



More than a decade of Innovation

Cost-effective DVD production

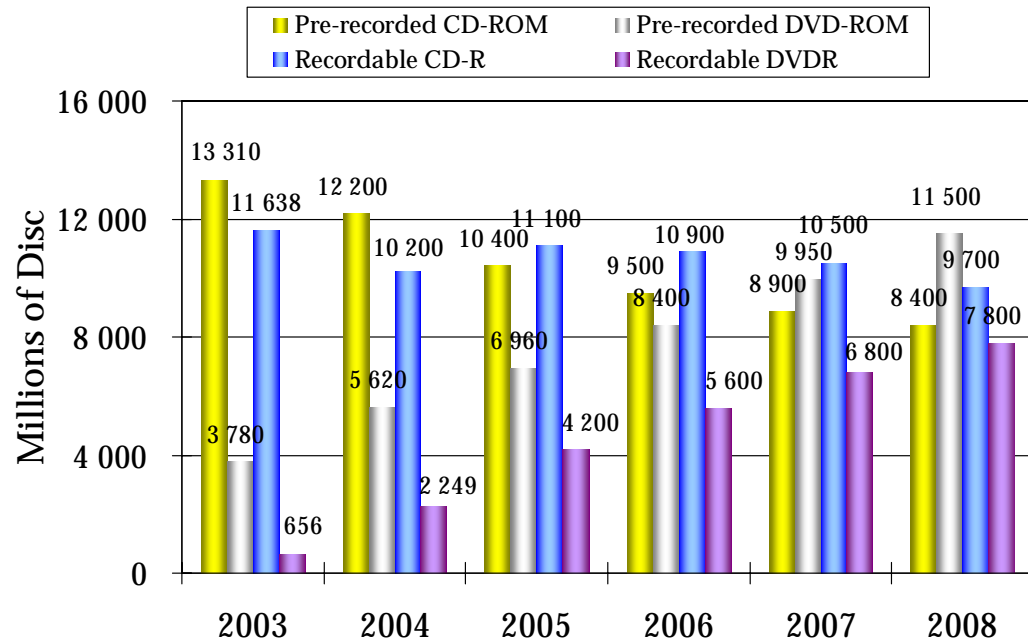
Martin Brown

Vice President Sales & Marketing

M2 Engineering



First the good news, DVD growth to continue through 2009



Source PIDA 2006

Over crowded market leads to severe competition

Bolagsfakta

Dicentia är väl etablerat på marknaden i Danmark, Sverige, Norge, Finland och Tyskland med huvudkontor i Köpenhamn. Företaget är noterat på Köpenhamns Fondbörs sedan maj 1998 och förväntas omsätta 600-675 MDKK under 2006.

Dicentia är det nya namnet för danska SDC DanDisc a/s, svenska DCM AB och sedan februari 2006 även danska Tocano/Toft & Fischer A/S.



måndag



- Singulus buys STEAG
- ODS expanding in europe
- Alpha Sweden bankrupt
- Number of bankruptcies in US e.g Future Media
- ...and more to come?

Only the fittest will survive

Profitability demands efficiency in every aspect

- Offering added value to get good price on output.
- Good, cosmetically flawless DVDs that can motivate a good price.
- Cost efficient production.
- Use of efficient machinery.

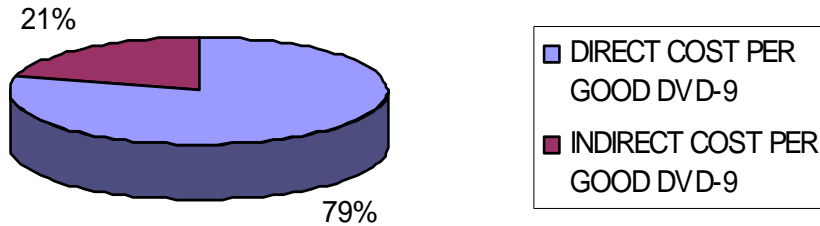
Increasing raw material prices is a major challenge

- Oil price increase of 100% between 2002 and 2005.
- Increased PC price linked to oil price?
- Power prices have increased 20% 2002-2004.
- Adhesive prices increased with 40% due to higher energy prices.

