

March 2000

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The Industrial Challenge :



During the International Conferences of Kyoto and Buenos Aires, the participating European member states demonstrated their voluntary commitment to a reduction of CO2 emissions in the atmosphere. To achieve this, amongst other actions, energy efficiency must be increased, in particular, the level of electricity consumption which represents 30% of CO2 emissions in the EU.

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The future of our economies and our planet depend not only on the future co-operation between the member states, but also the will of industry, distributors, installers, energy service sectors and electricity companies. We can be sure that they will work as a team to meet this new challenge.

If the petrol crisis of 1973 provoked a drastic reduction in energy consumption and the creation of new energy efficient machines, it is undeniable that these efforts have significantly relaxed since. Today, the will must be re-awakened as much on a world scale as at a European or national level and the appropriate measures taken. The time has come to put a value on the economic potential of better energy efficiency. We must exploit all economic advantages, to secure the supply of energy and to attain the community objectives for reduction of CO2 emission.

Purchasing Costs or Running Costs

Faced with insufficient information and rarely published analysis, the industry remains timid in its approach to new products. The installation of equipment often requires a minimum capital outlay but the running cost in terms of energy is often very high. However, a progressive evolution is now being seen.

For example, in Public Works and the domestic equipment market, labelling for the end user now provides more precise energy efficiency information for the products.

On the other hand, many high efficiency technologies have not been able to reach the market due to lack of resources, particularly technicians, consultants and qualified repairers with awareness of the subject. Often lack of immediately available capital still represents a block to their development.

The motors, which have been converted so far, are small to medium sized so that the required return on investment and overheads are not too high. However it is well to remember that a return on investment of less than three years is recorded in almost every case.

With 100% success of adoption of these motors by the market in 2010, would result in an annual saving of 900 GWh.

The "CEMEP volunteers" keep up the pressure and sign up

Electric motors represent more than 50% of total electrical consumption in industry and any improvement in motor efficiency will have a significant impact on this consumption.

At the end of 1995, the European Commission on energy entered into discussions with the manufacturers of electric motors regrouped at the heart of CEMEP (European Committee of Manufacturers of Electrical Machines and Power

Electronics). Thus, European manufacturers signed an agreement in 1999 aimed at promoting motors with improved output on a voluntary basis. Together, they developed a classification of output from 2 and 4 pole electric motors (A/C three phase motors – 1.1 to 90 kW) according to three levels of output (label Eff1, Eff2 and Eff3). Additionally, motor marking has been carried out since 1 January this year (the output being measured according to Method CEI 34-2). The signatories of the agreement must commit to reducing their motor production from level 3 from –30% in 2001 then 50% in 2003 for 4 poles and 30% in 2002 then 50% in 2003 for 2 poles.

Energy Saving : a Long Term Challenge

Energy is essential for growth, competitiveness and employment. The production and utilisation of energy has a considerable impact on the global warming of the environment.

A long term vision allows economic growth to be disassociated from energy consumption leading to a rationalisation of energy use.

