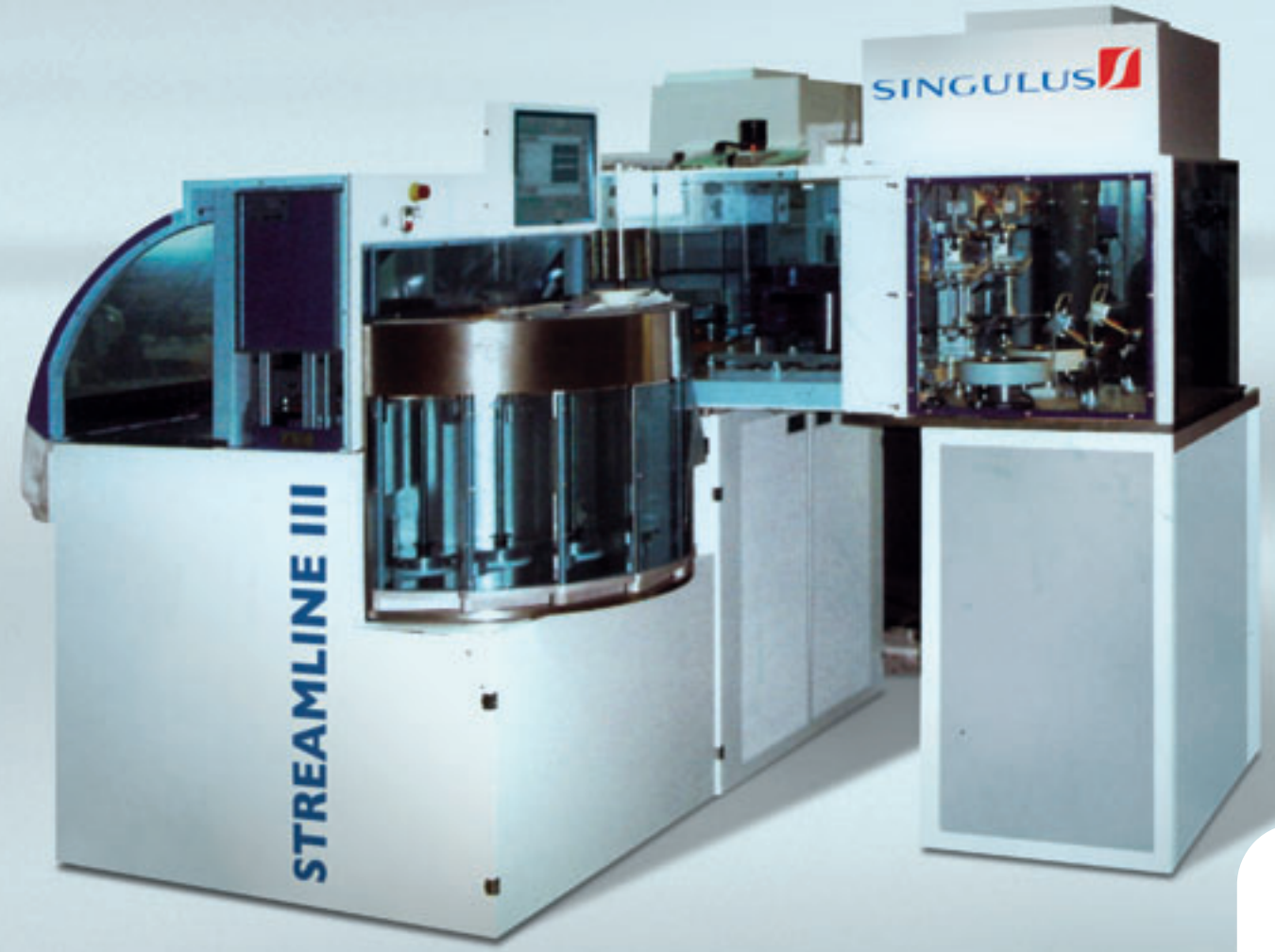
STREAMLINE III

High Performance Replication System for DVD R



SINGULUS

Smart Solutions to Drive the Future.

