

Market Research Report
by
Technical Industrial Services

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M A R K E T R E S E A R C H R E P O R T
O N T H E
S P I N N I N G M A C H I N E I N D U S T R Y
A N D E V A L U A T I O N O F
T H E M A R K E T P O T E N T I A L O F
B E L R O Y ' S
S P I N W E L L F R I C T I O N S P I N N E R

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12th October 1991

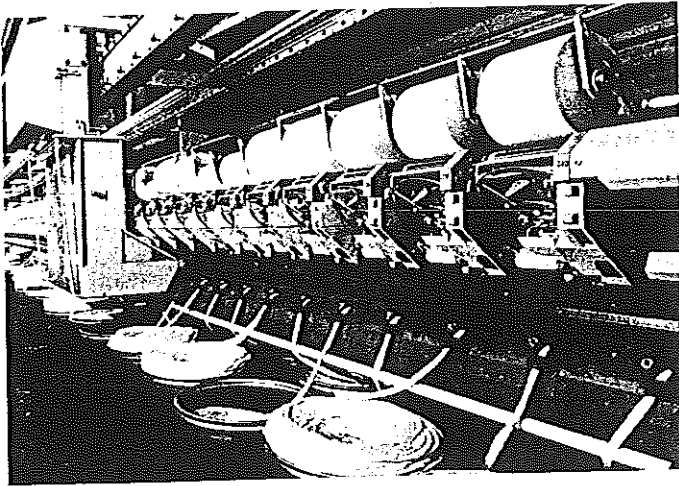
1. VALUE OF SPINNING MACHINE MARKET

The yarn spinning industry is a mature industry and almost every country in the world, from the richest to the poorest, produces yarn. To gain a substantial market penetration, spinning machines must be able to produce an extensive range of different yarns in a wide range of operating conditions.

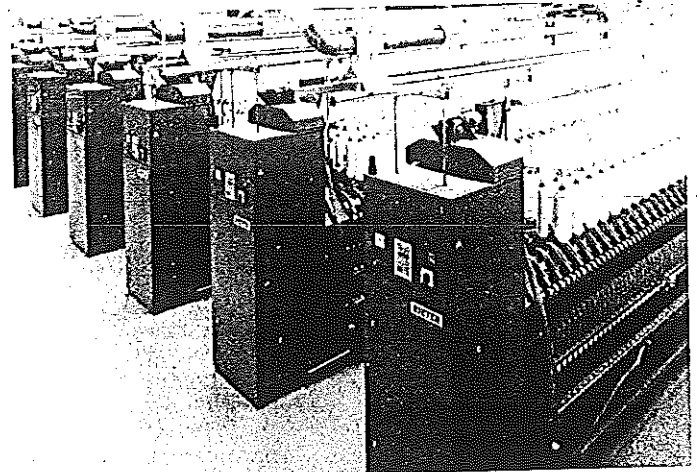
The nub of a spinning machine is the small unit that actually spins the yarn. It is from the way that its unit spins the yarn that spinning systems are named, for example Ring, Rotor or Friction.

Each manufacturer's machines contain a multitude of positions where yarn is spun, with each position containing the particular manufacturer's own type of spinning unit.

