
DORNIER

INSIDER

Customer Magazine of Lindauer DORNIER GmbH / No. 14 / February 2005



**Italy and Dornier –
creativity unites**

From seaplanes to weaving machines

**Fast reaction secures
the future**

Considerably shortened setup times
on DORNIER rapier weaving
machines, PS type

**Dear Readers,
Dear Friends of Lindauer DORNIER,**

the close of the business year 2004 saw yet again a positive year for our company. We managed to keep orders received and production in the main Weaving Machine Division at the same level or even achieved small increases despite the extremely difficult environment. The positive business result from the previous year will be more or less achieved again.

Our Specialty Machine Division was very successful in the business year 2004, especially in the film plant business sector. The high level of orders received in 2003 continued on into the following business year so that the company attained the highest ever production and turnover volumes in this sector.

The overall turnover of approx. 260 million EUR expected for 2004 is notably higher than previous years. The Board of Management also expects a better trading result than in the previous years. Our own resources covered all investments and a large part of project financing. The company continues to work without bank credits for many years.

The company expects a satisfactory business situation and full capacity utilization in the Specialty Machine Division for the coming year but also prepares itself for a continuing unstable and difficult market condition in the weaving machine sector.

Our existing product range, combined with our development targets, means we are well set to meet market demands over the coming years. The existing sound financial situation allows us to continue our independent corporate strategy

We can therefore also answer the question of long-term security for our customers' investments. These investments are only viable when customers can rely on the supplier's future innovative power and production reliability. That we apply the highest priority to these two factors is shown by our long-standing customer relations which are a significant foundation of our success and for which we are very grateful.

Peter D. Dornier



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This Insider as well as a range of further information are available under:

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Picture on the cover page:
Do 24 ATT seaplane taking-off from Lake Como

PLAYING IN THE CHAMPIONS LEAGUE

It's not the big ones who win against the small ones but the fast against the slow. This is not only obvious in sport but also in industry. Roberto Angiuoni, responsible for production and marketing at Enzo degli Angiuoni located in Birago di Lentate, Italy, uses this analogy to define performance and size of a company with the two significant objectives of his company, speed and flexibility. These criteria maintain the company's leading international position in the high quality upholstery fabrics sector.

Founded in 1981 as holding company by Enzo Angiuoni, current CEO of the group, the main volume of fabrics were originally woven and purchased externally according to his specifications. Right from the very beginning, nevertheless the company was concentrating its creativity and energy to become the reference for quality, style and modern management in the international upholstery fabrics weaving sector. The group was extended to its present size in two steps, the first in 1986 with the Enzo degli Angiuoni Tessitura Srl weaving mill equipped with machines for Jacquard fabrics and the second in 1991 with the Enzo degli Angiuoni Tessitura Giussano Srl weaving mill responsible for dobby fabrics.

120 employees produce an annual output of 1.8 million running meters of fabric of which 95% is customer orders. 5% is produced as grey stock fabric for short-term dyeing to meet customer demands. Marketing runs primarily via wholesalers, but also directly with the furniture industry and international producers. 80% of the fabrics are exported, mainly to England, France, Germany and the USA.

The creative team

The collection offered in the high-end range demands an extremely wide range of very different styles. Customers can not only choose from the



Design from the latest Enzo degli Angiuoni collection

Angiuoni collection but also specify their own wishes including orders of only 50 meters length which places very high demands on the production management and the in-house design studio.

The team of 9 designers, managed by Creative Director Mary Angiuoni, not only realizes wishes and suggestions resulting from around 400 customer visits per year in the company's own showrooms in Birago di Lentate near Como, London and Paris but also maintains close contact with architects, interior designers and stylists. Their ideas are also integrated in the

collections. Two collections are developed each year in spring and autumn and not only reflect various traditional cultural influences but also leave room for own innovative interpretations. Considering the additional, individual customer wishes it is not surprising that up to 2,500 different styles are developed every year.

All materials from silk to cotton, wool, and synthetics on through to linen are used. The proportion of coarse Chenille yarns in yarn count range Nm 1 – 10 for fabric weights between 350 – 600 gr/m² remains very constant at an average of 20%.

A flame retardant finish has also been



DORNIER rapier weaving machine installation in the Garbagnate Monastero factory

developed for these high quality upholstery fabrics that opens new sales potential.

Harmonized production management

In order to keep production technology at a level that maintains the highest quality standard for this wide variety of styles and materials, about 5% of company turnover is reinvested every year in technology, buildings and organization.

A state-of-the-art computer based storage facility has been installed to manage the approx. 300 tons of yarn which must be continuously available in 12,000 different colors. Weaving preparation is supported, among other ways, with a short warp section warping machine for up to 250 meter warp lengths for customer wishes requiring short batches.

