High-Speed DVDRs at High Production Rate

The DVD-R business is currently growing beyond even the highest expectations.

Market penetration and volume of recordable DVDs has increased this year by a factor of approx. three while recording speeds are continuously pushed to higher levels. Considered the premier products a few months ago, 4x DVD+R and DVD-R media are now the standard with 8x DVD+R discs and recorders already available.

Additionally, major drive manufacturers now offer multi-purpose recorders for both DVD+R and DVD-R media which give customers the security to enter the world of recordable DVD's without concern over losing out in a format war.

To sustain a high level of production technology, DVDR manufacturers need both highly efficient equipment and a reliable source of process know-how, especially for the ever increasing demands of higher speed recording media.

The advanced STREAMLINE DVDR/SP-A production system (Fig. 1) has become successfully established all over the world as reflected by double-digit sales. With a process cycle time of less than 4.5 seconds, a highly competitive average daily output of 16,000 good DVDRs (over 18,000 good discs per day max.) has been established.

A specially-developed fast molding process, spin-coolers, a tilt-stabilizing radiant heat dryer, relaxed thick-layer sputtering and I-BOND all contribute to extraordinarily good stability values for the production of high-speed media of high quality at fast cycle times.

International Showcase & Conference on Media Manufacturing Technologies
October 21 - 22, 2003
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- Conference Part I: 6 Keynote Speakers
- Conference Part II: 14 Training Sessions
- 19 Workshops
- Showcase with approx. 100 exhibitors

Come and see us at:
SINGULUS TECHNOLOGIES Hall 5.1 booth B39/C40
SINGULUS OMP Hall 5.1 booth B35/C36

Fig. 1 Several STREAMLINE DVDR/SP-A at Sky-Media

Fig. 2 Dye Station
SINGULUS is a young company with a remarkable success story. Founded in 1995, producing only a stand-alone CD metallizer, the company grew to become the world's leading sup

In Fig. 3 and Fig. 4 the stability of the physical properties and the electrical signals of 4x DVD+Rs produced at a 4.5 seconds cycle time for a period of eight hours are demonstrated.

While the STREAMLINE DVDR/SP-A is already designed for cycle times well below 4 seconds, SINGULUS has a permanent R&D program to reduce the molding cycle times to match the downstream.

Based on internal development efforts in all process steps, SINGULUS is in the position to offer a variety of approved dye processes. Up to now we recommend to choose between three different types of high speed dyes and the appropriate stampers for production of 4x DVD+R and 4x DVD-R media. Each dye process has been qualified and fine-tuned on a STREAMLINE DVDR/SP-A in a production environment. As a result, customers can independently select the process according to individual market demands.

As borne out by our research in mastering, molding, and dye processes, and our contacts with all major suppliers of dyes, stampers, and other consumables, SINGULUS assures that the highest level of process know-how is maintained, particularly with respect to new formats and higher recording speeds.

Ask for our STREAMLINE DVDR/SP-A dedicated inline production system to ensure stable processes and reliable disc quality in an accelerating market.
SKYLINE II: Again Benchmark in the Market

SINGULUS TECHNOLOGIES presented its new SKYLINE II CD-replication line at the MEDIA-TECH show in Las Vegas in May of this year. With more than 1400 SKYLINE systems operated by customers around the world, the SKYLINE is recognized as the undisputed benchmark for CD production. In 2003, SINGULUS will deliver more than 200 new systems.

Since the introduction of the SKYLINE II, SINGULUS has received an exceptionally high number of orders for this new type of replication line. Since then, more than 50 new SKYLINE II systems have been installed at customer sites in Europe, Asia, and the USA.

As a matter of fact the attractiveness of the SKYLINE II in the version DUPLEX could be increased in a notably degree through the reduction of its cycle time for the manufacturing of DVD5 from <8,5 to <6,0 seconds. Besides several improvements, this could be realized not only through implementation of our improved bonding station – I-Bond – but also by the use of servo controlled disc transport.

The positive feedback we have received from our customers attests to the seamlessness of the transition from the popular SKYLINE I to its SKYLINE II successor.