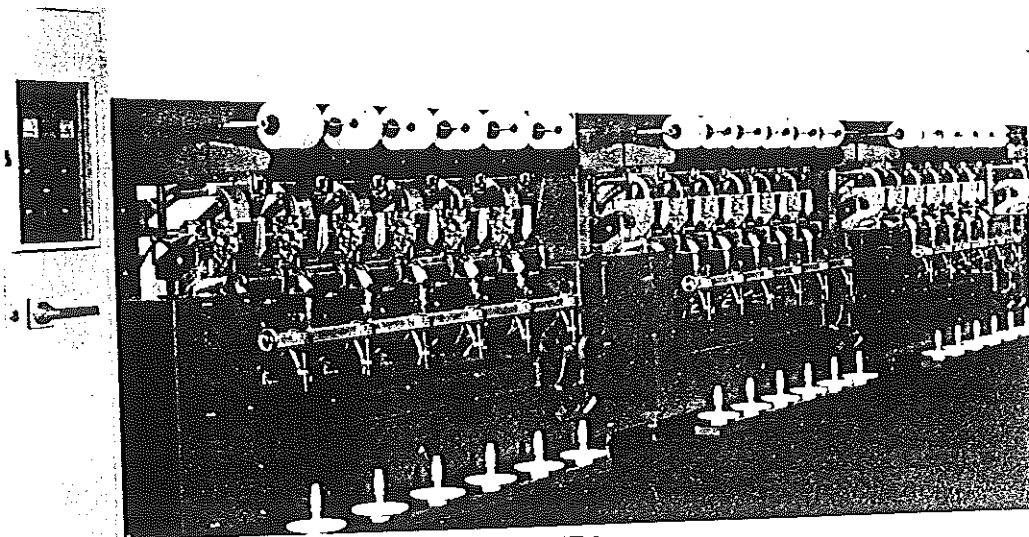
There is only one manufacturer producing friction spinning machines. Their yarns are unsuitable for the mass fabric markets.



Rotor spinning: the Schlafhorst Autocoro is among the leading machines using this technology.



Ring spinning: Rieter's G/5 series of ring spinning frames has enjoyed worldwide sales success.



Friction spinning: the DREF 2 (pictured) and DREF 3 machines from Dr. Ernst Fehrer are seen as commercially successful systems for niche applications.

The latest published industry statistics for the sales of spinning machines are as follows :-

	<u>Rotor System</u>	<u>Ring System</u>
Total spinning positions installed in the mills.	7,812,000	165,248,000
Total shipped in 10 year period 1981 - 1990.	7,511,524	27,070,322
Total shipped in 1990.	528,948	4,955,877

The Rotor spinning system started about 30 years ago. It is approximately 5 times more productive and considerably less labour intensive than the Ring system which started some 55 years ago, but its fine yarns are inferior to those spun by the Ring system.

In the last 10 years there has been nearly as many Rotor positions shipped as there are now installed. A large replacement programme was initiated by engineering changes enabling new machines to be built with greatly increased yarn delivery speeds, together with the advent of Schlafhorst's Autocoro with its capability to operate automatically for 24 hours per day, 7 days per week, 52 weeks per year.

These modern Rotor machines have so reduced labour costs, that the only way that the spinning machine manufacturers can increase the competitiveness of their machines is to look for ways of increasing yarn delivery speed.

In simple terms, to put one twist in a yarn takes one rotation of a Rotor Spinning Unit. The fastest Rotor Spinning Units can continuously rotate at the phenomenal speed of 100,000 revolutions per minute. To put the same number of twists in a yarn, a Friction Spinning Unit only needs to run at 5,000 revolutions per minute.

To estimate the market value of spinning machines we have done the following extrapolation :-

Shipped in period 1981-1990 :-

Average annual no. of Ring positions.	= 2,700,000	
Equated to Rotor positions on productivity terms.	= $\frac{2,700,000}{5}$	540,000
Add average no. of Rotor positions.		750,000

		1,290,000
		=====

Therefore, we can say that that over the last 10 years the industry has sold the equivalent of about 1,300,000 Rotor positions per year.

Rotor spinning machines sell for between £1,000 - £1,300 per position.

Using an average of £1,150 per position, then we estimate the market for spinning machines to be in the order of £1,500,000,000 per annum.

2. CONCLUSIONS AND RECOMMENDATIONS

At the current stage of the SpinWell's development, we consider that Schlafhorst, and probably Murata, would invest in the further stages of your development programme. However, in order for them to decide, you will need to provide them with the comprehensive technical data and future programme plans which you have shown to us.

You have to make the decision as to whether they may thus be able to poach your ideas, and we would give a note of caution. Dr. Fehrer, who owns the textile machine manufacturing company Fehrer AG in Austria, is a close personal associate. As you are aware, he invented the DREF range of friction machines which unfortunately can only produce yarn for a small niche market. To try to get into the mass yarn market on which the SpinWell is targeted, he entered into a deal with Schlafhorst and Suessen for them to use his intellectual property rights and know how to develop a friction spinning machine for the high volume yarn market.