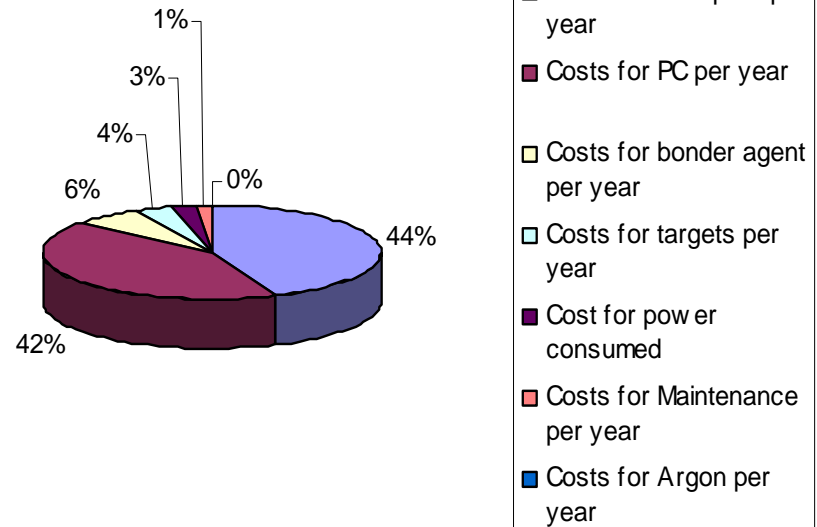
While disc prices continue to fall

Raw materials/stamper a major part of total disc cost

Direct Costs vs Indirect Costs DVD-9



Direct Costs DVD-9



Machinery contribution to cost-efficiency

- Capital investment costs.
- Cycle time/output.
- Up-time and yield.
- Power consumption.
- Material usage.
- Cost of ownership (maintenance costs etc).



M2 – Responding to the reality of a mature market

- Providing the most cost-effective mastering/replication solutions.
- Production carried out in own production facility in Amata Nakorn, Thailand.
- Developing the optimum solutions for 3rd generation formats.

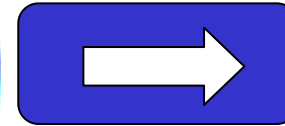
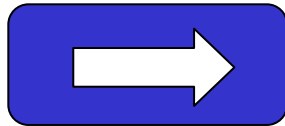


Quality and yield – Key to profitability

Electrical Signals
resulting from
correct/consistent pit geometry

Mechanical Properties
Cleanliness

Mechanical Properties
Jitter
No clouding



MASTER

STAMPER

REPLICA

Process window is defined by all stages.

It starts with the stamper!



GOOD STAMPER = WIDE PROCESS WINDOW FOR REPLICATION (MOULDING).



**BORDERLINE STAMPER = LIMITED PROCESS WINDOW FOR MOULDING.
Lower yield.**

What is a good stamper?



CAN BE USED IN DIFFERENT MOULDING PROCESSES, WITHOUT NEED FOR CONSTANT PARAMETER CHANGES.



GIVES GOOD ELECTRICAL SIGNALS ON REPLICAS = **MASTERING**



DOES NOT CONTRIBUTE TO COSMETIC DEFECTS (CLOUDING).



More than a decade of Innovation

M2 SQM – State-of-the-Art Mastering



Up to 160 CD or 100 DVD masters per 24 hours.



HD-READY



Revolutionary LBR design for stability and ease of service.



In-line quality measurement and closed loop control.