SINGULUS Further Expands Manufacturing Capacity

After completing an initial expansion of its Kahl facility in January of this year to enhance the company’s Engineering and R&D departments, SINGULUS TECHNOLOGIES will further expand its capacity by 3,000 m², increasing the overall floorspace of its operation to 18,000 m².

With a 3 million Euro investment in a fourth wing, the company will create optimal prerequisites for consistent, stable growth in its optical disc sector and will provide the space needed to accommodate its new MRAM and ophthalmic lens coating operations. By this October, the additional plant space will house the manufacturing systems for treated eyeglass lenses and MRAM storage chips.

As a leading global technology company for the development of optical data storage replication systems, SINGULUS TECHNOLOGIES continues to benefit from unbridled growth in these markets and expects further growth to be generated by its new business operations.
Rewritable DVD - Growing Market and Sales

The change in video recording from tape to rewritable DVD is at full speed with companies ramping up the production of recorders and discs.

Regional differences exist between the three DVD rewritable formats (DVD-RAM, DVD-RW and DVD+RW) with markets favoring DVD-RAM and DVD-RW in Japan and DVD+RW in Europe. The good news is that the choice between the formats is getting easier. The latest generation of DVD recording drives for personal computers are able to run at least two different formats; therefore, the data on the disc (a medium for archival storage) is not restricted to a particular format. This is good for the development of the market as well.

As a result of this progress, rewritable disc technology, which is based on phase change recording, advanced considerably last year and is expected to continue to grow.

SINGULUS’ SUNLINE rewritable disc production line has been running rewritable CD or DVD production at a customer site in Europe for over a year. SINGULUS was also successful in placing a complete SUNLINE in Taiwan, a very important location for rewritable optical disc production.

The system was installed in the spring of 2003 and entered full production after passing acceptance tests and production qualification. SINGULUS delivered the entire line, from the EM OULD molding machine to the SUNLINE, (the central component for disc transport, inspection, bonding, and storage), as well as the MODULUS multi-chamber sputter system.

A German installation team, supported by the local SINGULUS organization, worked along with the customer’s engineering group to implement the process and produce discs to meet customer specifications. While the system is now in full production generating approx. 13,000 discs per day, there is still room for higher throughput following a full assessment of process windows, product requirements, and system capability.

The 13-process chamber MODULUS is a favorite sputter tool since it can later be upgraded to higher throughput or equipped for more sophisticated rewritable layer stacks, even if not equipped with the entire complement of process stations at the outset.

Furthermore, the 13-station MODULUS, fully equipped with RF- and DC-sputter and cooling stations has again proven its capability for rewritable disc production. There have been multiple new orders for the MODULUS sputter system as a stand-alone unit.

The MODULUS is now ready to deliver its cycle time capability of under 4 seconds into disc production. While this throughput is extremely productive, it does not constitute the limits of the system and the trend is to move to shorter cycle times.

SINGULUS is actively engaged in the field of rewritable disc production and is further developing technology to expand its role as a well-respected provider of replication equipment.
The DVDplus© is combining the technology of DVD and CD in one disc. It is essentially a CD glued to the back of a DVD 5.

DVDplus© is a registered trademark of Dieter Dierks, for DVD Plus International. DVD Plus International is the global license holder of the DVDplus© patented double sided disc.

Many titles have already been released on DVDplus® world-wide. The first movie “Blair Witch Project II” released on DVDplus® in the United States sold more than 500,000 copies.

Currently three DVDplus® formats are available:

- DVDplus© - with both film and audio on a single disc, e.g. a film on the DVD side and the Soundtrack on the CD side
- DVD Audio plus© - combines the conventional CD with the new DVD high-capacity, 24 bit 192k audio format, e.g. one side for the High Fidelity Surround Home Equipment, the CD side for the car
- DVD ROM plus© - combines film with CD-ROM (for PC games, etc.) technology

The manufacturing of the DVDplus© disc differs only slightly from that of a normal DVD. Two half sides – one for the CD side and one for the DVD side have to be produced. Both sides will be bonded together to create a disc of 1,48 mm thickness, just 0,28 mm thicker than a standard DVD. That thickness does not affect the playability in DVD and/or CD players.