The wide range of style changes with very differing filling yarns and counts demands shortest setup times in the weaving mill. Standardization combined with 48 DORNIER rapier weaving machines (including

the new PS type) serves to meet these criteria. Roberto Angiuoni explained that the decision for this machine was made based on the fact that fast style changes for partially short warp lengths are more economical than high speeds that cannot be utilized to meet this demand profile. A decisive factor is also system reliability in producing 50 meter batches without faults and on



From the right:
Enzo Angiuoni, Mary Angiuoni, Roberto Angiuoni

schedule. DORNIER's unique system with positively controlled filling transfer and open shed filling insertion supports faster machine restarts after style changes without extensive adaptation and rapier adjustment to the new yarn – this means highest fabric quality with lower personnel effort.

The two sub-contract companies involved in dyeing, printing and finishing also work according to the company's guidelines and order profile.

Quality as measuring rule

Quality has top priority at Angiuoni for all investments and decisions and it is a continuous development process to integrate new technology as well as all the new ideas and demands from customers and the environment. Quality is also guaranteed by various tests in the company's own laboratory meeting international UNI regulations as well as European and American Institutes' specifications. ISO 9001 Certification rounds off the total quality system in the whole company.

Company philosophy

Growth is not the primary aim of Enzo degli Angiuoni. Much more important is recognizing and realizing new market trends, maintaining flexibility to react to customer demands, its commitment to total quality integrating state-of-the-art technology and the courage to invest in an on-going modernization process.

FIT FOR THE FUTURE



Reorganized weaving machine assembly line according to the flow principle

Significant success factors for long-term security of a company's future are the intensity in technological innovation and the strength of the production system. Textile manufacturers are holding investment plans back longer and longer and are waiting until the global textile market gives more reliable, positive signals. This puts pressure on suppliers of textile systems to speed up product availability and at the same time enable the widest possible variations.

"Just in time"

To meet these market demands for speed and flexibility, DORNIER's first step was an optimization process to reorganize and streamline the operation and process flow of the complete machine production. The method selected is based on the philosophy behind CIP (Continuous Improvement Process) or Kaizen, an integral continuous optimization procedure that originated in Japan which has successfully influenced automobile production for many years and is now finding its way into machine and plant manufacture. Based on the "just in time" principle

where the correct part is available at the correct location, at the correct time and in the correct quality and quantity, the following target was defined:

Achieving higher productivity by increasing efficiency. Single factors are, on the one hand, a reduction in all stocks unnecessarily tying up capital, such as work in progress, delivery or warehouse stocks, and, at the same time, shorter cycle and replenishment lead times. A further result is a productivity increase because all forms of waiting times, downtimes due to repairs, transport from other areas or journey times as well as the floorspace consumption are minimized.

Smaller production lots, reduced setup and cycle times

The first step was to reduce production lot sizes. This brought an enormous shortening in production time per lot size. At the same time, suitable measures were taken to reduce setup times so that production was overall faster at the same cost base. Our customers benefit from these productivity increases because the reaction to their demands is even faster and more flexible. This actually means that the

cycle time from order to delivery of a finalized, specified weaving machine was reduced from 12 weeks to 6 weeks with wider product variance at the same time.

DORNIER's production process acceleration and higher flexibility give customers important competitive advantages: Customers can themselves also decide faster and more flexibly, and therefore react more tightly focused and dynamically to rapidly changing market conditions.

Know how transfer possible

Questions on optimized production processes together with shorter reaction times to market requirements also arise within the textile industry, especially in the weaving mills. Faster production involving setup time and lot size reductions (warp length) whilst maintaining cost levels are also of primary importance there. DORNIER's know how and experience gained during these optimization processes is therefore very interesting for our customers as well.

Continuous Improvement Process (CIP)

With CIP, initially in the production area, DORNIER selected an integral approach based on various principles, such as improvement and retention of improvement, employee involvement, orientation to quality, processes and results, customer-supplier relation awareness (internal and external) as well as orientation towards numbers, data and facts. CIP was only possible with the commitment of the Board of Management to follow a path that can significantly change the existing

spirit, communication and awareness that optimization is a never ending process. When employees become more aware of the effectiveness and consequence of their personal work effort, this increases their commitment and, therefore, the quality level of their work.

Securing investment protection for the future

The initial results of DORNIER's permanent CIP program that supports significantly faster machine availability with higher flexibility in



Modern technical fabrics for contemporary art

Christo and Jeanne-Claude, two of the most prolific contemporary artists, had a new mega project after enshrouding the Reichstag in Berlin in 1995. The project, "The Gates", was unveiled in February 2005 and involved installing 7,500 rectangular arches along 37 kilometers of walkways and footpaths in the most famous park in the world, Central Park in New York. The arches are 4.87 meters high and between 1.68 and 5.48 meters wide depending on the landscape and were set up an average of 3 meters apart running as long rows through Central Park. The German company J. Schilgen GmbH & Co. KG in Emsdetten in Westphalia that delivered the fabric for the Reichstag in 1995 also delivered the saffron colored, recyclable nylon fabric panels for this new project. The company, founded in 1873, specializes in producing technical textiles. A 360 cm wide DORNIER rapier weaving machine, PTV type, was again used for this style - because only this machine working with rigid rapiers and positively controlled center transfer provides the reliability to produce such challenging, high-strength fabrics in the required quality.



