Effective on October 1, 2001, SINGULUS TECHNOLOGIES has acquired all shares of e-mould GmbH, and effective on January 1, 2002, also all shares of Optical Measuring-equipment & Projekts BV (OMP) in The Netherlands. The acquisition of both companies will enable SINGULUS to secure control over two very important process steps in optical disc production: Injection Moulding and Mastering.

With e-mould, SINGULUS TECHNOLOGIES will own another core competence. Expertise in injection moulding will provide an opportunity to independently advance the technology for complete replication systems. Due to the obvious technical superiority of electromechanical injection moulding machines over the hydraulic design, the EMOULD Roboshot has been the preferred acquisition target.

With OMP, SINGULUS TECHNOLOGIES combines the previous business field with the preceding mastering process step. The completion of the entire value-added chain will thus offer a significant strategic competitive advantage for all current and future disc formats versus all competitors.

Both companies will in future operate as associated companies of SINGULUS TECHNOLOGIES. With the background of the SINGULUS group, better worldwide support and technological synergy will lead to more benefits for our customers. More proprietary technologies will secure SINGULUS the long-term leadership throughout the world.
SINGULUS e-mould - the Pioneer in Electromechanical Injection Moulding

The injection moulding machine known by the brand name “EMOULD Roboshot” is built on a base machine manufactured by FANUC, the global leader in electromechanical injection moulding machines. The Japanese company FANUC has exclusively transferred the long-term worldwide use of its machines for optical media to e-mould.

SINGULUS e-mould will continue its efforts to supply other end users or OEM partners (especially integrators of optical disc manufacturing lines) and integrate the EMOULD Roboshot into any system according to customer requirements.

Applying the background of the SINGULUS group, SINGULUS e-mould is able to offer better worldwide support and technological synergy which will lead to increased benefits for our customers. The strong market position of EMOULD in Europe and Asia in combination with SINGULUS’ strategic position will offer new possibilities for further growth.

Range of Products

- EMOULD Roboshot CD
- EMOULD Roboshot CD-Card
- EMOULD Roboshot CD-R
- EMOULD Roboshot DVD
- EMOULD Roboshot DVD-R
- EMOULD Roboshot Microdisc

Main Characteristics

- The EMOULD Roboshot is very clean and extremely quiet in operation
- The EMOULD Roboshot is ten times more precise than comparable hydraulic machines
- The EMOULD Roboshot is saving about 65% of electrical energy versus hydraulic machines
- The EMOULD Roboshot electric moulding machine is almost maintenance-free
- The EMOULD Roboshot features injection compression
- The EMOULD Roboshot proved to be the most productive moulding machine for the optical disc industry for all formats. During its five years track record as optical disc machine the Roboshot has been optimized so that the overall performance of the machine is unsurpassed

The technical superiority of electromechanical injection moulding machines over the hydraulic design, coupled with the leading technology of SINGULUS replication lines, provides a significant strategic competitive advantage for all current and future optical disc formats.

e-mould has been supplying SINGULUS TECHNOLOGIES with all-electric injection moulding machines since the beginning of 2001. The EMOULD machines have since been certified for all existing optical disc formats as well as new formats such as DVD-RW. SINGULUS TECHNOLOGIES is convinced that e-mould’s product performance and quality have surpassed the benchmark established among competitors.

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Effective on January 1, 2002, SINGULUS TECHNOLOGIES AG has acquired all shares of Optical Measuring-equipment & Projects (OMP), Best/The Netherlands.

With the acquisition of OMP, SINGULUS TECHNOLOGIES combines its existing business of optical disc replication systems with the very important preceding mastering process. The completion of the entire value-added chain will offer a significant strategic competitive advantage for all current and future disc formats versus all competitors.

The background and foundation of OMP originated from broad experience in the research and development of optical media mastering and production equipment. The development of optical media was initiated in the 1970s by the principal inventors of the Compact Disc at PHILIPS Research Laboratories in Eindhoven, The Netherlands. At that time, OMP management was directly involved in significant developments in the emerging optical media industry.

In 1994, OMP decided to apply its in-depth mastering know-how and experience to the development and manufacture of a completely new generation of photoresist-based CD and DVD mastering systems based on the latest technologies.

