

# Moving with the times

THE OPTICAL DISC EQUIPMENT MANUFACTURERS

**TOOLEX**

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# Introduction Toolex International

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# **Toolex International** *a powerful vision for the future*

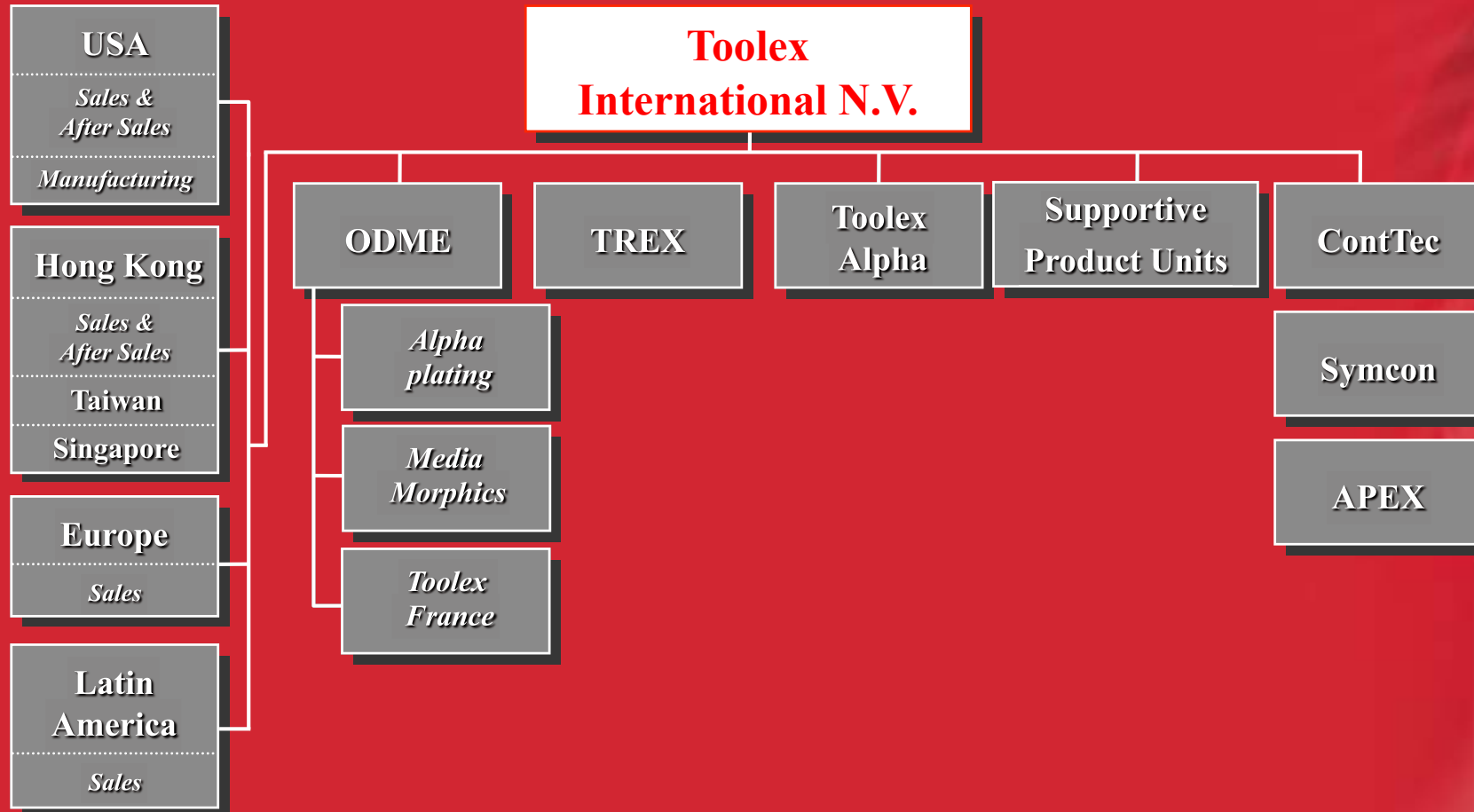
**A knowledge-based company with a  
highly-skilled, service-oriented workforce,  
leading the world in optical media mastering  
and replication technologies  
for the next century**