Highest manufacturing precision for conjugate cam packages for weaving machine gearboxes

corporate culture by breaking away from embedded employee thinking and handling behavior where experience has shown that resistance can be expected. DORNIER therefore used an external consultancy company to support in training, monitoring and coaching the whole process.

Employees produce quality

CIP's central aspect is that process changes are planned and realized at the source. Focal point are the employees with their knowledge, capabilities and creative potential.

CIP demands higher quality awareness through higher employee commitment. Experience with CIP shows: CIP does not just demand, CIP opens up self dependent thinking and behavior, team

product variance also answer the question how the long term security of our customers' investments can be assured. These investments are only viable when customers can rely on the supplier's future innovative power and production reliability. Both factors are of primary importance for DORNIER.



TURKEY – A COUNTRY AT HIGH TEXTILE LEVEL

Last year's International Exhibition of Textile Machinery in the Tüyap Exhibition and Congress Center in Istanbul makes it obvious: Turkey is on the way to further strengthen its strong position in the international textile market. The measure of success was the well over 50,000 visitors from more than 40 countries who visited this fair with 650 exhibitors from 25 countries.

DORNIER's presence at the ITM 2004 was a resounding success: The noticeable increase in interest in our products over the past five years was rewarded with a good order level, last but not least because DORNIER recognized the market potential early enough and made the appropriate strategic investments.

State-of-the-art technology secures competitive edge

The country on the Bosphorus is the bridge between Europe, Asia and the Near East and merges oriental and occidental influences in a continually surprising manner. Turkey regards itself as an excellent "just in time" supplier for Europe and also for the CIS, and has invested a huge amount of money in logistic expansion over in recent years. Transport times to the most important markets have been reduced considerably and decisively compared to those in the Far East. The former low-price supplier has also developed into a producer of high quality goods in nearly all production areas.

High competence supported by Western know how

International basic and on-going training of the Turkish entrepreneurs in Europe or America have formed the corporate culture of the mainly medium-sized weaving mills towards the Western standard and to a very selective usage of modern technology. The personnel also use a very well developed know how. The flat company management structures support extremely fast and flexible reaction to



DORNIER's stand at the ITM 2004 in Istanbul

the latest fashion demands from the European and American markets.

Increased demand for faster, more flexible systems

DORNIER's rapier weaving machine, basically the synonym for weaving the latest fashion, creative range is represented in strong numbers in Turkish weaving mills and therefore a decisive factor for the Turkish success in this market segment. The number of rapier weaving machines operating today, as well as air-jet machines, which started to be delivered later on, totals about 3,500 machines in approximately 100 weaving plants. DORNIER has therefore recently modified its marketing and service structure to meet the increasing requirements of this important market: The complete technical support, whether consultancy or installing and putting machines into operation, is now carried out by local technicians.

Future prospects

Apart from applications for high quality Jacquard fabrics for home textiles, an increased demand was also registered for stretch denim, high fashion clothing fabrics as well as technical textiles.

Turkey will secure its future market advantage with high quality, proximity to European markets and expansion of its own clothing industry. Even more so as the trend towards fully integrated companies develops and offers a continuous value creation chain from the fiber to finished goods with their own label. A further strategic pillar will certainly be Turkish cooperation in expanding the Central Asian textile industry. The well-priced mass produced fabrics coming from this region could help hold off East Asian competitors.

INNOVATION AND INVENTOR PRIZE AWARDED TO LINDAUER DORNIER GMBH



From the left: Hans-Joachim Koslowski, Deutscher Fachverlag, Dr. Adnan Wahhoud, Peter D. Dornier and Werner Braun, Deutscher Industrieverband Garne-Gewebe-Technische Textilien

The Innovation and Inventor Prize for outstanding innovations awarded on the occasion of ITMA 2003 by Industrieverband Garne – Gewebe – Technische Textilien e.V. (IVGT) [Industrial Association Yarns – Fabrics – Technical Textiles] in cooperation with the Verlagsgruppe Deutscher Fachverlag GmbH went to Lindauer DORNIER GmbH and their manager of air-jet weaving machine development, Dr.-Ing. Adnan Wahhoud.

The ITMA (International Textile Machinery Exhibition) taking place every 4 years and being the largest trade fair for textile machines worldwide serves as window for technical innovations. At the last ITMA in October 2003 in Birmingham, Lindauer DORNIER GmbH presented not only groundbreaking innovations in all product lines but also the DORNIER EasyLeno® system for which the award now was granted.