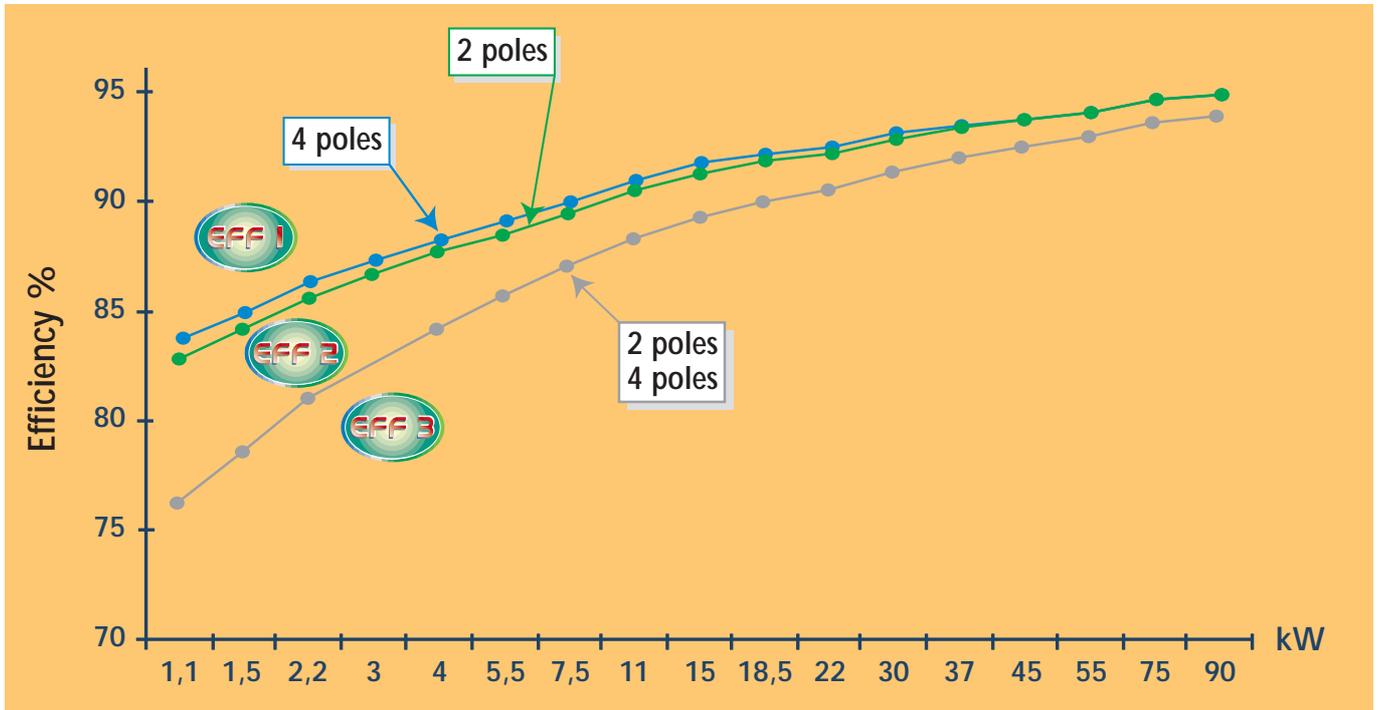
Today we are dependant for 50% of our energy from fossil fuels. The prospects from now until 2020 will require to meet a targeted reduction to 70% natural gas, 80% coal and 90% petrol .

The European Community will have to face in the coming years strategic energy challenges which will have an impact on its citizens and consumers.

There is also the profitability of the enterprise which is only possible guaranteed by the reduction of manufacturing cost alone. But energy efficiency will only fully penetrate the market if energy prices match the real costs (possible taxes could be levied to make the two coincide).



The High Efficiency Motor



The new Leroy Somer range of improved output motors

Since the first oil crisis, Leroy Somer has been a leader in energy matters across two research areas: new renewable energy sources (leader for windmill generators) and energy savings (ECO+ series).

In the course of the last few years, with the progress of power electronics, Leroy Somer has been bringing into focus motors specially designed to work with electronic speed variators (LSMV series). Followed by motors and geared motors with integral electronic variators (Varmeca), speed variation being one of the means to make important energy savings.

With its strength in the EPAAct area and the NRCan (American and Canadian energy laws), Leroy Somer has played a key role in the development of the CEMEP agreement initiated by the European Commission. Even now, the company is showing considerable motivation by the total recasting of the traditional range of A/C three-phase motors. It allows two new ranges to be offered covering the areas defined by EFF1 and EFF2 which fall within the framework marked out by the EC. Leroy Somer is committing itself to reach the targets within the agreed deadlines.

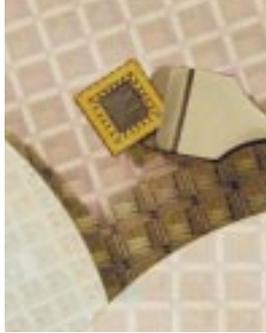
These new motors reduce installation costs, reduce the total energy consumed, the production costs and are absorbed by the savings they create and by the length of their lifetime. Their costs are exactly the same as before to allow interchangeability. These

motors have, amongst others, the advantage of prolonging the life of the components, the bearings and the insulation systems.

The operators, for their part, will not be disappointed as these new motors allow a real decrease in the noise and vibration levels.