# History Toolex international N.V.

- 1987** Start of OD&ME
- 1991** Take over of ODM (from Philips)
- 1994** Creating Symcon
- 1995** Take over of ContTec
- 1997** Reverse take over of Toolex Alpha ODME International B.V., creating Toolex International N.V.
- 1998** Take over of Laser Optics Division Delmar
- 1998** Take over Mikab
- 1998** Take over Special Zone
- 1999** Take over Trace Optical
- 1999** Take over Digipress France

# Organisation Chart 2000



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## **Three core BU's** *focusing on what makes us the best*

- **ODME** - mastering experience at the core of our business
- **TREX** - rapidly becoming a major player in CD-R
- **Toolex Alpha** - building strongly for DVD

**All supported by focused regional sales organisations**



# Getting ready to make their own success

- **Peripheral units:  
young businesses, grown into strong companies**
- **Now ready for their independence outside Toolex**
- **Giving them freedom for the future,  
to address much wider markets**

# Toolex today *already going further*

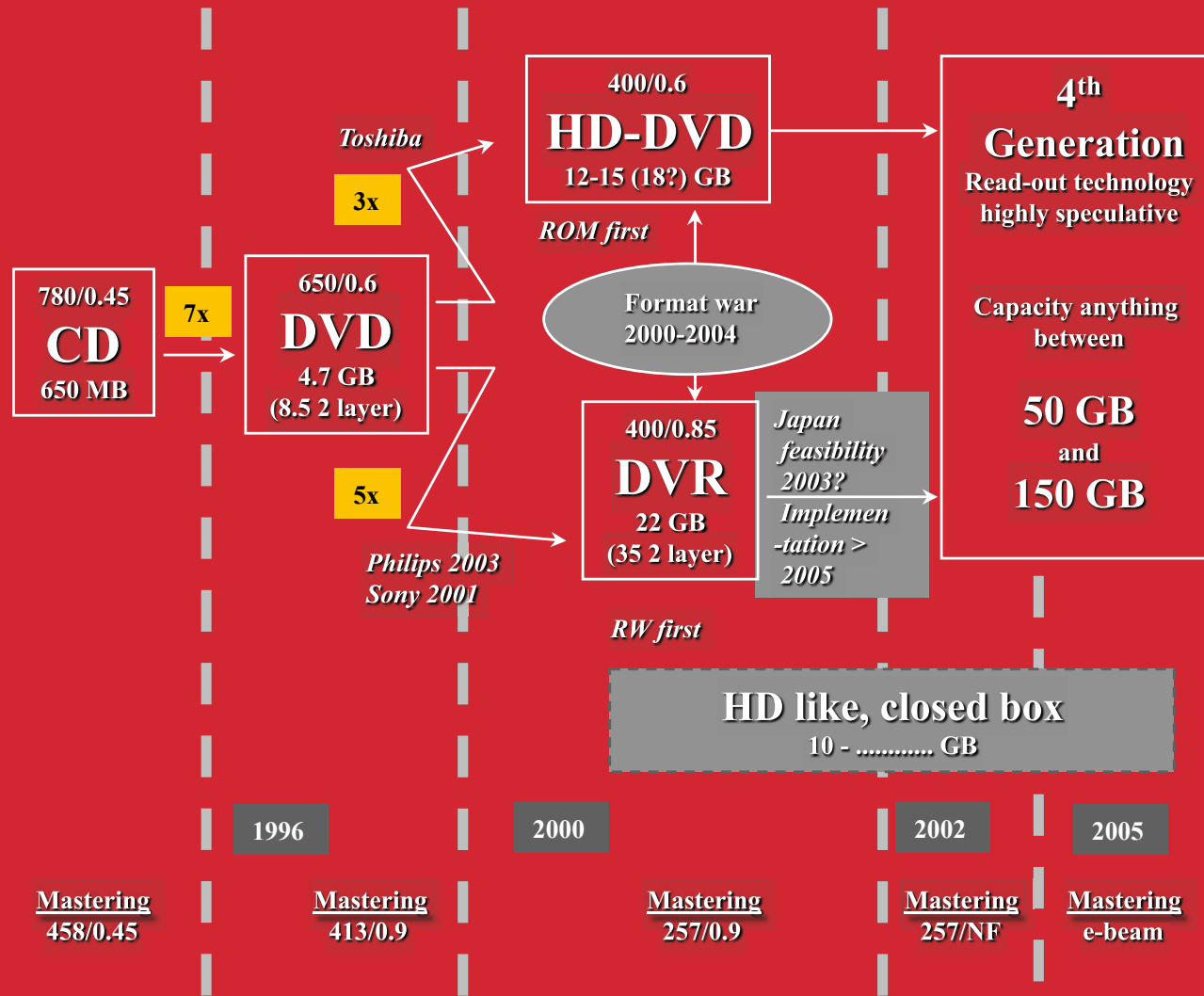
- **World leader in mastering** → **50% market share**
- **20% in CD-R replication** → **and growing fast**
- **25% in DVD replication** → **established with major DVD producers**