Higher efficiency and higher productivity at same costs

DORNIER EasyLeno®, introduced into the market a short time ago and described in detail in the Insider (No. 13/09.03), won special attention from the jury of the Innovation and Inventor Prize of the Industrieverband Garne

– Gewebe – Technische Textilien e.V. (IVGT). This new system simplifies leno fabric production enormously, raises productivity considerably and reduces material consumption.

Previous processes for the production of the complex leno fabric structure, created high loads on the weaving machine shedding severely limiting the performance potential. DORNIER's EasyLeno® system now allows performance increases of up to 200% whilst at the same time retaining gentle yarn handling and a considerable reduction in maintenance requirements. Completely new fabric appearances can also be realized and fast changes from leno to plain weave are possible. Both increase flexibility and creative potential for the user.

Inventor Prize to Dr.-Ing. Adnan Wahhoud

The innovation prize awarded to Lindauer DORNIER GmbH also included awarding the inventor prize to Dr.-Ing. Adnan Wahhoud. As manager of the air-jet weaving machine development department, Dr. Wahhoud has been responsible for a variety of innovations from Lindauer DORNIER GmbH over several years, among them also the outstanding DORNIER EasyLeno® system.

Pledge for the future

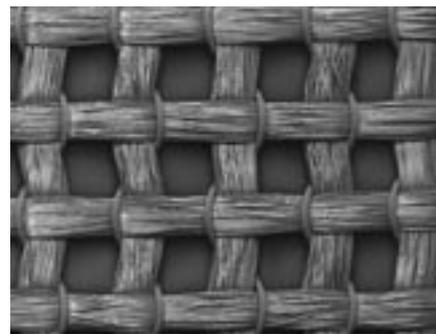
The receipt of this renowned prize underlines the respect of the experts for Lindauer DORNIER GmbH and its decades of pioneering work. This prize also signals the demand and commitment of DORNIER to continue to provide customers with leading technological performance to meet new and future market demands.

Extended textile fabric structure properties using EasyLeno®

The classic leno device works negatively using springs. The EasyLeno® system works with a positive action like the sley, which means that warp tensions for leno and plain ends can be varied within a wide range. This al-



Fabric reverse side with various warp yarns and tensions



Fabric face with various warp yarns and tensions



Fabric with warp yarns with different elasticity

lows completely new leno fabrics with interesting textile properties.

One option could be to use two warp end systems with different yarn counts, for example Polyester 33 dtex and 330 dtex, alternatively for leno and plain ends. The photos on page 8 show the difference when the coarser yarn is subjected to the higher tension and vice versa. These variants permit the production of new double face fabrics.

Using Lycra and normal yarn in the warp allows an exact setting for the Lycra elasticity range especially for clothing fabrics and therefore defined stretching behavior for finished products. The Lycra ends can stretch only until the normal yarn stops further stretching. Such a construction is conceivable for sportswear where even intense stretching should not damage the fabric.

Color transparency

Yarn loads in the warp are very low with this system because shed depth and thread deflections are minimized. This allows the use of monofilament warps with up to 30 ends per centimeter. Drapery weavers can therefore use a universal warp where filling design can determine the coloring. This can also be varied as required with the option to program up to 8 different filling densities and to use 8 different filling yarns from 22 dtex to 800 dtex. Wide ranges of transparency levels are therefore possible and slip resistant fabrics

can be produced with fabric weights down to 10 gr/m².

It can be seen in our picture below how transparency and color depth change by using plain weave and leno weave side by side (because of the limitations of photography, we recommend a visit to our showroom in Lindau).

In practice, the aim is to find alternatives for styles with high transparency levels combined with higher densities. For example the Organza style serves to show further advantages of the EasyLeno® technology. The leno technology supports weaving a style made of Polyester 22 dtex with 40x40/cm in plain weave and 30x22/cm in leno weave with higher transparency, better slip resistance and 35% material savings. Such styles can be produced on a DORNIER air-jet weaving machine at 550 rpm and 360 cm nominal width.

In the area of technical and semi technical fabrics, highly interesting potential for cost and weight reduction, while at the same time increasing productivity is conceivable. The DORNIER EasyLeno® is modularly applicable to both DORNIER rapier and air-jet weaving machines and thus opens new options for creative weavers.



Comparison: leno weave with PES 22 dtex on the left and plain weave with PES 78 dtex on the right

Change in the Lindauer DORNIER GmbH Board of Management

In 2005, the Lindauer DORNIER GmbH Board of Management comprises:

Dipl. Ing. (FH) Peter D. Dornier as Chairman of the Board of Management is also responsible for marketing, sales, customer service, construction and development in the Weaving Machine Division.