Your Technical Director Alan Parker has always believed Dr. Fehrer's technology is flawed, and that it was for this reason that Schlafhorst failed to achieve a commercial process, rather than for any engineering problems. However, Dr. Fehrer was very disillusioned by the contribution made by Schlafhorst and Suessen and has decided that with his new development RING DREF that he will only license it when the technology is fully developed.

Alan is very confident that the technological breakthrough which was made several months ago will enable the SpinWell to be further developed and thus achieve yarn quality standards which will result in a massive sales potential for a machine manufacturer.

If these yarn standards are achieved, then it will be easy to find a machine manufacturer who is prepared to spend the vast sums needed to develop and tool up for a multi-position machine based around the SpinWell. This is simply because the technology of friction spinning allows yarn to be spun much faster than rotor spinning technology.

As discussed later, a spinning machine based around the Spinwell, will, at a conservative estimate, sell for 20% less than the Schlafhorst Autocoro for any given volume of yarn production. Consequently, we are certain that you will have enough interested parties to be able to negotiate a good commercial deal for yourselves.

In fact, at that stage, by merely showing them the yarn, you would be able to get companies sufficiently interested for them to agree to terms and conditions which protect your intellectual property rights.

As Alan is so confident of achieving his yarn improvement targets, we recommend that it would be to Belroy's commercial benefit not to lock yourselves into a machine manufacturer at this stage of the SpinWell's development, but instead to raise money from other sources to fund the development needed to achieve these targets.

Schlafhorst's sales of their Autocoro Rotor Spinning Machine amounted to about £300 million per annum and we consider that if the SpinWell meets its yarn targets, then your present financial proposals to Schlafhorst could be increased.

We consider that you would then be able to negotiate a one off licensing deal of £2.5 million, together with an annual royalty payment of 2% of sales, which, if the machine became as successful as Schlafhorst's Autocoro, could be as much as £6 million per annum.

3. REQUIREMENTS OF MACHINE MANUFACTURERS

The key to success in the spinning machine market is to produce machines which can spin a variety of yarns to a high quality, whilst at the same time enable the manufacturers customers, namely the mills, to sell their yarn at a competitive price.

3.1 Yarn Quality

There can be no doubt that your Technical Director Alan Parker is a leading expert on yarn quality standards and has had many articles published on the subject. In fact, if we were seeking an assessment of a yarn, or a spinning system, it would be to Alan that we would turn.

At its present standard, the SpinWell's yarn is satisfactory for 30-40% of all yarn types, mostly in the knitting sector. However, there have been a host of spinning developments targeted at a particular yarn type, but few of these have achieved any long term commercial success.

Therefore, we concur with Alan's opinion that to persuade a major spinning machinery manufacturer to take on the design & tooling costs for the production of a commercial fully automated multi-position machine based around the SpinWell, then its technology will need to be capable of producing acceptable yarns on about 70-80% of all yarn types.

3.2 Yarn Production Speeds

On the question of productivity, we have witnessed your SpinWell prototype spinning yarn at nearly double the speed of Rotor machines.

We understand from Belroy's Report dated 18th September 1991 and entitled - Friction Spinning - Comparison of a spinning machine based around a SpinWell with Schlafhorst's Autocoro - that you intend to stick at a yarn delivery baseline of 1½ times faster than Rotor machines until such time that you reach the stage of developing a multi-position prototype, when delivery speeds will steadily be increased.

3.3 Capital Costs

Again from the above mentioned report, we understand that you have calculated that a full length automated spinning machine based around the SpinWell, will cost between 15-20% more per position than a similar size Autocoro.

Therefore, using say 17½% as a basis, and using a delivery speed of only 1½ times faster, we can extrapolate the following approximate comparisons with a typical automated Schlafhorst Autocoro plant of say 2,000 positions:-

	<u>Positions</u>	<u>Cost per Position</u>	<u>Capital Cost</u>
Autocoro	2,000	£ 1,250	£ 2,500,000
SpinWell	1,330	£ 1,500	£ 2,000,000

This saving equates to a 20% reduction in capital costs for any given volume of yarn production.

4. FINDING A PURCHASER

You have already held preliminary discussions with the two largest spinning machine manufacturers in Europe.