This development resulted in the DMS 8000, which represents a breakthrough in various aspects such as initial investment, size, ease of use, reliability and durability, maintenance and operational costs. Based on these advances and backed up by the experience of users around the world, the DMS 8000 is now state-of-the-art in optical disc mastering systems.
All three DVD formats have 4.7 GB per side and can hold 120 minutes of high resolution video. However they differ in the substrate structure, the addressing information for the player laser beam and have different data transfer rates. Accordingly a different stamper is required for each format. DVD-RW and DVD+RW both allow 1000 time overwriting and have similar layer stacks, however require different target materials. Therefore they can be produced on the same equipment. DVD-RAM uses more layers and different materials for achieving even 100,000 overwrite cycles. Accordingly a DVD-RAM disc needs a larger number of process stations for sputter deposition. For data storage purposes DVD-RAM has some advantages, nevertheless all three formats are equally suitable for video recording.

SUNLINE - The new Replication System for all Rewritable Discs

The Final Stone...
Six years after the companies foundation, SINGULUS TECHNOLOGIES now is putting the final stone to complete the product portfolio. After a two year development period SUNLINE is launched to the optical disc industry. The machine will manufacture all of the various rewritable optical disc formats CD-RW, DVD-RW, DVD+RW and DVD-RAM. These phase change discs will replace the diskette for data storage and the VHS cassette for home video recording in the near future. By this move SINGULUS now can provide production equipment for all CD and DVD formats.

The Range of Disc Products
No other SINGULUS machine can and has to produce so many optical disc formats as SUNLINE, since in the DVD world no standard recording format is established yet.

New Features
Sputtering is the key production step for all rewritable optical disc formats. Accordingly the MODULUS played also the dominant role in the design of the manufacturing line. For high production yield, clean substrates are needed for sputtering and bonding. Therefore a twin cleaning station has been implemented, where discs are cleaned before they enter and after they leave the sputtering machine. This will remove dust from sprue cutting after moulding and remove particles possibly generated in the sputtering system.

Since deposition rates and profiles vary over the lifetime of a sputter target, it is necessary to change the sputtering parameters accordingly. This can be done by using a database with standard curves or automatically by a closed loop control system. For the latter purpose a layer stack monitor is part of the system, which can individually measure the thickness of the most important sputtering layers. This is the equivalent function to the TMD in the SPACELINE.

The tough price competition for blank media like CD-RW requires cost efficient mass production. To maximize uptime for moulding and sputtering, a disc in/out buffer has been integrated, which can be used for storage of moulded discs (e.g. during a service of the sputtering machine) or for feeding in discs from spindle (e.g. when working on the moulding machine). This buffer will also strongly support the in-house process development, since different types of mouldings (e.g. with modified groove geometry etc.) can be fed into the stream of discs during a production run.

CD-RW There is a 1-4x and a 4-10x version currently. Higher recording speeds are expected for 2002.

DVD-RW Video recording disc from PIONEER. Approved by the DVD Forum and equipped with copy protection features. Currently 1x recording speed, new versions expected for 2002.

DVD+RW Video recording disc from PHILIPS and created outside the DVD Forum. No copy protection on the recorded disc but reject of copy protected discs. Up to 2.4x recording speed when writing with constant angular velocity.

DVD-RAM Video recording and data storage disc from PANASONIC. Approved by the DVD Forum and equipped with copy protection features, however incompatible with existing DVD players. Currently 2x recording speed.
Field proven Components
Of course we took the opportunity to pick components from the SPACELINE as the market benchmark for DVD manufacturing. The entire bonding system is based on this machine. Moreover, the SINGULUS bonding wizards contributed even some improvements, which then became part of the SUNLINE. For instance the bonding arm has received a tight position control by a gear coupling to the servo motor and the UV lamp is modified for better edge curing and to allow some tilt control. Of course the many improvements to the dosing system of the past are completely transferred. Wherever possible gripper fingers have been employed and the disc is handled in the center. This will care for most reliable operation and flexibility in disc outer dimensions. Even though the machine has an entirely new face, it is clearly standing in the tradition of the SINGULUS mechanical engineering.

Well prepared for the Future
The rewritable optical disc formats have a slow start so far, nevertheless there is common agreement on their important role in the future. Over the coming years we will see that they find their way into every computer and living room. With the SUNLINE SINGULUS provides a production system to its customers, which can handle whatever format and future recording speed version. This makes the investment a safe decision even when the format world is changing. The SUNLINE functionality, speed and design to cost set a new benchmark for the manufacturing equipment market. We are happy to provide more information.
Since September 10, 2001, a MODULUS is running in Kofu, Japan, at the Optical Disc Technology Center of PIONEER. During the DVD-RW cooperation work with SINGULUS TECHNOLOGIES, the PIONEER engineers have learned to appreciate the quality of the submitted sample discs, particularly the achieved layer uniformity of the SMART CATHODE and a low substrate tilt due to disc cooling (no potato chips).