# We've got what it takes

- **World-beating process know-how and process technologies**
- **Mastering experience transferring directly to leadership in replication**
- **Leading-edge technology**
- **Deep understanding of customer and market needs**



# Format roadmap





**Mastering**

**ODME**

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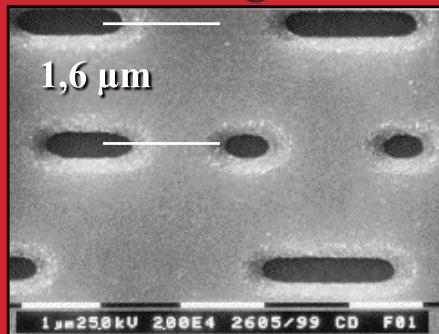
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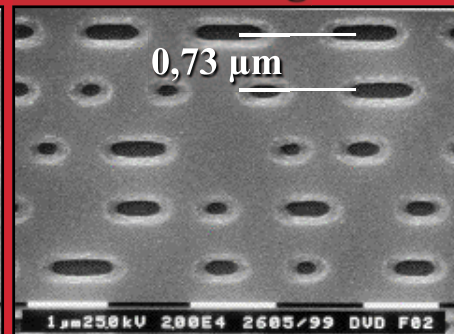
# Formats in relation to recording technology



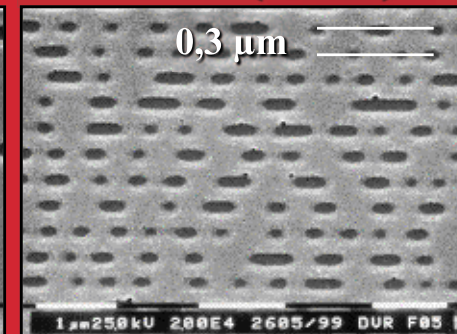
CD recording



DVD recording



DVD-RAM (25 GB) recording



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# High density today: *Second generation DVD (DVD-Rec)*

- DVD-R
  - 4.7 GB
- DVD-RAM
  - 4.7 GB
- DVD+RW
  - 4.7 GB
- Compatibility questions ?