STREAMLINE III

High Performance Replication System for DVD R

The STREAMLINE III is a replication system dedicated to the economical mass production of high performance DVD R.

The STREAMLINE III replication line is designed for a dry cycle time of the downstream equipment of less than 2.5 s. A production cycle time of better than 2.8 s can be achieved for 4.7 GB media depending on the dye process and the cycle time of the injection molding machines. Reproducible and stable in operation, the new, fast STREAMLINE III is the result of our R&D activities in multiple interacting process areas, from mastering and molding and dye technology to metallization and bonding.

The STREAMLINE III is now available with the SPACELINE II finishing module. The new system combines the advantages of an economically designed system with the proven SPACELINE DVD replication line based on a market base of over 1100 systems. The final processing of recordable DVDs is performed using a SMART CATHODE® sputtering unit and the reliable SPACELINE II bonding module.

SINGULUS TECHNOLOGIES is well prepared to provide all process know-how necessary to start up production of recordable DVD media.

Optional fast DVD 5 production
For manufacturing DVD 5 at low cycle times until the end of the target lifetime, a 10 kW power supply for SP1 is installed instead of a 8 kW power supply.

_ Production cycle time DVD 5 (without metallized top disc): 2.50 seconds (Al layer ≤ 40 nm).

Optional CD production
This option enables the STREAMLINE IIII to manufacture Compact Disc formats (CD-Audio, CD-ROM) while using only one of two injection molding machines. Therefore some parts at the spin-off and sputter units have to be exchanged.

If not ordered within the contract, neither the mold for CD manufacturing nor the devices to be exchanged are part of the scope of delivery.

_ Production cycle time CD: 3.40 seconds
_ Target lifetime for Aluminum: Up to 130,000 at 40 nm thickness


DVD+R

Main Characteristics

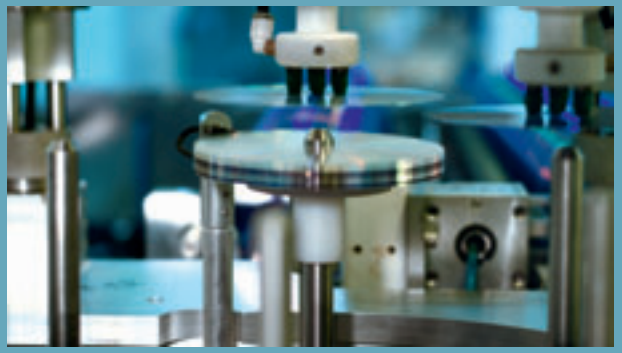
Downstream cycle time well below 2.8 seconds (Options: 2.50 seconds for DVD 5 with clear top disc and 3.40 seconds for CD)

_ Downstream cycle time well below 2.8 seconds (Options: 2.30 seconds for DVD 5 with clear top disc and 3.40 seconds for CD)
_ Modular, highly integrated design incl. all production steps from cooling, metallizing, edge cleaning, bonding, UV curing to quality inspection
_ High productivity, high uptime
_ Entire machine including electric rack mounted on a base frame
_ Clear structured disc flow, avoiding any mismatch between discs halves
_ Automated handling of DVD and DVD R through all production steps
_ Minimum space requirement
_ Excellent maintenance and service accessibility
_ Machine system components and automation modules proven and representing the state-of-the-art
_ Nearly all handling movements are driven by AC-servo-motors
_ DVD / DVD R handling by mechanical 3-finger grippers via center hole of disc
_ Transportable to the production site with fork lift truck

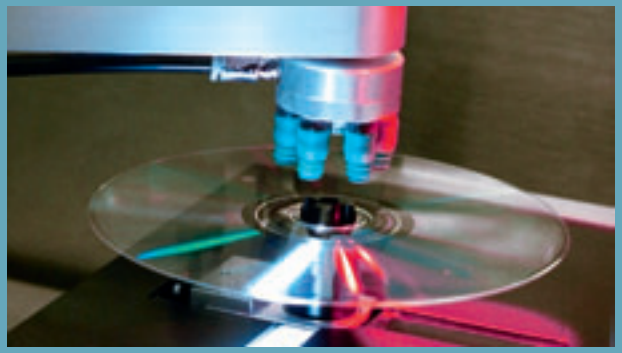
Concept

Dye Coating: Precise, controlled, perfect.
Uniform dye application, low material consumption and high production speeds – STREAMLINE III sets new standards in dye coating.