SQM – Flexible design for expansion/upgrade



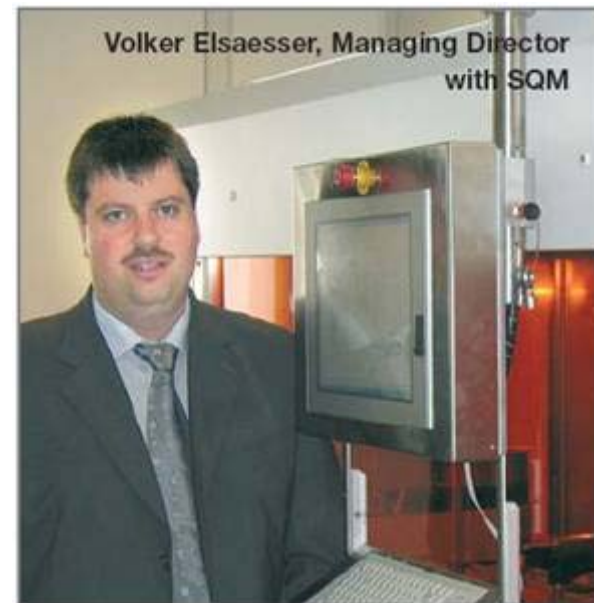
SQM with 2 Laser Beam Recorders Shown at Mediatech, Frankfurt

SQM – The stamper maker's choice



Synchronicity Mastering Services

Premier stamper service in N.America
300 stampers per day
Business based on premium quality and service



Elsaesser GMBH – Horb Germany

Leading stamper service in Europe.
200 stampers per day
Stampers delivered to 24 countries.
SQM support/training centre.

SQ20 – The last word in DVD production

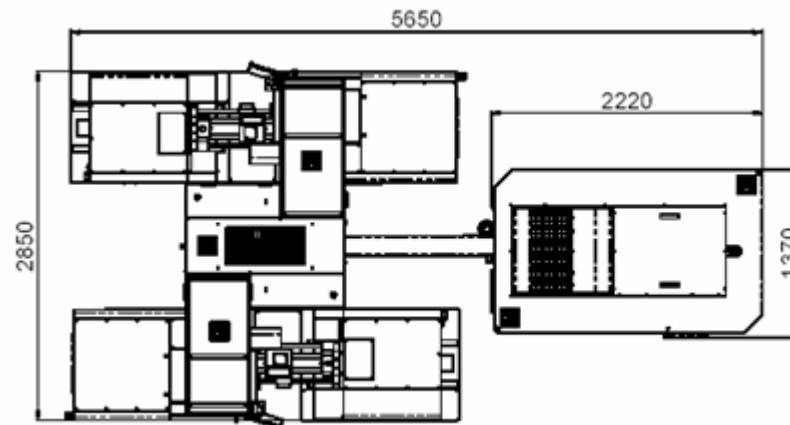
- Newly developed DVD line to meet the requirements of all replicators.
- Fast cycle time (<2.3 seconds) with upside potential to <2.0 seconds. Moulding is limiting factor.
- Cost-efficiency considered during all stages of machine design.
- Lowest possible cost of ownership.