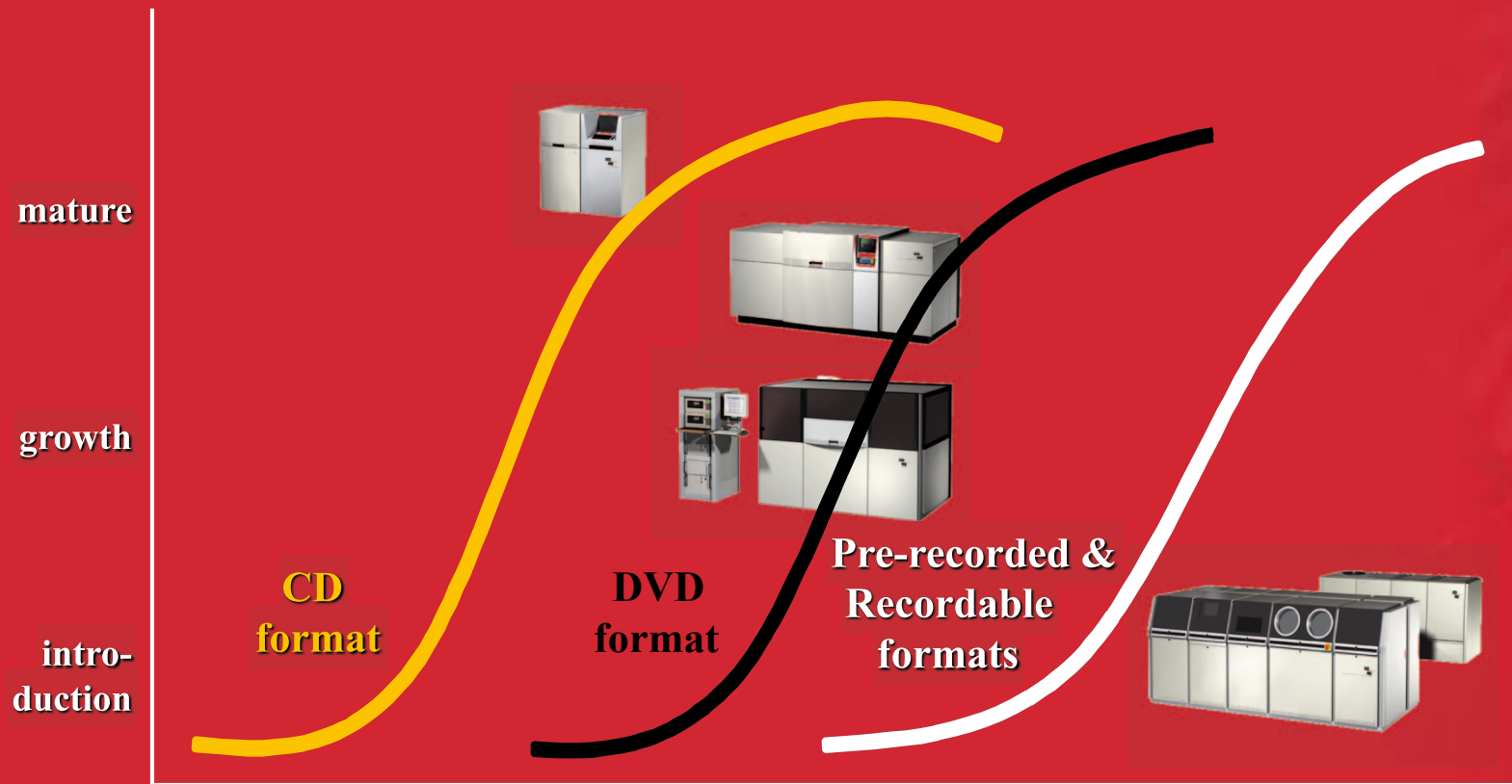
# Mastering solutions for the future

- **Mastering of current high-density formats (DVD, +RW, MO) possible using 413 nm dual beam recorder**
- **Mastering for next generations possible using optical technology**
  - **Deep UV ( $\lambda = 257$  nm), NA 0.9**
  - **High contrast photoresist process**
- **Mechanical requirements can be met by evolutionary development of existing recorder platform**

The TOOLEX logo is positioned in the bottom right corner of the slide. It features the word "TOOLEX" in a bold, white, sans-serif font. A thin red horizontal line is located directly beneath the letters "O", "O", and "L". The background of the slide is a red-tinted image of a complex optical disc mastering machine, with various lenses, mirrors, and mechanical components visible on the right side.

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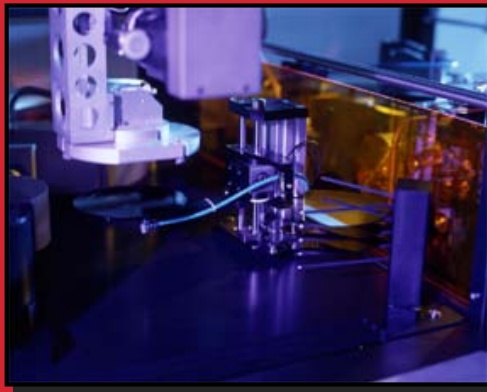
# Format life cycles and Mastering systems