RIETER

Rieter indicated to you a number of months ago that they were not in a position to invest in your company. They stated that this was because of internal difficulties. We accept that at the time there was a major reorganisation of the Rieter group, including large scale lay offs. However, in our knowledge of the organisation it would be unusual for them to invest outside in a technology that was not fully proven.

The policy they have adopted for many years is to only buy in new technology after it has been fully developed, even though, as in your case, they believe that the technology is likely to succeed.

Their strength is the ability to supply the full range of machines which are needed to convert bales of raw fibre into finished yarn. Therefore, to keep pace with changing market requirements and which are often dictated by fashion, they have a multitude of machines having to be continually updated. Obviously, this involves a high level of internal research and development funding.

They have a long established record of licensing proven technology and then spending considerable money in refining that technology so that it can be incorporated into their range of machines.

SCHLAFHORST

Schlafhorst have an entirely opposite business philosophy. Their policy is to produce a narrow range of machines based on spinning and winding and to gain a major market share in their targeted products. As you are aware, they have already carried out an extensive development programme on friction spinning, but failed to achieve a commercial process.

We would agree with the report prepared on the SpinWell in November 1988 by Werner International, Management Consultants in Brussels, that to seek to offer Schlafhorst's competitors a superior alternative to a process introduced by them, was a logical business strategy for Belroy to adopt at that time. However, with the failure of their own process, things have obviously changed.

Schlafhorst would be an ideal partner for Belroy, but it is going to be extremely difficult to arrive at a deal at this stage of your development which does not leave you exposed to them poaching your ideas.

OTHER POTENTIAL PURCHASERS

The Far East is the major purchaser of textile machines and there has been a steady increase in the market share of machinery manufactured in this area.

There are three major Japanese manufacturers, namely Toyota, Murata and Howa.

MURATA

They are the major competitor to Schlafhorst in winding machines and in many ways adopt a similar philosophy to Schlafhorst. They would also be an ideal partner.

TOYOTA

The textile machinery business, originally operating under the name TOYODA was the founder company of the car giant. They are still a very successful textile machinery maker who have tended to license technology or to do joint projects with other machinery makers rather than carry out their own research and development programme. We believe they would be an ideal partner once you had fully developed the technology.

HOWA

They have tended to concentrate on traditional machines and we would not think they would be a natural partner.

Also, there are a number of smaller but expanding manufacturers in Korea and China.

In addition, Eastern Europe is a major producer of yarn and in a closed market has large scale manufacturers of machines to serve this market.

On top of this, because a SpinWell with a fully developed yarn technology would be a potentially high volume product, then we are certain it would be of interest to many other engineering companies on the fringe of the spinning machinery industry.

5. TECHNICAL ASPECTS OF THE SPINWELL

We have had detailed discussions with Alan and examined your comprehensive progress reports which have been produced during the last 5½ years work on the development of your SpinWell friction spinning unit. From our examination of your work on the technology of the SpinWell, together with the way you have designed and developed your prototype machine, it is apparent that a great deal of effort has gone into ensuring that it will be capable of operating satisfactorily in a commercial environment.

We are not yarn specialists. However, based on our discussions with both Alan and Keith Busby of the Bolton Institute of Technology, who is one of the leading yarn technologists in the United Kingdom, and who produced the independent report for yourselves last November, we are convinced that you have, since that report was produced, made a significant breakthrough in friction spinning.

We think there is little doubt that Belroy are now the world leaders in this technology.

Alan has outlined the next stage of the development programme you propose to undertake and based on the extensive development programme already completed, it is perfectly logical and comprehensive.

6. PATENTS

We understand that due to the changes necessitated by your technological breakthrough, the SpinWell patents which you originally filed are now redundant. We concur with Alan's view that you should only file your 7 or 8 new patents when you are a little further along your development path.

Until then, you will obviously have to keep your secrets safe, but as you are aware, you have only twelve months from the date of filing before you will have to expend considerable money to obtain world-wide protection of your intellectual property rights. Obviously, it would be a much better proposition to only have to spend this money after a deal has been reached with a textile machine manufacturer.