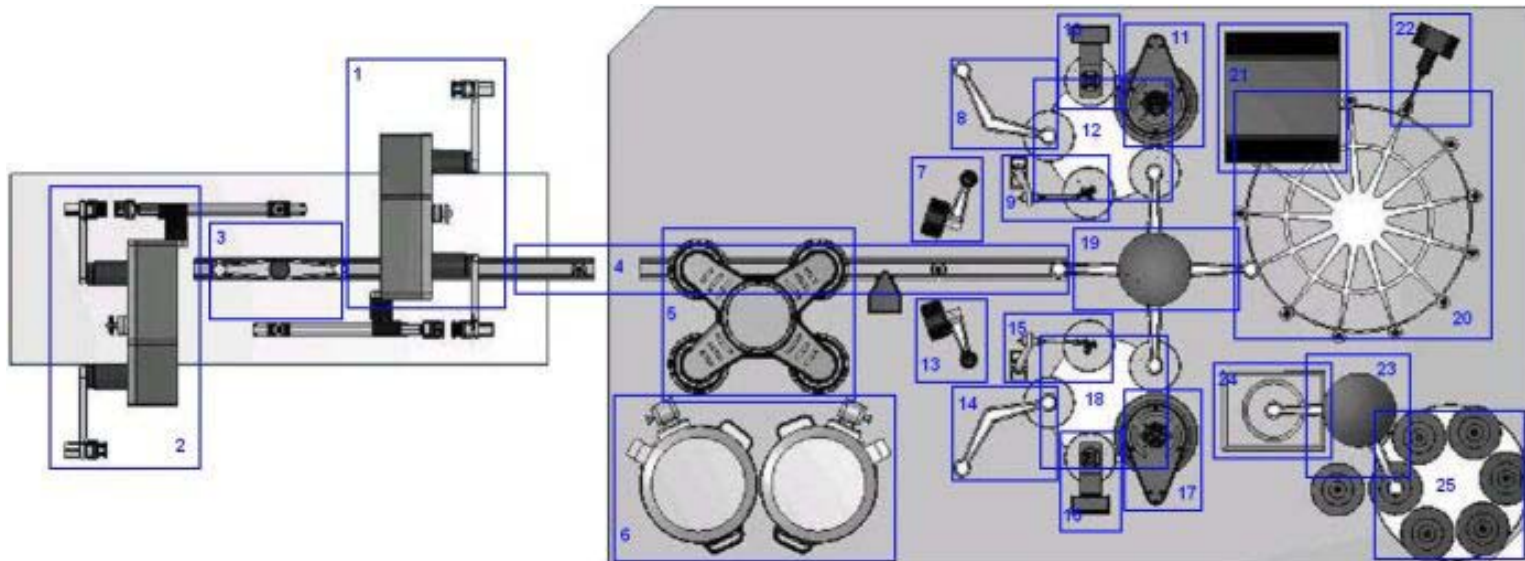
SQ20 – Compact solution for all DVD formats