APPLICATION



LS works closely with BOC Edwards on vacuum pump technology

BOC Edwards offers total solutions to semiconductor producers and related businesses. When it wanted to design a new vacuum pump for use on load lock, transfer and PVD chamber applications used in microchip manufacture, it needed a sophisticated new motor and drive system.

To suit its purpose, the pump has to be compact and lightweight. This requires a close integration of the pump, motor and drive and needed close co-operation between the manufacturer and BOC Edwards at all stages of the design and production. After looking at various options, Leroy Somer's experience, flexibility and expertise to meet the design requirements made them the obvious choice.

The IPX100 is capable of pumping from atmosphere to pressures of less than 10⁻² torr and has been specifically developed for mounting directly on the process tool, thus eliminating the need for a long vacuum foreline. Excellent vacuum pumping performance enables rapid load lock pump down, reducing cycle times and increasing tool productivity.

It was clear from the outset that an off the shelf motor and drive would not enable a sufficiently compact unit to be produced. So, having selected Leroy Somer as the drive manufacturer with the experience and adaptability to produce the required design, engineers from LS and BOC Edwards had to work effectively as one team.

Leroy Somer has a long track record of designing products to suit customer's requirements and working closely with their engineering teams. Recent projects such as the electric car are good examples.

BOC Edwards was already purchasing adapted electric motors from Leroy Somer and so confidence was well established.

With efficiency as the number one priority, 'brainstorming sessions' were held in France and the UK. There was a deal of urgency on the project as the management had set tough completion targets.

Concept designs were quickly produced and the final product defined during various discussions both at the BOC Edwards factories in the UK and the LS factory in Angoulême.

The final unit that LS provide is actually a stator, a rotor, an integrated drive and an RFI filter. The motor is an integral part of the pump, with the stator being installed directly into the pump housing. The motor is rated at 3.6kw but running at an impressive 18000rpm at 300Hz by means of specially developed LS Drive software.

It has low vibration, is light, quick and easy to install and test and undoubtedly points the way for future designs. Manufacturers use it because of its combination of high performance, easy installation and low-cost maintenance.

The IPX100 vacuum pump with its integral motor and drive is a technically advanced product and there is no doubt that it could not have been produced without extremely close collaboration between Leroy Somer and BOC Edwards.

It is proving to be a great commercial success



and the engineers of both companies are already discussing other projects to further enhance vacuum pump technology.

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New Leroy Somer UK approved service centre strategy



An LS maintenance contract allows the extension of warranties, while the development of LS Smart motor technology will assist in cost-effective predictive maintenance.

To meet the requirements of customers accustomed to the legendary LS quality standards requires the total involvement of the Leroy Somer UK offices its distributors and service partners. It will also require the approval of exceptionally equipped service centres, to complement our After Sales team. A select few will be appointed to the scheme with a high level of service and support having been built up over a number of years.

Rewinds & J Windsor & Sons (Engineers) Limited is the first of these to be approved as a service centre for motors, gearboxes and electronics, in accordance with the new LS strategy to provide a resource based network of after sales facilities.

highest quality, available 24 hours a day, all year round.



A team of highly trained and skilled engineers and craftsmen achieves quality control supplementing the ISO 9001 standard of Leroy Somer. The company also has a commitment to the most up to date training programmes.

In addition to the more usual services, such as motor rewinds, Leroy Somer was attracted to RJW by their expertise in thermographic analysis for non-intrusive, early fault detection, dynamic balancing and condition monitoring programmes together with spiral welding for shaft reclamation.

The approval scheme is a critical step in Leroy Somer's strategic plans to improve service to the end user. It will further enhance Leroy Somer's ability to offer the total service package that customers need and expect.

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The growth of Leroy Somer has been traditionally through sales of products to the OEM market whilst the ultimate customer is the user.

For the End User, the ability to contribute to a Total Asset Management programme including preventative and predictive maintenance, for the complete installation of motors, gearboxes and electronics, is increasingly important.



Based in Liverpool, Manchester, Bolton and Wallasey, RJW has over fifty years experience in the repair of electrical, mechanical and (more recently) electronic equipment. With modern plant and sophisticated test and repair equipment it is able to repair, overhaul and test motors, gearboxes, control panels, variable speed drives and a host of other industrial equipment.