# Automated Masterliner 200

- **Advanced and full automated in-line solutions for the needs of high run pre-recorded DVD production**
- **Minimum operator involvement at all stages - from photoresist coating through recording, to metallizing - thanks to fully automatic operation**



# Key factors for success

- **Integrated process quality through:  
integration of dataprocessing, mastering and electroplating**
- **Mastering solutions for different market segments.  
Systems optimized in terms of quality, performance  
and pricing**
- **Know-How of injection molding and replication of pre-recorded  
and recordable formats**

# Pre-recorded replication

## Toolex Alpha



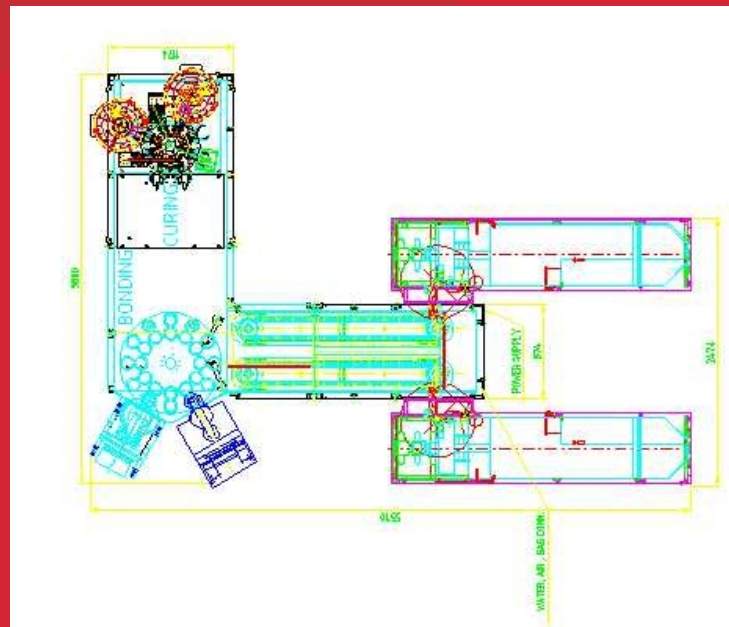
# Pre-recorded replication products

- The Miniliner plus is a small and compact, high quality single line CD/DVD-5 system that requires minimal capital investment
- The Flexliner has been developed for maximum utilisation, required for the cost-effective production of DVD-5/9/10 and CD format discs without compromising



# New DVD line

- Next generation advanced DVD system
- Highly productive DVD-5/9/10 system.  
Replacement of the Fi-Fo DVD line
- Process optimisation



# Key factors for success

- **Replication solutions for all market segments.**
- **System optimized in terms of format, output and pricing**
- **Advanced product quality through automated process optimization**
- **Stable DVD process for all DVD formats through extensive knowledge of key process technologies such as molding and bonding**
- **Overall high quality end-products (DVD replica) through: Integration of process know-how of stamper making, molding and finishing**