Only 16 m2 foot print for a complete production system



SQ20 – Machine layout



SQ20 – 'Never drop a disc' philisophy

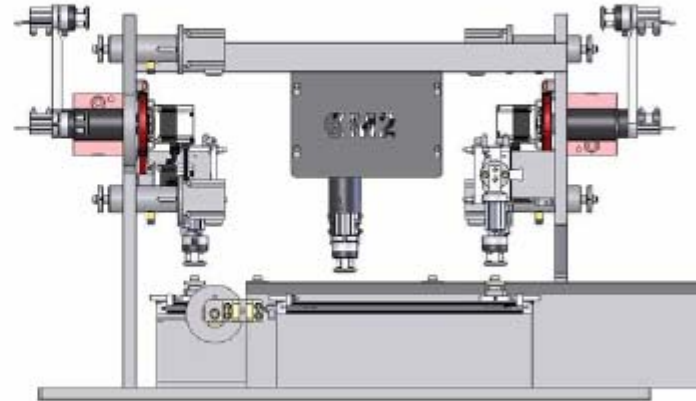


All process stations in fixed positions, alignment free handling

RESULT = Less wastage



SQ20 - Spin cooling for flat substrate at low cycle times



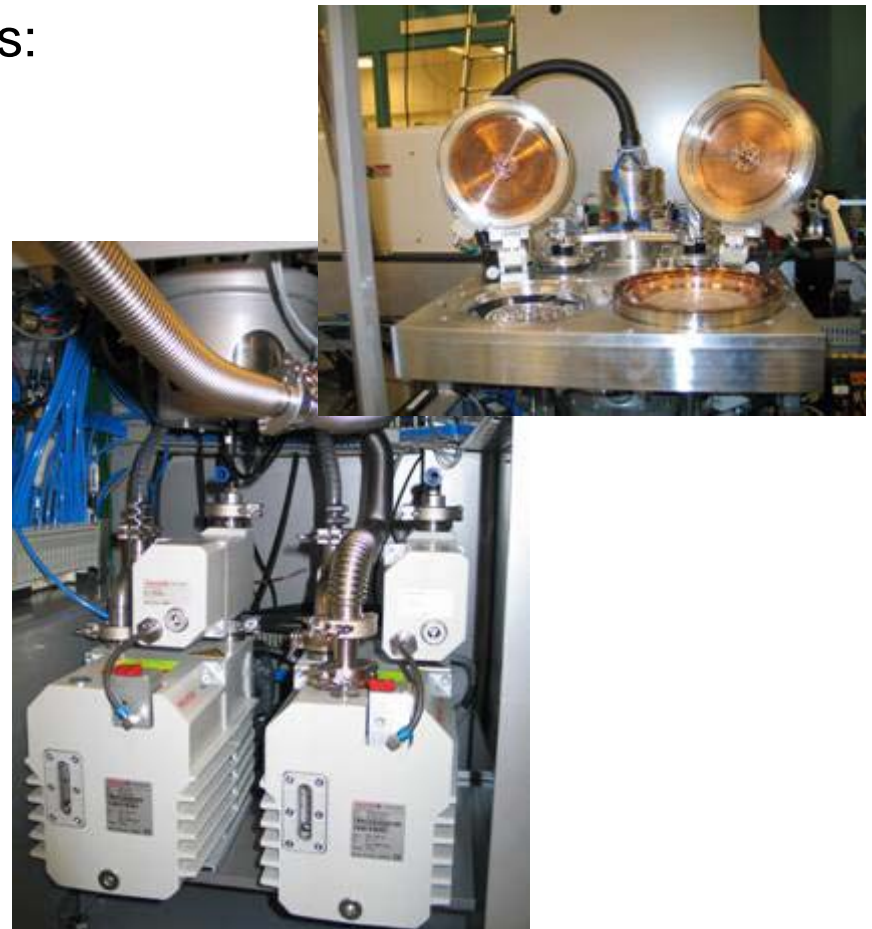
RESULT = Higher quality and yield

SQ20 - Dual magnetron sputtering system

One vacuum chamber for two cathodes:

- Reduced power consumption due to combined vacuum pumps and turbo pumps.
- Fewer spare parts.
- Less maintenance.

RESULT = Lower cost of ownership



SQ20 - Dual bonding tables

- Wide process window for DVD and HD-DVD bonding process.