By offering a complete engineering service solution, RJW can guarantee a service of the

LSK DC Motors are best for Extrud

Davis Standard Corporation of the USA is the world's largest extruder manufacturer. In 1998 it took over the flourishing business of Betol Machines Ltd in the UK and so discovered the benefits of using Leroy Somer DC motors.

Davis Standard can offer customers an amazing range of extrusion equipment from a single machine to a complete production line. The products that these machines can make include Tubing, Door seals, Window Frame profiles, Picture frames, Central Heating, gas and water pipe, Braided hose, Cast and Blown film, Pen refills, Drinking straws and a host of other items.

The factory in Luton is the European Headquarters for Thermoplastic Tubing, Pipe and Profile extrusion equipment, covering Europe, the Middle East, Africa, Asia and Australasia.

UK built single screw extruders feature a DC motor with thyristor controlled drive and tachogenerator feedback for accurate speed control. The barrel zones are heated electrically and cooled by air fan blowers. 3-term proportioning instruments control temperature zones with

additional units for die head and extrusion tooling.

Standard extruders range from 18 to 200mm screw diameters and are designed to work with a wide range of materials and applications. There is the option of computer controlled process and quality control systems that can be custom designed to individual specifications.

The Leroy Somer LSK motor has been the main power unit of choice for the last ten years. Now, Davis Standard Limited in the UK is expanding the range and motor powers will increase to typically 400KW from a previous maximum of 30KW.

The benefits of the Emerson Group are also being used, as a local Control Techniques Drive Centre now provides complete drive systems comprising panels, drives and motors. As a result, there will be a new market for LS AC motors, in addition to the main DC drive motors.

As Davis Standard Operations Director, Mark Woodgate says, "We intend to expand the UK operation and we will take our key suppliers such as Leroy Somer and Control Techniques with us."

Extruders are not complex items of equipment, but they do often go into harsh environments where they are expected to work hard and get used and abused. Mark Woodgate continued "We need to build a product that has quality, robustness and durability. The LS DC motor falls into that category quite nicely. It is durable, built well, readily available in standard form, gives few warranty problems and is at an attractive price".

There is a tendency to think that DC motors have been around forever, but the Leroy Somer LSK is very much a product of modern technology. Its development stems directly from work done in producing an innovative new motor for the automotive industry - a vital element in the production of the electric car.

The result is a motor that is in most cases one frame size smaller than that of equivalent power from the old series.

The legendary reliability comes from paying special attention to the brush gear and commutator. Even with the increased output, the operating temperature of the commutator has not increased. Computer modelling was used to optimise the motors' air passages, cutting noise levels as well as improving cooling. An 18.2kw machine now produces 67dba compared with 74dba from a comparable earlier model.

Perhaps the real secret to the LSK lies in the concentricity of the armature in relation to the stator and the use of standard ball bearings to



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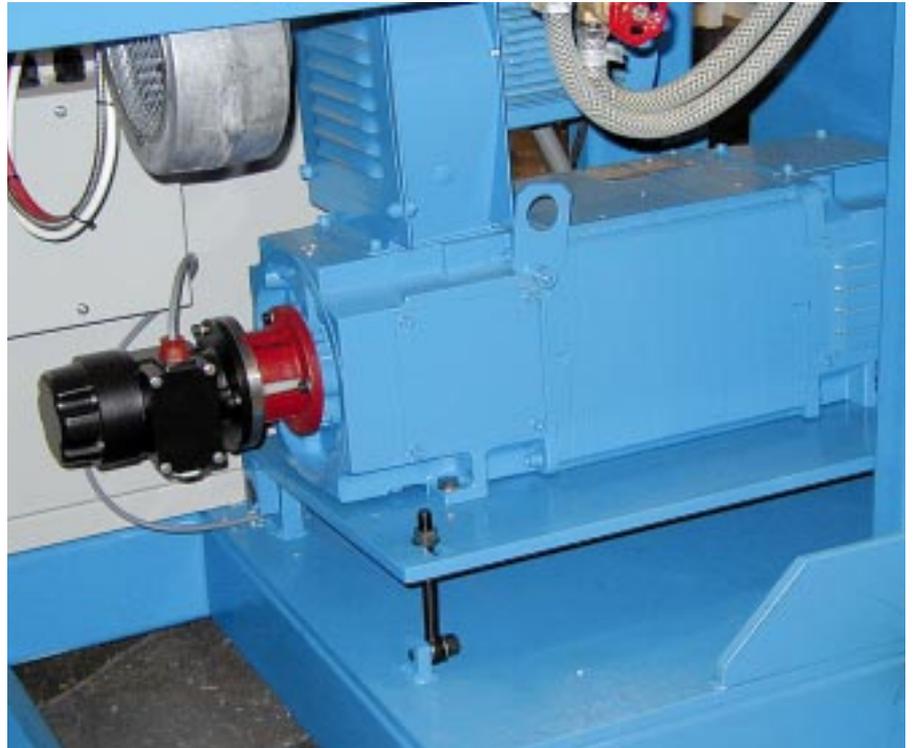