Dr. Andreas Rutz continues to manage sales, customer service, construction and development for Specialty Machines.

Dipl. Ing. (FH) Michael Ebeling has been heading the management areas of production and logistics since autumn 2002 with responsibility for costs, schedules and quality to secure the highest possible availability and flexibility.

Dr. Heinrich Ahner is responsible for the finance, accountancy, personnel and EDP areas and will however retire in 2005 having set the course for his successor.

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ITALY AND DORNIER – CREATIVITY UNITES



High quality Italian silk fabric for upholstery and clothing

When one speaks of Italy, one automatically thinks of fashion and design. These two terms have made Italy the number one textile country worldwide. Nowhere else in the world are fabrics produced with such virtuous creativity. Italy's world renowned fashion designers set fashion trends and enjoy the highest level of international attention.

Textile country Italy

The mainly medium-sized family businesses in the important textile centers Como/Brianza, Biella, Veneto and Prato have the necessary flexibility to make fast decisions. Italians not only have a reliable feeling for colors, forms and designs but also have a high level of technical know how which means knowing what the production machinery must be capable of to manufacture high value fashion products.

Italy and Dornier

Italy can by all means be regarded as an important motor for the economical success of DORNIER as a company. The creative spirit and the enthusiasm for modern technology have been, and are, the common denominator. Lindauer DORNIER GmbH today has an outstanding reputation with its products in this key textile market. However, the first connections with Italy in the early Twenties of the last century were not of a textile nature but aviation!

Aircraft production was prohibited in Germany as Professor Claude Dornier founded his company immediately after the end of the First World War. To expedite his plans, Prof. Dornier founded the Italian company CMASA, Costruzioni Meccaniche Aeronautiche Società Anonima, at the end of 1921 in Marina di Pisa. The Do "Wal" seaplane was built there which, according to Prof. Dornier, laid the foundation for Dornier's international reputation.

He said "the Wal made Dornier". Later on, after aircraft production was allowed again in Germany, Dornier delivered not only the Do "Wal" but also 6 Dornier "Super Wal" at the end of the Twenties to the Italian airline of that time, SANA. Apart from that, two of the legendary, 12-engine Do X seaplanes equipped with Fiat engines were delivered to the Italian government.

Dornier seaplanes have long been the synonym for technical pioneering spirit, versatile use and extremely long life cycles. These fundamental qualities, with appropriate modification, served also as basis for the weaving machines and textile finishing machines with which industrial production began again after the Second World War when aircraft production was once again prohibited in Germany.

Key market Italy

For textile machinery makers the Italian market has always been a special challenge in terms of versatility, flexibility

and product quality. Italian weaving mills demand machines that provide the features that are technically able to make their products unique and leaders in international competition: machines that can adequately realize the sparkling creativity in fabric design. Latest fashion demands flexibility, versatility and high quality levels with matching machine precision and reliability.

Lindauer DORNIER and its weaving machines have been closely connected with the Italian market for many years. The company's huge worldwide success would not have been possible without the decisive impulses from connections with Italian customers. Renowned Italian weaving mills were the driving force for many innovations involved in weaving machine development and perfection, and which were, and continue to be, indispensable criteria in the realization of their creative ideas.

Do 24 ATT – pioneering spirit on Lake Como

The mutual close connections between DORNIER and the top Italian weaving mills have a long tradition and found expression in an event at Lake Como in July 2004. DORNIER invited its most important customers from Northern Italy to a rare event at the traditional Aero Club Como, the only seaplane “airport” in Italy: They were not only very close when the legendary Do 24 ATT touched down on Lake Como but also enjoyed special round trips to experience the flying qualities of this aviation legend. Flown by Iren Dornier, a grandson of seaplane designer Claude Dornier, this seaplane is still an epitome of pioneering spirit, creativity and engineering technology. Built in 1943, it also represents the long service life of DORNIER products. These values are the distinctive elements in the manifold, close relations between DORNIER and the Italian textile industry.

Effective representation as guarantee for excellent customer support

An important pillar for the best possible handling of the Italian market is the cooperation between DORNIER and TESMA S.r.l. di TESTORI. This company was founded in Como in 1904 by Giacomo Testori, professor for textile technology in Milan, and celebrated its 100th anniversary in 2004.

In 1954, the sales organization specializing in weaving machines, ribbon looms, weaving preparation machinery, finishing and printing machines

was supplemented with the trading company Testex S.p.A. responsible for technical support and spare parts service.

The companies TESMA S.r.l. and Testex S.p.A. have a joint head office in Lainate as well as their own separate locations in the main Italian textile cities such as Milan, Castellanza, Como. Together with the agency LEADER-TEX S.r.l. responsible for Prato, the close customer support, for which Lindauer DORNIER has always been renowned is granted.