RESULT = Better quality/higher yield

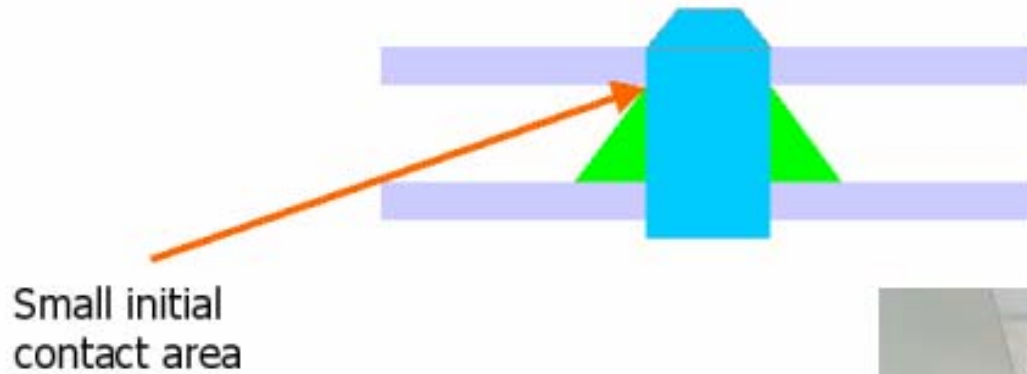


M2 – CenterBond II™ Technology



Adhesive applied all the way to centre of disc

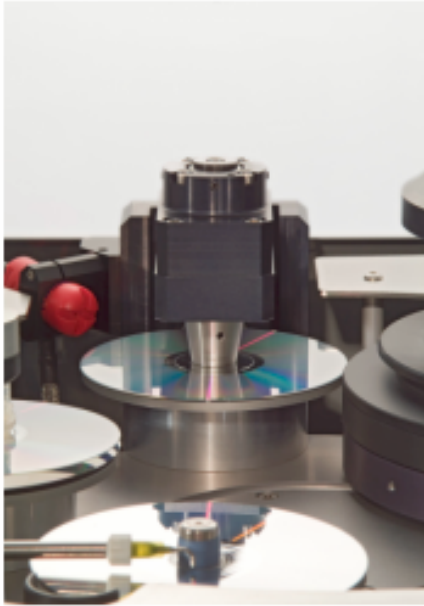
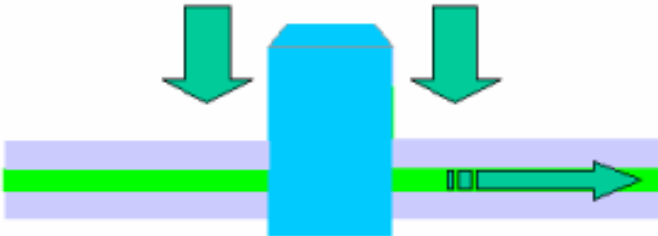
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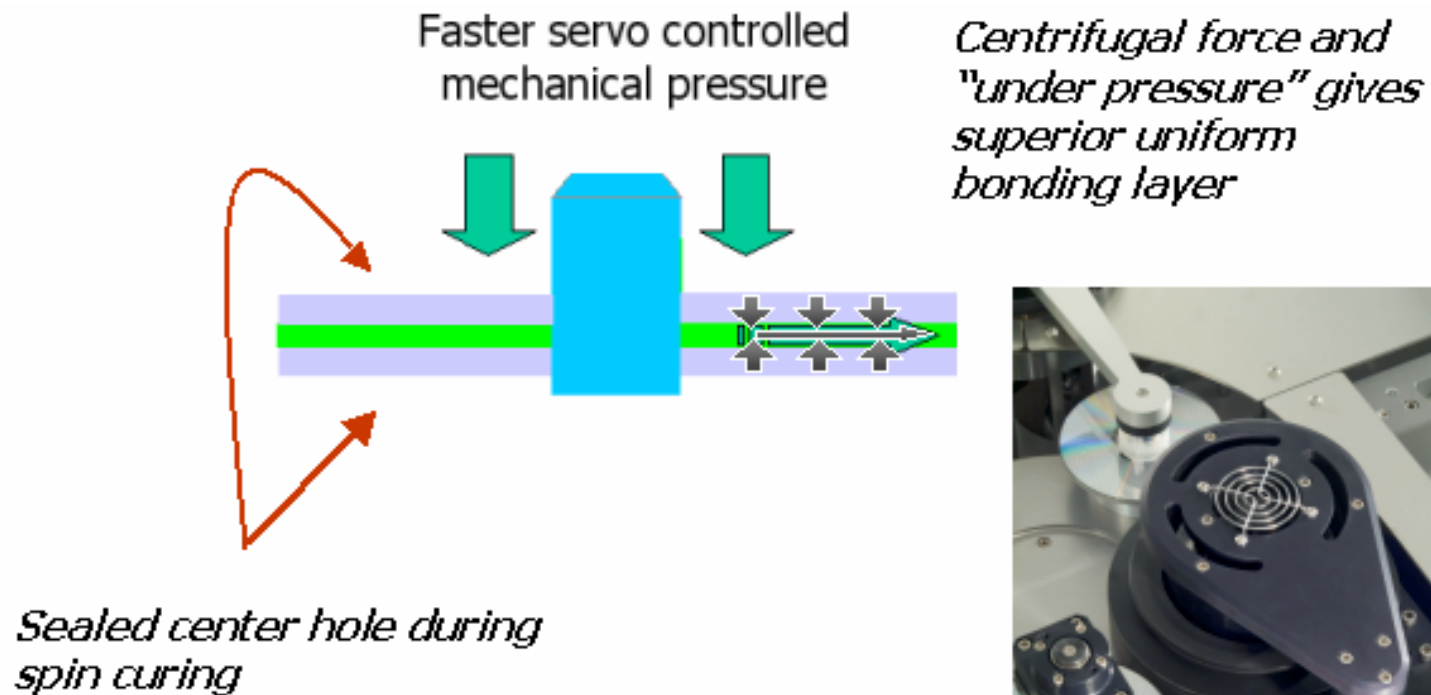