accommodate the forces due to overhung loads on the shaft.

New machining and balancing methods are used together with automated handling, to allow surfaces on shafts, end shields, bearings, armature and stator to be finished more accurately in relation to each other.

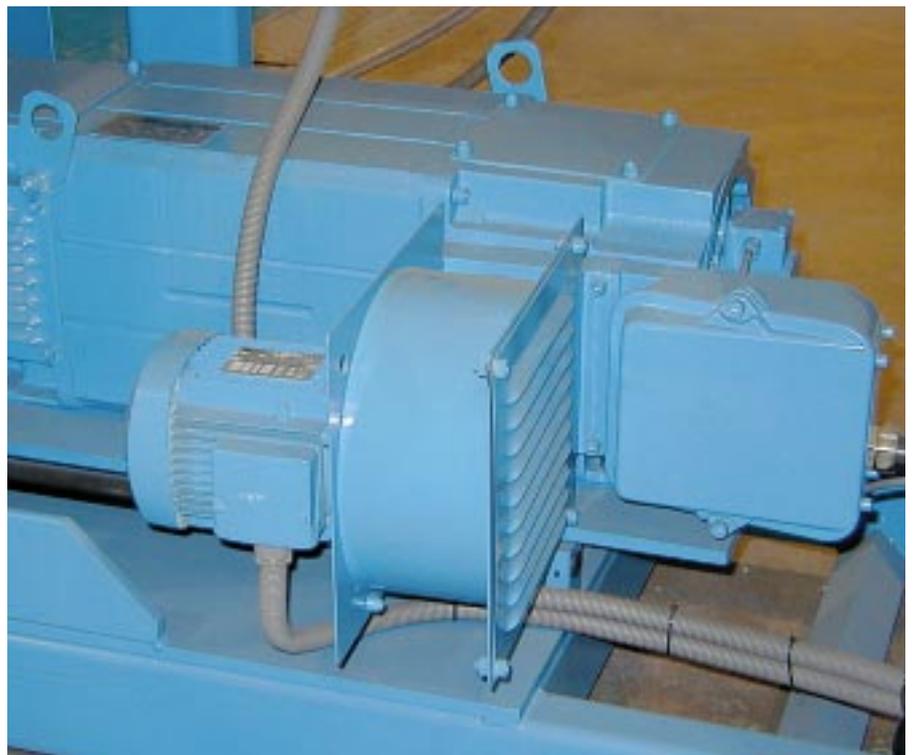
Many manufacturers of DC motors have to resort to the use of roller bearings to accommodate the forces due to overhung loads resulting from the use of pulleys, belts and chains.

The LSK range can absorb radial forces which are up to 70% higher when using standard ball bearings and 375% higher if roller bearings are used. Working to better tolerances also allows bearing life to be extended to 20,000 hours. With exports accounting for a large part of the UK production, world-wide after sales support is also vital to Davis Standard Limited. Leroy



Somer is well placed in this department too, with experienced local facilities in most parts of the world. So the future for the partnership looks excellent. Davis Standard Limited has a growing business and a growing range of equipment. Leroy

Somer has the motors that it needs to power them and within the group has the capabilities to offer the comprehensive electrical package to take the relationship forward.



Have you ever had to waste a driveshaft?