Do 24 ATT seaplane touching down on Lake Como



Peter D. Dornier in discussion with business partners during the 100-year celebrations at TESTORI

FAST REACTION SECURES THE FUTURE

Wholesalers and retailers must adjust to changed consumer behavior over the coming years. Consumers purchase selectively after detailed consideration, the product should match individual tastes and be immediately available. Suppliers forced to mention delivery times could quickly lose customers. The textile industry must generally adapt to further growth in style variations, reductions in piece lengths, as well as increased demands on flexibility and quick reaction.

Weaving mills

For weaving mills that means reducing cycle times for ever shorter and shorter orders. This demands analyzing organizational structures and setup times under the microscope. Adapting organizational structures to meet these demands can have far-reaching effects on internal logistics and personnel requirements. Machine manufacturers are also under pressure to reduce setup times. The significant “long machine standstill times” that influence cycle times can be split into:

- waiting times
- the actual setup times on machines and
- restarts after style changes.

Optimizing waiting times can only be influenced by logistical changes whereas setup and restart times are influenced by machine technology. DORNIER has already focused intensive development work on these last two factors over the past years and will continue to do so in the future.

Waiting times

One example of how to reduce waiting times is described on Page 5 in “Fit for the Future”. This shows how organization and process flows in overall fabric production can be modified within an optimization process to ensure that the material required for the new order is available at the machine in the correct quantity and quality and at the correct time. For dobby weaving mills this could mean, for example, changing the function of the drawing-in department into a logistics center. Yarn and warp beam stocks also gain new significance within the preparation cycle.

Setup times

The fact that parts of the preventative maintenance program are carried out during style changes is often forgotten when considering setup time. These times can therefore be additionally influenced depending on how easy maintenance is as well as spare parts usage on the machine.

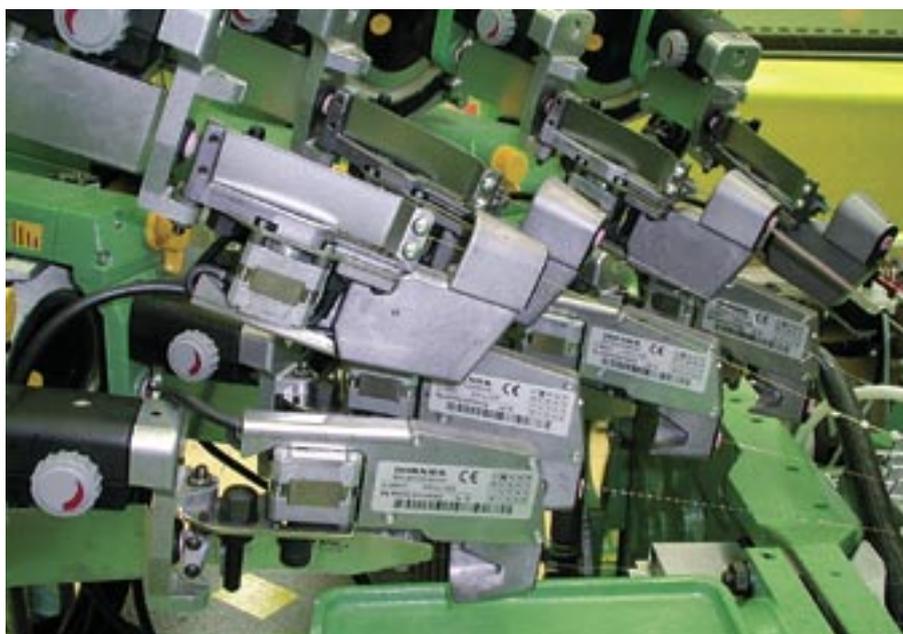
DORNIER rapier weaving machines have many intelligent features that serve to reduce setup times.

These include:

- Rapier and thread length settings not necessary
- Fast width changes on PS type machines
- Patented PSL system for fast shaft locking (Option)
- Patented AirGuide® and MotoLeno® (Option) devices for easier setting
- Saving settings for electronic color selectors, tensioners and scissors
- Precise, reproducible filling density and warp tension settings
- Fast changeover between cylinder and full-width temples



Feed side of DORNIER rapier weaving machines with patented AirGuide® as well as the newly designed control housing



Electronic filling thread tensioner with integrated filling stop motion EFC

- Fast switching between tucked and leno selvages
- Patented FDC system for rapid change between dobby and cam machine
- Quick Style Change system QSC.

Rapier and thread length settings not necessary

The precisely controlled and universal rapier heads don't require adjustment or setting work for new yarns. Rapier guide elements or rapier heads need not be exchanged which eliminates related readjustments to shed settings. Filling insertion with open shed weaving also results automatically in constant thread length because the receiving rapier with the filling end stops directly next to the reed. Every filling end, whether fine, coarse, heavy, light, elastic or brittle, is retained by the rapier until the catch selvage binds it. The warp shed is only closed afterwards. This eliminates determining thread lengths by extensive work on settings and re-timing close of shed, warp tension and thread tensioning, all depending on the yarn type and pattern.