M2 – CenterBond II™ Technology

Faster servo controlled
mechanical pressure



M2 – CenterBond II™ Technology



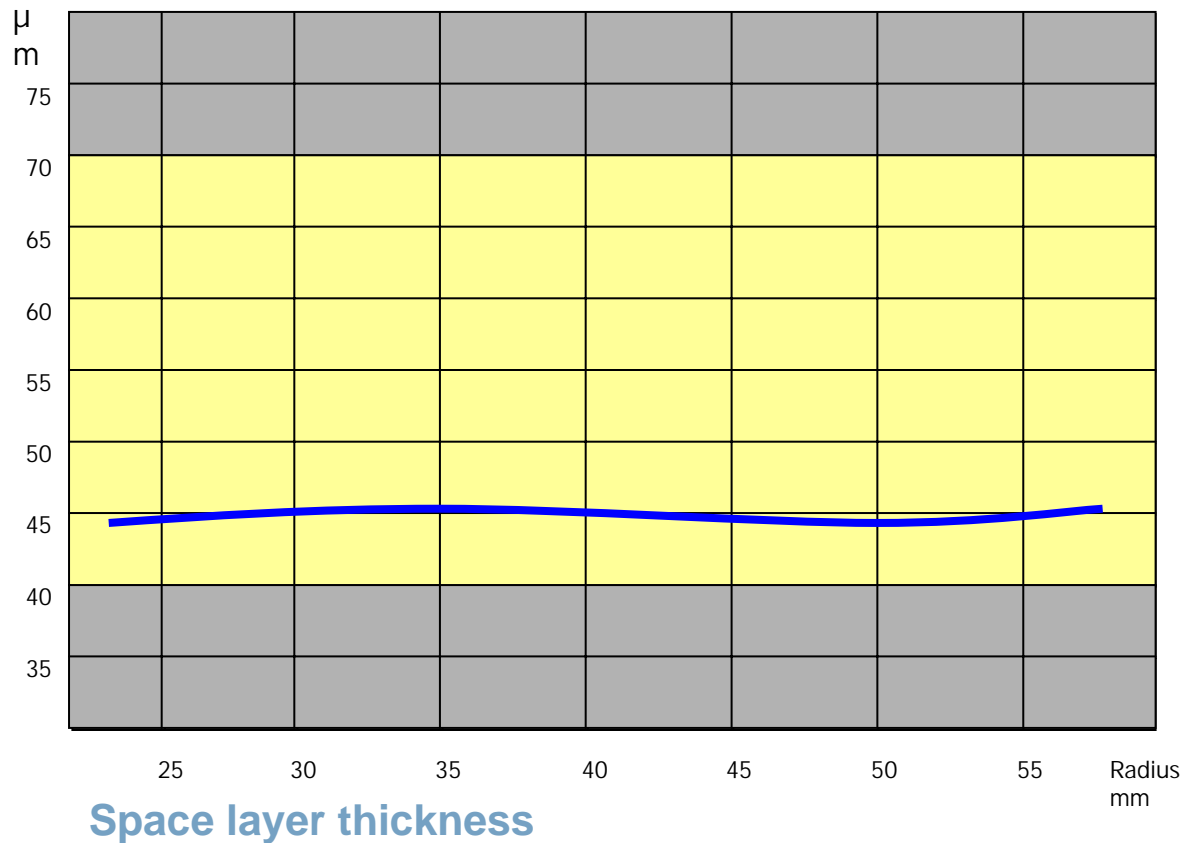
M2 - LED SpinCure™

- Traditional UV lamps have been replaced by LEDs.
- 12 times the lifetime compared to UV lamps.
- 1/3 of the "wear and tear cost" compared to traditional UV lamps.
- No warm-up time.
- No disc deformation due to heat transfer.
- Reduced downtime for lamp replacement.