SINGULUS TECHNOLOGIES AG has adapted its standard DVD replication line SPACELINE during the past six months for the production of DVDplus©. To successfully produce DVDplus© on a SPACELINE just little modifications are needed. Besides some modifications in the bonding process the mold for the layer 1 has to be adapted by increasing the mold cavity for the CD layer. There is no change needed for the SINGULUS EMOULD injection molding machine.

DVD Plus International have exclusively qualified the SPACELINE for the production of all DVDplus© formats. The SPACELINE can produce 22,000 good DVDplus© per day.

A DVDplus© upgrade set for the SPACELINE is available from now on. Test discs produced on our SPACELINE have shown that both sides of that format are playing on most of all existing DVD players, whereby the CD side is mostly playing on all CD players.

Fig. SPACELINE for DVDplus©
First DMS EVOLUTION Passes Tough Test at Prime Disc, Hong Kong

The DMS EVOLUTION mastering system from SINGULUS OMP was officially unveiled in February this year. The new system was specifically designed to meet the requirements for DVD mastering. It has many new features including a SINGULUS designed Nickel Vanadium metalliser, rationalised process and internal buffer. The redesigned LBR continues in the DMS tradition with respect to its compactness, simplicity of design and high degree of mechanical stability. This new system represents a complete professional package for mastering in all production environments.

As with any new technology it was important to prove the system performance and stability in a production environment at a Beta site. This chance for Beta test approval was provided by Prime Disc Ltd. in Hong Kong.

The project provided to Prime Disc comprised a complete turnkey mastering/stamper making solution based on the DMS EVOLUTION fitted with a 6x/2R CD/DVD switchable LBR with Eclipse encoding, 3 cell Technotrans electroforming system and stamper finishing equipment from Sibert.

The agreement with Prime Disc was to thoroughly evaluate the DMS EVOLUTION after which a detailed final acceptance would be performed. The stringent final acceptance test was not only intended to prove the mastering quality/stability but also the quality and consistency of the stampers produced (thickness, etc.) and the consistent quality of the replicas produced at various replication sites.

The influence of the replication process was clearly apparent with varying results being obtained by the different replication processes. All replication processes did, however, produce replicas well within specification without the need for changes to the replication process. All replicas produced were also free of any cosmetic defects. The replicas produced from 20 CD stampers having a long program length were analysed and the jitter values measured are shown in the graph.

Mr. Patrick Lam summarised the project as follows: "Prime Disc has established stringent internal quality standards which allow us to distinguish ourselves from our local competitors. We were satisfied with the performance of the DMS EVOLUTION. We have run the machine on a 24 hour basis during the evaluation period and have produced stampers for our own replication and also provided stampers to third parties.

The Project Manager at Prime Disc was Mr. Patrick Lam who has extensive experience in the optical disc industry. The SINGULUS OMP Project Manager was Ray Ma from the SINGULUS Vika office in Hong Kong.

Mr. Patrick Lam (Prime Disc QA Manager) & Ray Ma (SINGULUS Vika)

An example of the jitter results obtained from the replicas of the DVD 5 stampers is also shown by the graph.
SINGULUS TECHNOLOGIES Opened New Subsidiary in Taiwan

SINGULUS Taiwan officially opened for business on July 1st, 2003. The office is modern, functional and conveniently located close to Taipei City in the new Nei Hu Technology Park. SINGULUS Taiwan occupies 3000 sq. ft. on the 2nd floor of the building. The facility houses a sales and marketing group, employs 15 service engineers and provides accounts and a spare parts service to our extensive customer base in Taiwan.

SINGULUS Taiwan is managed by Mr. Tony Nam and Ms. Grace Chang with additional support from the SINGULUS Asian headquarters located in Singapore. The opening of the Taiwan office further consolidates SINGULUS’ position as the leading optical disc equipment supplier in Asia. SINGULUS TECHNOLOGIES Asia Pacific and SINGULUS Taiwan have a total combined staffing of nearly 70 people including 37 installation service and process engineers. The SINGULUS Asian organization also supports the SINGULUS OMP and the SINGULUS EMOULD group.