The system operates with six dye coating cups, driven by AC servomotors.



Heating. For active discs.
To remove residual solvent out of the condensed and air-dried dye film, the inspected dye coated substrates are fed into specially designed drying unit.



Metallizing: Fast, efficient, consistent.
The Streamline III uses a powerful metallizer that optimizes the process. For metallization of the molded (DVDR respectively DVD/CD substrates) with reflective material, one SINGULUS V high rate sputter module with patented SMART CATHODES® is used.

Each sputter module (SP1) is driven by a separate 10 kW (400-1000V) power supply.

Main Process Steps

1 Injection Molding
Two equal and qualified DVD R injection molding machines including DVD R molds, take-out robots and temperature control units are used.

2 Cooling System
All substrates are brought to ambient process temperature and humidity in a cooling conveyor for further processing in the dye coating unit.

3 Dye Coating Unit
The dye coating unit of the STREAMLINE III can be equipped with up to 6 process stations for the application of a layer of organic recording material onto each grooved polycarbonate substrate.

4 Take-out
There is one three-arm transfer handling system to transport the substrates from the conveyor to the dye inspection unit, to the sample take-out position and laser marker unit, and back to the conveyor.

5 Drying Unit
To remove residual solvent from the condensed and air-dried dye film, the inspected dye coated substrates are fed into the drying unit.

6 Sputtering Unit
For the deposition of a thin reflecting film (metal layer) onto the dye coated substrates, the high rate sputter unit SINGULUS V is used.

7 Substrate Conditioning
The cooling unit , with air supplied from an independent climate unit, acts as a conditioning station to ensure the layer 0 substrates are thermally conditioned for the dye coating process.