During several visits to Kahl, Germany, Takishita San and his team have verified the good sputtering results and ease of operation. Accordingly, they decided to employ the machine for their own development projects in Kofu. The machine has a special configuration to support work on DVD-RW future versions as well as the development of the next generation DVR-blue discs. PIONEER as one of the world’s leading competence centers will play a prominent role in the creation of this new high density format. The primary application will be video recording in the upcoming HDTV broadcasting generation, where 20+ GB storage capacities will be required.

"Over the last 12 months we have developed a very good working relationship with the SINGULUS R&D engineers and learned to trust and respect each other," says T. Takishita, manager of the PIONEER disc development project. "Their sputtering hardware expertise and our process know-how make up for a perfect match. We experienced a smooth machine installation and comprehensive training on site. We are now in full operation and have quickly been able to implement our DVD-RW process. We are close to demonstrate the next DVD-RW recording speed version and a lot more is coming up. We got the right machine for our program!"

"I am not completely satisfied," says Dr. Hans Ebinger, SINGULUS product manager. "We had a soccer match scheduled for one of the weekends, which was surprisingly cancelled from the PIONEER side. We have to figure this out one day! Regarding the machine installation everything was working to our expectation and after a few days we were in operation. I am sure that Takishita San’s team will do a great job in creating new rewritable processes on our MODULUS."

The SINGULUS customers running DVD-RW will strongly benefit from this, since a smooth process transfer is assured by employing the same machine for development and production. We believe that the work we have conducted jointly during the last 12 months was only the start of a longtime partnership."
DVD-R Seminar in Hong Kong

DVD-R, the write-once medium of the DVD family, is predicted to have the biggest growth rate and market share of all recordable DVD formats. Having installed already two inline DVD-R production systems STREAMLINE Duplex in Europe and experiencing a huge demand for DVD-R machines in Asia, SINGULUS invited customers from different Asian countries to a DVD-R TECHNOLOGY SEMINAR, held on Dec. 7 and 8 in the facilities of our representative VIKA International Ltd. in Hong Kong.

Main subjects of interest were the newly designed machine components as well as the process technology necessary to manufacture high quality DVD-Rs. Besides the proven dye coaters and inline bonding station the STREAMLINE Duplex incorporates two additional outstanding features to ensure the highest quality. Both the unique spin-cooling station right after moulding and the straight principle to keep all substrates under equal thermal influence throughout the production line are essential to end up with optimum shaped finished discs.

In addition to those technical prerequisites, the customers’ interest was highly attracted by the fact that SINGULUS is in the position to offer the transfer of own DVD-R process know-how for different dye systems. Last but not least it was well appreciated that a complete DVD-R inline system STREAMLINE Duplex can be turned into CD-R production with only minor changes. Keeping up with the keen progress in the field of recordable media the SINGULUS STREAMLINE can offer both:

High quality DVD-R or 2.7s fast CD-R production - the choice is yours.
New Locations in US and Asia!

US West Coast Office moves to Los Angeles

SINGULUS TECHNOLOGIES, Inc. is pleased to announce that as of January 1, 2002, our West Coast office will be relocated just north of Los Angeles to Westlake Village. While service engineers will continue to be resident in both the northern and southern areas of the state, our new office location will be in closer proximity to our major customer base which has substantially grown particularly by our DVD-business in recent years. The new facility will allow for expansion of our spare parts inventory and customer support capabilities.

The office will be staffed by Rick Nuffer, Vice President/General Manager; Chris van Dijk, Sales Manager; Dio Almaza, Technical Manager; Tom Conant, Service Manager and Joyce Pritchard, Office Administrator/Spare Parts Manager. Florin Drancea and Ibsen Lourenço will continue to provide technical support in Southern California while Tony Aguinaldo and Jeff Turpin will remain in Northern California.

The new office is located at:
2815 Townsgate Road, Suite #115, Westlake Village, CA 91361.
For information please contact us:
Tel: 805 - 373-6216, Fax: 805 - 230-3073.

Asia Training Centre moves from Malaysia to Singapore

Due to the overwhelming success and increasing demands for SINGULUS products and process training, a decision was made to relocate the facility from its present Malaysian location to a larger purpose designed location in Singapore.

This consolidation of our resources in Singapore will enable SINGULUS to increase the frequency of courses and allow a larger number of attendees to participate.

The new expanded Singapore facility will include the SKYLINE DUPEX and the SPACELINE System. As before all equipment will be fully functional and operate in a simulated factory environment. We will include the new e-mould equipment and provision will also be made to conduct basic OMP training for mastering.

SINGULUS Singapore is very excited about this development, as we feel that it again confirms the growing strength of SINGULUS as a company and it demonstrates our total commitment to our customers and the optical disc industry in Asia.