapting speed to the application

The purpose of speed-reducers is to adapt the speed of an electric motor to the requirements of the driven machine. However, whilst identifying the type of gear unit required is a simple task: helical, worm, planetary; the selection of a product for a specific application is more difficult. Many parameters must be taken into account: power, speed, torque and operating cycle together with the output position of the shaft. The possibilities multiply rapidly, without even considering the range options. In addition the mounting requirements need careful consideration.

Leroy-Somer, The master of drive systems

Leroy-Somer is not only specialised in gear reducers. Above all, the company designs and manufactures complete drive systems, producing the widest ranges in the market. In the majority of sales, the reducer is almost always fitted with a motor, a variator and sometimes a brake. Which further increases the possible combinations. To deal with the diversity, Leroy-Somer has set up individual engineering units in the factory to optimise the manufacturing time and to ensure delivery schedules can be met.

Personalised delivery time

The delivery time has become one of the key elements in the concept of service, each order requiring a precise delivery date. The manufacturing lead-time for a standard product is in the order of 3 to 4 weeks, ex-works. One third of the products are manufactured without special requirements, (ie products found in the Catalogue for Industry). These are managed by the "CMR" (Rapid Assembly Centre, located in the factories or in subsidiaries located all over the world, close to the customer) whose objective is to despatch in 5 days. In addition a further level of delivery is possible which is "personalised" subject to a prior



arrangement with the customer. The "Customer Charter" consists of a written contract between the customer and Leroy-Somer to deliver, within an agreed time, predetermined in advance for specified products. There is also the possibility to operate a "Kanban" system that relates to production trends (combinations of stocks delivered according to demand). Finally, there is the "Rush" system, which is manufacturing with a planned departure ex works within the day.



A precise and rapid technical assistance

Leroy-Somer consults with the customer to define together the technical solution and the correct geared unit for the application. The selection is aided by the many technical catalogues available for each product, which are regularly brought up to date.

A completely new innovation from Leroy-Somer is the Configurator, which easily allows the selection of all types of reducer according to a number of application criteria, entered in the selection. The resulting selection is presented to the customer in 6 different views, which can be imported into a CAD package using DXF file formatting, along with a dimensional drawing if required. The Configurator CD is available in many languages (French, English, German,.....) and precedes the future service planned for online internet access to Leroy-Somer.

After-sales service

A whole range of after-sales service is available: assistance with the commissioning on site, after-sales breakdown service 24hrs, 7 days a week. The latest service from Leroy-Somer is the launch of maintenance and repair kits (consisting of the basic parts together with additional recommended parts) completely ready to fit.

Close to the customer, guaranteed delivery times, precise information, and a Leroy-Somer gearbox responding to the needs of a market with progressive innovation.



ranteed

Which actions for which markets?

Strengthened by the experience accumulated in the industrial sectors, Leroy-Somer is constantly developing new ranges of geared motor units particularly adapted to aggressive or demanding environments. Here are two examples among others:

Agri-Food



The main challenge for geared motors, in this market sector, is corrosion. The new range of worm and wheel reducers, the Multibloc 2000 IA and the CB 3000, incorporate many remarkable improvements: water retention zones reduced, reinforcement of mechanical seals and electrical connections, elimination of fretting corrosion.

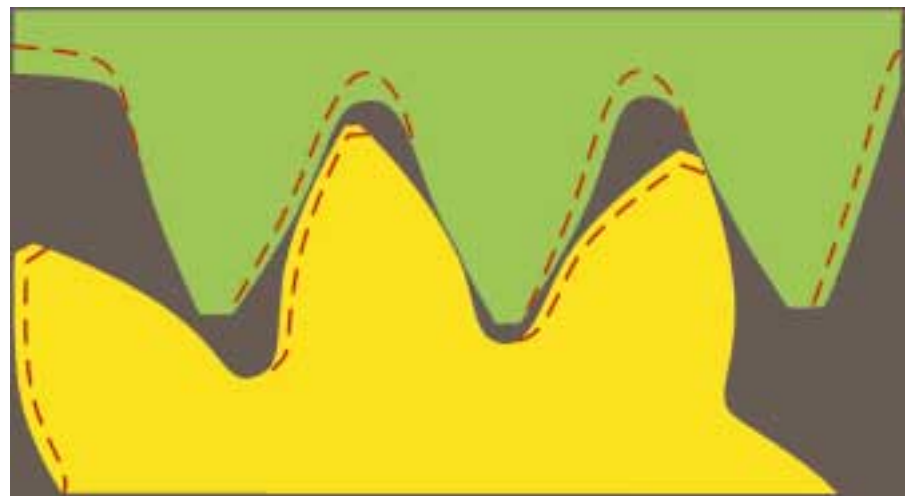
Explosive atmospheres



The new ranges of geared motors can be supplied with LSPX/FLSPX motors with or without brake and were developed to operate in dusty atmospheres where storage and handling of organic materials can produce flammable dust (cereals, greases, foodstuffs). The range starts at 0.09 and is completed by the 400 KW. The product fully conforms to the requirements of ATEX 94/9/CE, where the characteristics and the surface temperature of 125°C are guaranteed and a sealing protection to dust of IP65.



THE CB3000, PURE KNOW-HOW



Increased torque - through increased width and length of teeth, using CAD design techniques.

For more than 80 years, the Leroy-Somer products have benefited from an incomparable know-how of basic techniques: mechanical precision, complex machining, and thermal processing for special steels. Today, the quality of the production equipment and the method of calculation by CAD have resulted in the reduction of friction zones and friction losses. The result: a completely new range of reducers: the CB3000, which is a true reflection of this know-how.

Thanks to the many simulations carried out by CAD, the new range has achieved an increase in torque of up to 40% without exceeding its original design envelope. Its modularity, solidity and longevity have been increased. Its casting is more robust and has a unique sealing arrangement. As with the CB2000, the new CB3000 maintains the best radial load capacity and thus the best lifespan of the bearings.

Finally, the CB3000 can be fitted to the complete range of Leroy-Somer electric motors and speed controllers.

Editor in chief :

Jean-Michel Lerouge
Leroy-Somer
Bld Marcellin Leroy
F-16015 Angoulême

Co-ordination and layout :

Im'act

Editorial committee :

Fr. Galais, A. Galloway, P. Hellstrand,
R. Lamprecht, J. Laureys, J. P. Michel, O. Powis,
A. Rostain, G. T. Sorensen, V. Viccaro.

Leroy-Somer Ltd

Heathrow Interchange
Bullsbrook Road
Hayes - Middlesex - UB4 0JR
leroy-somer@leroy-somer.co.uk
Tel: 020 8756 7000
Fax: 020 8756 7028

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A TEAM
AT YOUR SERVICE

A LOCAL
APPROACH

Leroy-Somer makes
the world go round.

CONTINUAL INNOVATION

CONSULTATION

➤ Since 1919, the company has invented and manufactured electric motors, and Leroy-Somer makes little noise about it. It's a question of culture. They are however the world leader in drives systems for industrial processes and generators: alternators, motors, geared-motors, electronic drives and associated software and have become a world reference. But did you know that 4 out of 5 Leroy-Somer products operate outside of France? That 50 % of its products are less than 5 years old? That 60 % of its sales are products adapted specifically

to the customer application?

Now, you know. Thanks to the enthusiasm, the motivation, the competence of 8000 employees, in France, Europe, the U.S.A. and Asia, Leroy-Somer contributes to the world's rotation whilst saving energy in the process, without shock and without noise.



Electric motors, generating, industrial processes.