8 Edge Cleaning Stations
Removes residual dye on the edge of the dye coated and metallized layer 0 substrates.

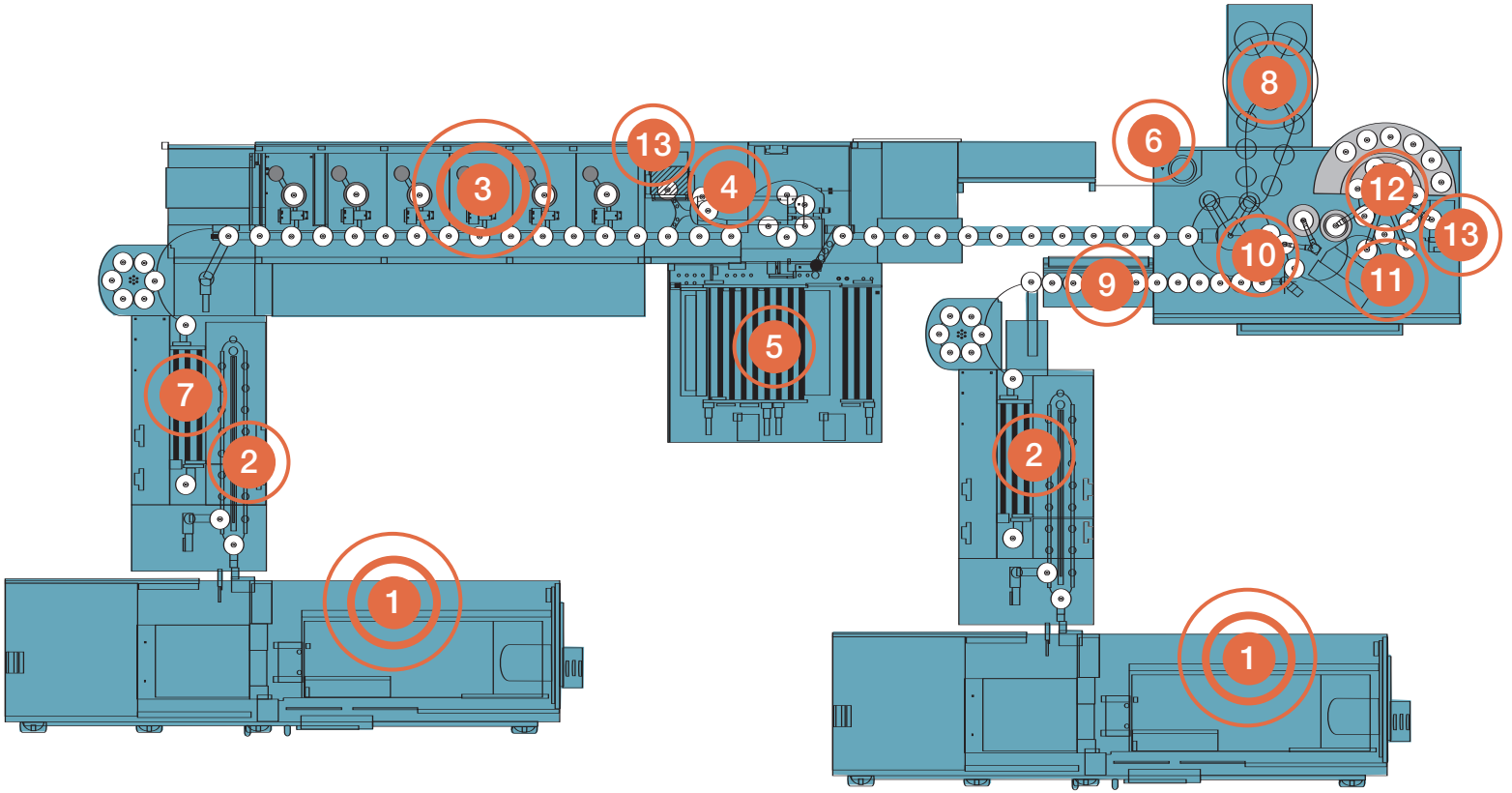
9 Transfer Conveyor
One transfer conveyor transports the blank layer 1 substrates to the bonding unit

10 Bonding Unit
Bonding takes place on a four-position turntable, where bonding material is dispensed onto the metallized and edge-cleaned information side substrates.

11 UV-Curing Station
In the UV-curing station, the discs are exposed to ultraviolet radiation to cure the bonding material by means of a radical polymerization reaction.

12 Final Cooling Conveyor
An eight-position conveyor is applied to cool each DVD R after UV-curing to ensure that the discs are in thermal equilibrium when they reach the following final quality control system.

13 Inline Quality Inspection System
A two-step inline quality inspection system is integrated in the STREAMLINE III. This concept includes the intermediate inspection of dye coated layer 0 substrates and the final inspection of the finished DVD R.



Product	**Digital Versatile Disc Recordable, Compact Disc (CD-Audio / CD-ROM / DVD 5)**
- Diameter:	120 mm
- Thickness:	Depending on disc format
- Material	Polycarbonate (PC)
- Reflective Layer:	Aluminum
- Semi-Reflective Layer:	Silver-Ag, gold and others on request
- Bonding Agent:	Qualified for UV-curing

- Total Cycle Time:	< = 2.80 seconds for DVD R
- Total Cycle Time:	2.50 s DVD 5 with clear top disc 3.40 s CD
Target Lifetime of SMART® Targets	
- Silver Ag for DVD R: (gold or others on request)	up to 90,000 at 100 nm thickness
- Aluminum for DVD 5 Full Reflective Layers:	up to 130,000 at 40 nm thickness

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