As many of the major Taiwanese optical disc producers are investing in other countries, particularly China, SINGULUS Singapore and Taiwan will now work even closer with our strong Asian agent network to consolidate and coordinate our customer support in these countries. The staff in the SINGULUS Taiwan office are in most cases already very highly experienced, however SINGULUS TECHNOLOGIES Asia Pacific will focus on developing the local skills to the highest level possible to be able to meet all the demands that the high-tech Asian customers expect.

First Success in Egypt!

SINGULUS TECHNOLOGIES has entered into a cooperation with the company MIDDLE EAST Technology (M.E.Tech) based in Kairo, operated by Mr. Yasser Gamil, in January this year.

Meanwhile this organisation grew up by the operation assistance, Mrs. Aliaa Ibrahim, and two service engineers specially trained at SINGULUS to strengthen the service and sales activities in the Middle East and North African region. In addition, M.E.Tech holds a spare parts stock inventory for all relevant SINGULUS equipment in Kairo to provide the fastest reaction possible.

Based on this full commitment to the Middle East and North African market, SINGULUS received further orders for SKYLINES, SKYLINE Duplex and STREAMLINES.

Further information: M.E.Tech email: metech.singulus@link.net Tel.: +20122414753

Both SINGULUS OMP and Vika provided an excellent service in all aspects of the project including installation, training and process optimisation”.

Guido Dalessi, Director of Sales at SINGULUS OMP, adds: “We greatly appreciate their contribution, attention to detail and valuable feedback provided throughout the project. I anticipate that the approval received from Prime Disc will have a positive impact on the success of the DMS EVOLUTION in the Hong Kong and Chinese market places.”

The conclusion is that the DMS EVOLUTION has come through this test with flying colours and that any teething problems were quickly resolved to allow the system to run continuously for the entire test period. The final acceptance test is among the most stringent to which the SINGULUS OMP mastering technology has been subjected, including the testing of replicas produced in different countries from the same stampers.
In 1974, Dr. Wollermann-Windgasse completed his study of physics at the Technical University Darmstadt (TUD), specializing in laser and plasma physics, vacuum technologies, semiconductors, and thin film coatings. After completing his doctorate in 1979 and 6 years as a scientific assistant at TUD, he began his career in industry. Before joining SINGULUS TECHNOLOGIES AG, he held several positions at the Trumpf Group culminating in a position as the managing board and speaker of the laser technology division of Trumpf Group. He additionally held the position of Managing Director of Trumpf Lasertechnik GmbH and Trumpf Laser GmbH & Co. KG. The company, located in Ditzingen, Germany, is one of the world's leading laser and machine tool companies, with an annual turnover of approximately 1.2 billion Euro and more than 5600 employees. He also holds a number of appointments as trustee and board member at societies such as the VDI, VDMA and the Fraunhofer Gesellschaft.

Dr. Reinhard Wollermann-Windgasse is Managing Director of SINGULUS OMP, Best, the Netherlands and will also be appointed Managing Director of SINGULUS EMOULD GmbH, Aachen effective October 1st. Dr. Reinhard Wollermann-Windgasse was born in 1950. He is married and has 2 adult children.

Joachim Stiller has been appointed the new Managing Director of SINGULUS EMOULD GmbH, Aachen, effective October 1st, 2003

After completing his engineering studies at the University of Niederrhein, Joachim Stiller joined the Schlafhorst Group, the world's leading supplier of winding machines, which became part of the Swiss Saurer Group in 1991. The company has an annual turnover of approximately 2 billion Euro (major activities: production of winding machines and drive systems). After two years as an R+D engineer for basic development, he was promoted to project manager, and in 1997, became department head for new product development. In 1999, he was appointed Managing Director of Operations at Schlafhorst Winding Systems GmbH, with a staff of 400 employees. Joachim Stiller was born in 1963. He is married and has three children.