RESULT = Better quality/higher yield/reduced costs

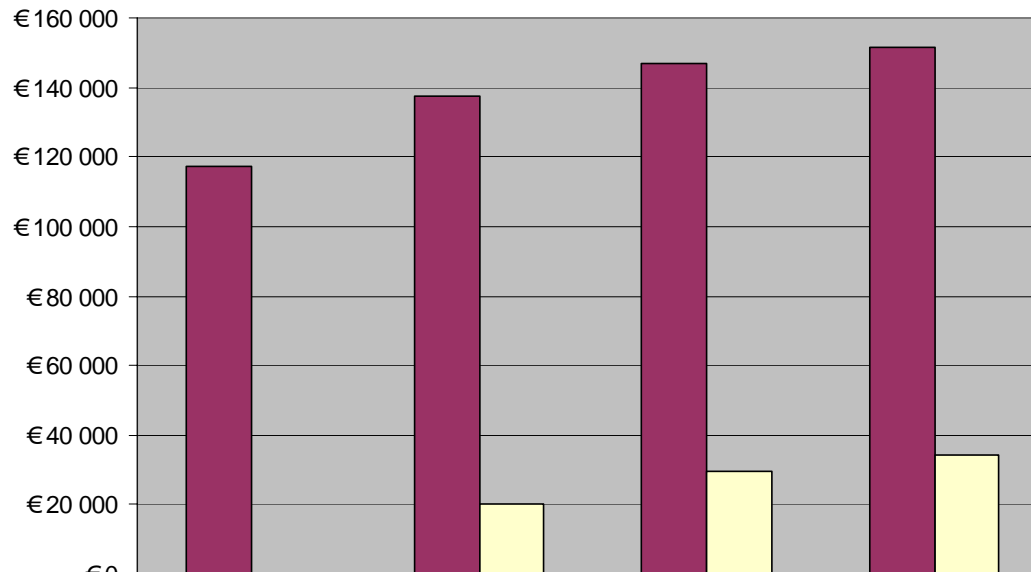


CenterBond II & LED SpinCure give low cost and low eccentricity



Great savings using M2 LED SpinCure™ technology

Adhesive Costs and Savings per year



	45	45/61 (Typical disc)	45/65	50/65
■ Cost per year	€ 117 328	€ 137 432	€ 146 668	€ 151 596
■ Savings per system and year	€ 0	€ 20 104	€ 29 341	€ 34 268

Annual saving!



Advantages of the using M2 SpinCure technology for HD-DVD

- Good uniformity of the space layer
 - Samples made show less than $\pm 1 \mu\text{m}$ variation on disc.
- Easy control of space layer profile
 - By spinning and curing at the same time the shape of the space layer can be control by adjusting speeds and times.
- Very low eccentricity
 - Typical Radial Run Out (RRO) < 50 .
- CenterBond gives durable discs
 - Bonding all the way to the centre reduce the risk of discs cracking when used in a laptop drive.

SQi – M2 Injection Moulding Machines

- Based on Toyo platform.
- SQi-s for DVD-5/9, SQi-H for DVD/HD-DVD.
- Fully electric moulding machine with low power consumption. Typically 7kVA (IMM+MTC).
- Compatible with all major mould types.
- M2 designed MTC and in-built transformer for greater efficiency.
- All support provided by M2 engineers.





SQi – M2 Injection Moulding Machines



COMING SOON WITH SPRUELESS MOULDING

Sprueless moulding reduces PC costs from 4 to 9%

- The weight of one sprue is depending on the type of mould.
- Sprue from a Toyo Techno mould typically weighs 0,325 g.
- Direct savings in polycarbonate using Toyo Techno mould: $0,65/16,65=4\%$.
- Sprueless moulding also eliminates problems relating from stringing at faster cycle times.



SUMMARY:

- **M2 providing solutions to meet the requirements of mature market.**
- **SQM offers high quality/high volume mastering with HD-DVD compatibility.**
- **SQ20 is the last word in DVD/HD-DVD production in terms of cost efficient production.**
- **SQi enables a total solution to be provided with full support from M2.**