It's one of those strange facts of life that electric motors always seem to run faster than the speed we really need. This is where the gearbox comes in, of course, adjusting the final speed to our actual requirements.

But how often have Managers, Foremen and Maintenance men cursed speed reduction units on conveyors? When the time comes to replace them, they are well and truly welded to the driveshaft. The only solution, in most cases is to cut the shaft and then have the time consuming and difficult task of replacing it.

Do not despair, though, there is an answer in the shape of the Leroy Somer Poulibloc 2000.

PB 2000 is a hollow shaft speed reducer that mounts directly to the driven shaft. It transmits power directly, making a base, coupling chain and sprocket unnecessary. This saves the engineer the time usually spent aligning the units.

A torque arm, which also acts as a tension adjustment for the belt between the motor and reducer, anchors the unit.

Standard reduction ratios are 1:5, 1:12 and 1:20 and the required output speed is obtained through the ratio of the belt and pulley drive. 8

sizes cover the power range 0.37 to 55 kW and torque of 485 to 10,600 Nm.

The real secret, however, is in the unique tapered bush that suits a wide range of shaft dimensions and works, even with raw steel to 119 tolerance, without the need for special machining. The bush is self-releasing and tightened, not with screws or Allen keys which are fiddly and liable to corrosion, but with a 'C' spanner.

Whatever the conditions the units have to work in, when the day comes to replace them, it is simply and easy.

Leroy Somer is one of the world's largest producers of electrical and mechanical drive products for Industry. Part of the Emerson Group, the Company has 32 factories in Europe and Offices/Warehouses in the UK, plus numerous independent distributors.

Extensive stocks are available at short notice and the Hayes central facility near Heathrow has an assembly centre for gearboxes, allowing



final assembly to be made to customer's specification.

Leroy Somer is renowned for the quality of its products and commit more than 8% of annual sales to research and development. Advanced design and high levels of automation in manufacture are as much responsible for this quality as the sophisticated quality assurance systems themselves.

In the case of the PB 2000, the bush is made from spheroid graphite cast iron for extra strength. It is tapered at a 6.3 degree angle to allow easy installation and removal. Specifically designed to work in the difficult conditions found in quarries and mines, agriculture and the chemical industry, the housings are silicon scaled to create an air and oil tight unit, capable of withstanding temperatures of -40 to +100C.

A corrosion resistant magnetic drain plug helps to collect any foreign bodies, which may have found their way inside during oil change. Oversized spherical roller bearings are used throughout the range, which enables them to withstand high overhung loads, due to belt drive transmissions.

The helical gearing in the PD 2000 has an efficiency of 95 to 98%, much higher than a worm gear reducer, for example, and offers a very flat configuration. The overhung load on the shaft is, therefore, low, resulting in a longer life from the bearings.

There are many applications for the units, ranging from quarries, cement plants and a host of factory based uses. They are trouble free in use and extremely reliable, but you will only fully appreciate them if you ever need to replace them.





APPLICATION

University of Liege- Carenes Wave Machine



Boats have been through the University of Liege (Belgium) Carenes Dock, run by the Naval Architecture and Transport Systems Research Unit (ANAST), before their maiden voyage! Built in 1980 and operational six years later, every boat must go through this dock to be checked for its seaworthiness. This high technology venue, the highest standard of its kind in the world, is particularly spectacular for non-specialists and for any shipbuilder worthy of this name.

Carenes Dock is in the process of testing every type of ship: fishing and pleasure boats and catamarans. Nowadays, it is also used to test the performance of the best sailing ships in the world!

The dock, 100 m long, 6 m wide and 3.8 m deep, is ready for action to test its victims to find out what makes them tick and discover their possible weaknesses. A psychologically testing time for future competitors who are hoping to launch themselves into the exciting adventure of a round the world race.

The principle is quite simple: a scaled down model of the boat is pulled along the length of the dock. It is then a

question of carrying out the different tests in simulated conditions: resistance to movement, propulsion power and general performance of the boat in the sea, whilst the wave machine can simulate waves of more than 20 metres.