Both outer control levers can be tilted upwards permitting rapid rapier removal for maintenance purposes.

Fast width changes on PS type machines

The new control housings positioned over, and moveable across the modified one-piece temple profile significantly simplify width changes on both dobby and Jacquard machines. The lower temple profile bar no longer requires to be adjusted for a reeded width change so that times for style changes with width changes are reduced by around 30 minutes.

Patented PSL system for fast shaft locking

The pneumatic shaft connection system PSL (Pneumatic Shaft Lock) is a significant simplification for hanging in shafts. It centers the shafts and couples them in automatically independently of the respective shaft settings. The necessity for play-free connection, created the need for improvements in the undermotion lever bearing, type AutoLub. This achieved improved rigidity and exact alignment of the undermotion levers. Disengagement for removal and locking after insertion are performed comfortably by push-button on the machine's display. This saves 2 minutes per shaft, therefore around 24 minutes for 12 shafts.

AirGuide® and MotoLeno®

- lower setting effort

The newly developed AirGuide® air cushion guide for rapier rods works without vertical guide rollers which further saves setting work. Doubling the service life also considerably extends previous maintenance intervals. A temperature monitoring system also enables automatic self-monitoring of the system.

Similar advantages are gained when using the two-end leno MotoLeno®. Eliminating catch selvage bobbins and their associated equipment, as well as two selvage shafts obviates time-consuming work during style changes. Apart from that, varying shed timings and weaves for selvage and ground weave important for good running behavior can be set quickly and reproducibly on the machine display.

Saving settings for electronic color selectors, tensioners and scissors

A similar effect has been achieved for the electronic color selector ECS, thread tensioner with integrated filling stop motion EFC and scissors where elimination of mechanical elements and consequent usage of stepper motor technology means that settings can be made using the machine display and maintenance and setting work are obsolete. Both represent a considerable timesaving potential.

According to the yarn properties and levels of dust generated, the controlled filling tensioners have been provided with new universal brackets which allow the tensioners to be mounted upright or upside down.

New: 16-color selector for dobby machines as well

The 16-color selector on the PS machine type is a new option for dobby weaving that not only supports creativity but also brings weavers time advantages when pattern weaving. Just one loading of the filling creel can support several pattern runs. Machine



16-color selector for dobbie and Jacquard weaving machines

setup for production runs with a lower number of filling colors is possible with a less manual effort. This color selector is, of course, also available for Jacquard weaving as well.

Precise, reproducible filling density and warp tension settings

Today's standard is entering settings, and being able to reproduce those settings, for filling density and warp tension on the machine display. This simplification must also be seen in relation to reducing setup times. Of importance is the precision with which modern machine technology can now realize such setting values. DORNIER works here with a precision of 0.01 fillings per centimeter and ± 1 gram for warp tensions.

Fast changeover between cylinder and full-width temples

The existing one-piece lower temple profile bar is connected to the machine's profile breast beam across the whole width which brings extreme stability. The profile in this lower piece can either accommodate normal cylinder temples or, with little manual work, be combined with the upper profile of the full-width temple. This width independent design requires no new adjustment and therefore reduces setup times during style changes. A

switch from cylinder to full-width temple takes just under 30 minutes.

Fast switching between tucked and leno selvages

Customer demands for quick change between different selvages have to be satisfied as well. In conjunction with the electronic selvedge scissors, an option for rapid switching between leno and tucked selvages, within about 30 minutes, has been realized on PS machines.

Patented FDC system for rapid change between dobbie and cam machine

DORNIER's FDC (Fast Dobby Change) system supports rapid switching from cam to dobbie machine and vice versa during style changes. This opens up the advantages of cam machines with low-shaft styles with regard to fabric appearance, quality, low thread breaks and higher speeds as compared to dobbie machines without losing high-shaft options for fashion styles.

The device described not only reduces setup times but also gives weavers options to react quickly and reliably to new complex style requirements.

Quick Style Change system "QSC"

An important aspect when analyzing setup times is of course the application of quick change systems for fully pre-drawn warps including warp stop motions. It is almost forgotten that DORNIER already developed such a system in 1991 and presented it for the first time as "QSC System" at the ITMA 1991. Such systems are normally located in the drawing-in department so that the patents for the main transport system were transferred to Stäubli who now offer the complete system. Today's weaving machines have the necessary fittings (option) with corresponding warp stop motion support, shaft guidance and centering finger for a defined docking position.

Restarting for new styles without problems

Restarts for smaller batch sizes that can also involve complete style changes must not only be fast but also free of malfunctions. Readjustment and checking for suitable settings can sometimes take several hours on negative tape rapier machines, so that this work not only means reduced efficiency, but also higher personnel work load and faulty fabric. DORNIER's rapier weaving machine has its decisive advantage at this very crucial point.