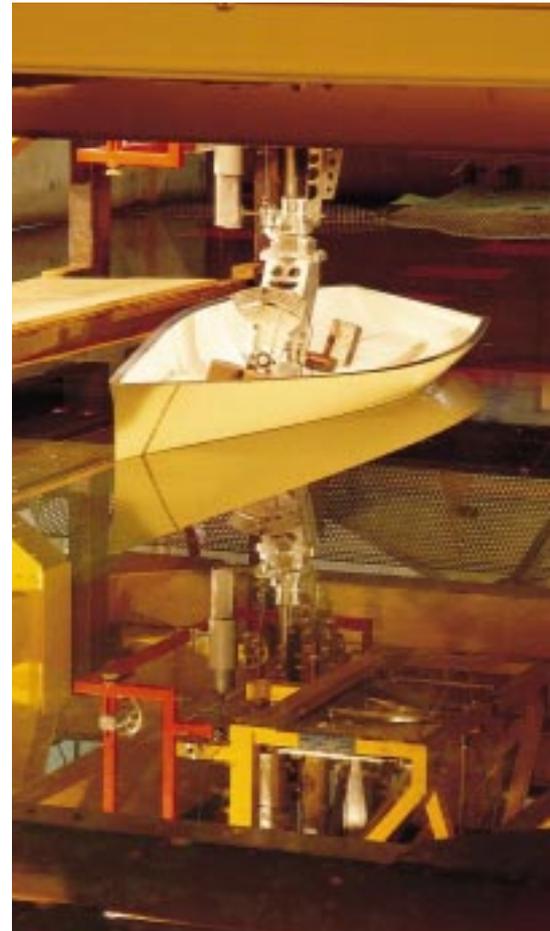
The data is directly recorded by a computer. The designers can thus refine the calculations previously made. Sometimes a difference of as much as 20% can be observed between the two values.

Given the Latin origin of the name given to this type of dock, we can be sure that the boats which pass through it will be more than a "Coracle".



For most of the tests, the platform movement is controlled by a Leroy Somer DMV 2342 alternator. The

DMV2342 allows a gentle start and a tight control over acceleration and deceleration. In fact, given the 100m length of the dock, the "useable range" - relatively short - does not allow for any wasted space and therefore any undertow when the boat is launched.



Photographs by Yves Goethals

The Ice Hotel, Kingdom

Jukkasjarvi, in Sweden, has for hundreds of years been a good place to meet, relax and for good company for all travellers crossing the vast stretches of Lapland. Nowadays, visitors are still pouring in from all over the world into this region of idyllic scenery. Hungry for adventure, seeking the exotic or romantic, or simply fascinated by the kingdom of the ice floes, these travellers are looking, above all, for a different experience.

And they won't be disappointed! After all, isn't the Jukkasjarvi Ice Hotel enough reason on its own for travelling? Has the idea of having a little holiday among the icefloes ever tickled your fancy? We are not suggesting a remake of the famous

"Hibernatus" but at least 10000 tons of pure ice crystal and 30000 tonnes of sparkling snow generously given by Mother Nature. Out of this noble material the vast expanse of 4500 m² of the Ice Hotel was born. It offers a magical and surreal world set out as a hundred

uniquely designed rooms and majestic suites, an Ice Chapel, an even more original cinema, a sauna and finally an "Absolute Ice bar" for the lesser mortals among us. Recreated each year, this by no means run-of-the-mill venue is an invitation to dream.



Typical Ice Hotel Bedroom.



of Ice Floes and Dreams



Photographs by Tomas Utsi

The "Absolut Ice bar"

In this absolutely not to be missed bar of Jukkasjarvi, everything is made of ice (even the glasses) apart from the atmosphere. It's the stopping-off place "par excellence" for anyone wanting to finish off an evening at the Ice Hotel. This venue is frequented by numerous

personalities such as the Swedish royal couple, the Irish President, but also the no less famous Naomi Campbell, Kate Moss, Jennifer Brown, the Ice Bar is now in its fifth reincarnation.

The "Ice Chapel"

Built in 1992, the Ice Chapel is an integral part structure of the Ice Hotel. Once constructed, it was ceremonially handed over to the Parish during the traditional Christmas celebrations and will be used for services, baptisms and

weddings until the middle of May. Bit by bit, the edifice will gradually disappear into the Torne River.

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Want to save money?



Can Leroy Somer interest you in its range of

high efficiency motors.