Thanks to the system family concept, several of the developments already mentioned are also integrated into DORNIER's air-jet weaving machine.

Additionally further developments that will reduce setup times have also been made for the air-jet weaving machine in the filling insertion area and will be described in the next Insider.

“LINEN IS OUR HOBBY”



From the left: General Director Dipl. Ing. Petr Vik and General Manager Jaroslav Buda

Long before the Eastern European member countries joined the EEC they had already realized that despite their cost advantages over Western industrial nations, keeping production limited to mass and standard styles would suffer under cost pressure from Asian low-cost producers. Therefore we have seen them move more and more towards producing high quality fabrics for clothing, home furnishings and technical cloths combined with appropriate service requirements. One of these companies, Texlen Linen a.s. in Trutnov in the Czech Republic, has developed into one of the most important linen fabric suppliers for top Italian, French and German clothing manufacturers.

The company

The state-controlled combine Texlen, founded in 1950, was split into single companies in 1989 that then regrouped as Texlen. The group was privatized in 1998 and 70% of the shares were bought

by the export company Texlen Linen. The owners are Dipl. Ing. Petr Vik as General Director and Jaroslav Buda as General Manager for production and marketing.

After a drastic restructuring phase with personnel reductions and new investments of 1.5 million Euro per year, 1,100 employees in eight factories now attain an annual turnover of 30 million Euro. Total annual production is 9 million running meters of fabric of which 30% are colored woven linen fabrics.

Specialist with large product mix

Specialization as fully integrated linen company with a wide product mix characterizes the company and its strengths. Earlier products were mainly home textiles comprising dishcloths, flat towels and tablecloths made from linen unions and now amount to only 35% of overall production. The new company management concentrates on apparel fabrics, with today 55%

of production, and technical textiles with 10%. The high quality standards demanded by top European clothing manufacturers and designers are attained with:

- An own spinning mill with a monthly capacity of 120 t wet and dry-spun linen
- A weaving mill equipped with 76 modern DORNIER rapier weaving machines and
- Two finishing companies with yarn and piece dyeing as well as a printing works for home textiles.

The trend in dishcloths and flat hand towels is more towards seamed goods so an in-house sewing operation was established. However highest quality towels with tucked selvages are offered to satisfy particular customer demands.

Adapting to customer wishes and faster service are the two key parameters for a weaver working to specific customer orders. The weaving preparation was



Texlen fashion show with linen collection



Texlen collection of linen clothing fabrics

equipped with a short warp section warping machine for up to 50 m warp lengths and a second machine for up to 560 m warp lengths to be able to react to varying demands from wholesalers and clothing manufacturers, especially for yarn-dyed styles, and to meet demands for minimum batches of 400 m. Orders of 25 m per design are produced now and again on special request.

The weaving department

It is not surprising that the weaving department has to cope with a daily average of 10 or even 25 style changes in the pattern weaving season. This is where DORNIER rapier weaving machines show their real strength with fast restarts after style changes because rapier setting adjustments to the new yarns are not necessary.

The wide range of styles places heavy demands on weaving machine flexibility. Yarn counts of the mainly 100% linen fabrics vary from Nm 5/1 dry or wet spun to Nm 52/1 wet spun. Fabric

weights vary from very light shirting fabrics from 107 gr/m² on up to mailbags with 360 gr/m². The fabrics are available as 3/8 bleached grey fabrics as well as yarn or piece-dyed fabrics.

The following must be considered for the linen yarns being used:

- Dry spun linen yarns are extremely brittle and very dusty. They also have thick places and thin places almost without any strength.
- These variations in dry spun yarns can vary between 40% (thin places) to 200% (thick places).
- The very hairy yarns, both wet and dry spun, cling in the warp.

According to Mr. Buda, only one weaving machine system - DORNIER's rapier technology with positively controlled center transfer and open shed filling insertion - can produce the required fabric quality for these yarns in the warp and filling economically and reliably at the present time. His reason: The controlled rapiers clamp the yarn reliably, whether thin or

thick places, the low tension peaks in the complete filling insertion support reliable insertion of the brittle and low breaking strength yarns and open shed filling insertion avoids clinging warps. A further advantage is that the rapier rod air guide AirGuide® fitted on the latest DORNIER rapier weaving machine generation blows 'fly' away, and supports keeping the fabric clean.

Company strengths

The variety of the product range, high service capability, the ability to offer plain and color woven fabrics in coordination from lot sizes of 400 m upwards, supported by a vertical operating structure achieves the highest measure of flexibility. When one considers the commitment of management and employees who have attained the current position and who will support future growth, one can understand the company's slogan: "Linen is our hobby".