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# Recordable replication

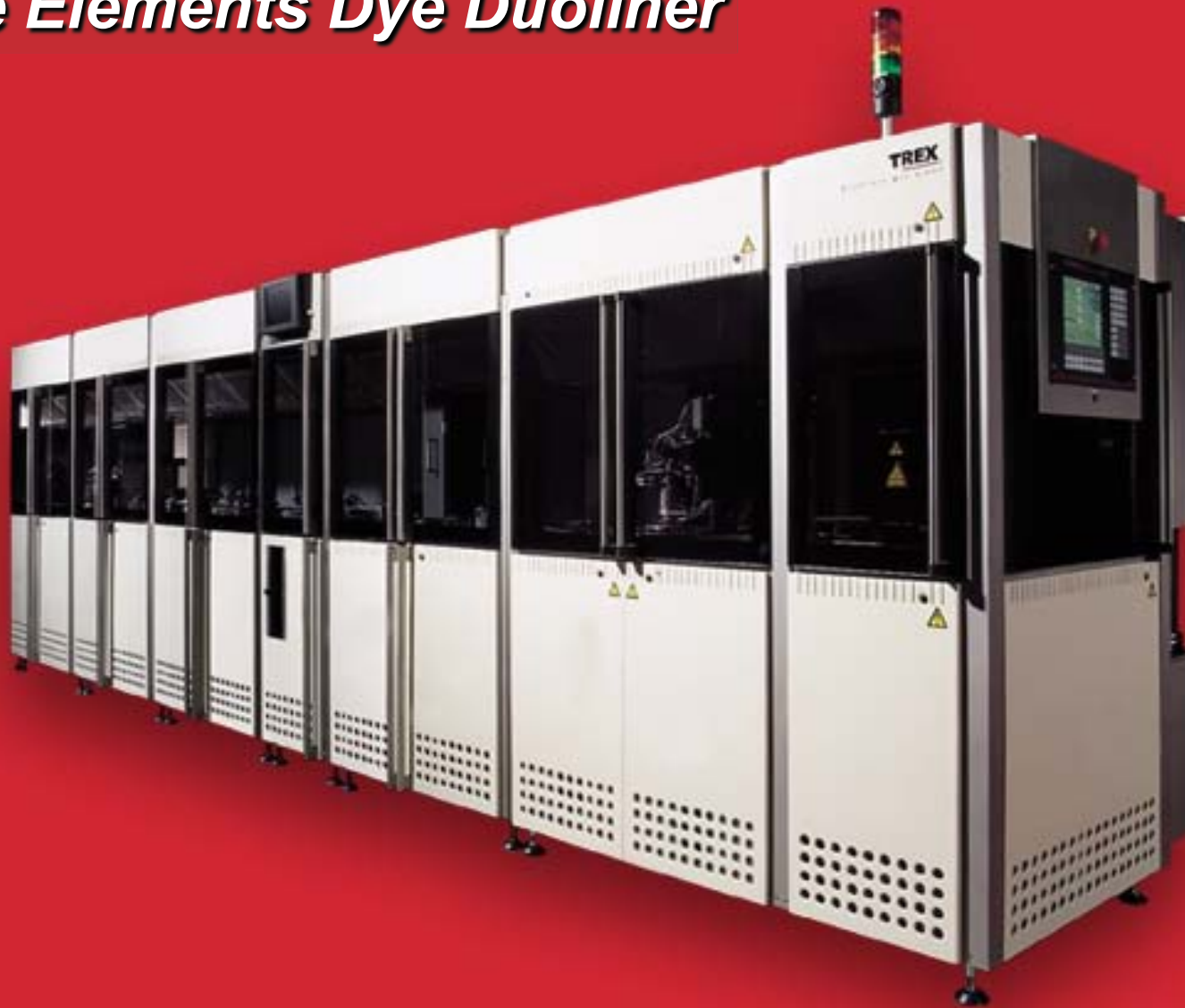
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# TREX

## *The Elements Dye Duoliner*



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# CD-R Key factors for success

- **Reliability**
- **Compatibility**
- **Fast penetration in the consumer market segment**
- **Operational software is mature and user friendly**
- **Combi Drive boost CD-R and DVD-ROM**



# Nobody goes further in offering a broad range of solutions



**CD**



**DVD**



**Recordable  
formats**



# Supportive Product Units (key technologies)

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# Knowledge

## *why we stand out from the crowd*

- **Injection moulding:**
  - optimizing tomorrow's production speed and yield
- **Process control software:**
  - higher productivity for customers, more sales for us
- **Metallizing and coating:**
  - we know how for the future
- **Transferring mastering expertise to benefit our replication systems**
- **Total systems capability**
  - we have the bigger picture!

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# Product Unit

## *Injection Molding*

### Actual status:

- 800 molding systems installed world wide

- **MoldXpress**

- CD	3.7	-->	3.5	-->	3.2 sec
- DVD	4.5	-->	4.0	-->	3.7 sec

- **Transfer of production location**
  - To accelerate developments
  - improve technical environment (molding technology, universities)
  - wide high-tech supplier base

The TOOLEX logo is displayed in a bold, white, sans-serif font. The letters 'O', 'L', and 'E' are connected, and the 'X' is also connected to the 'E'. The logo is positioned in the bottom right corner of the slide, partially overlapping a vertical image of a mechanical part.

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# Product Unit

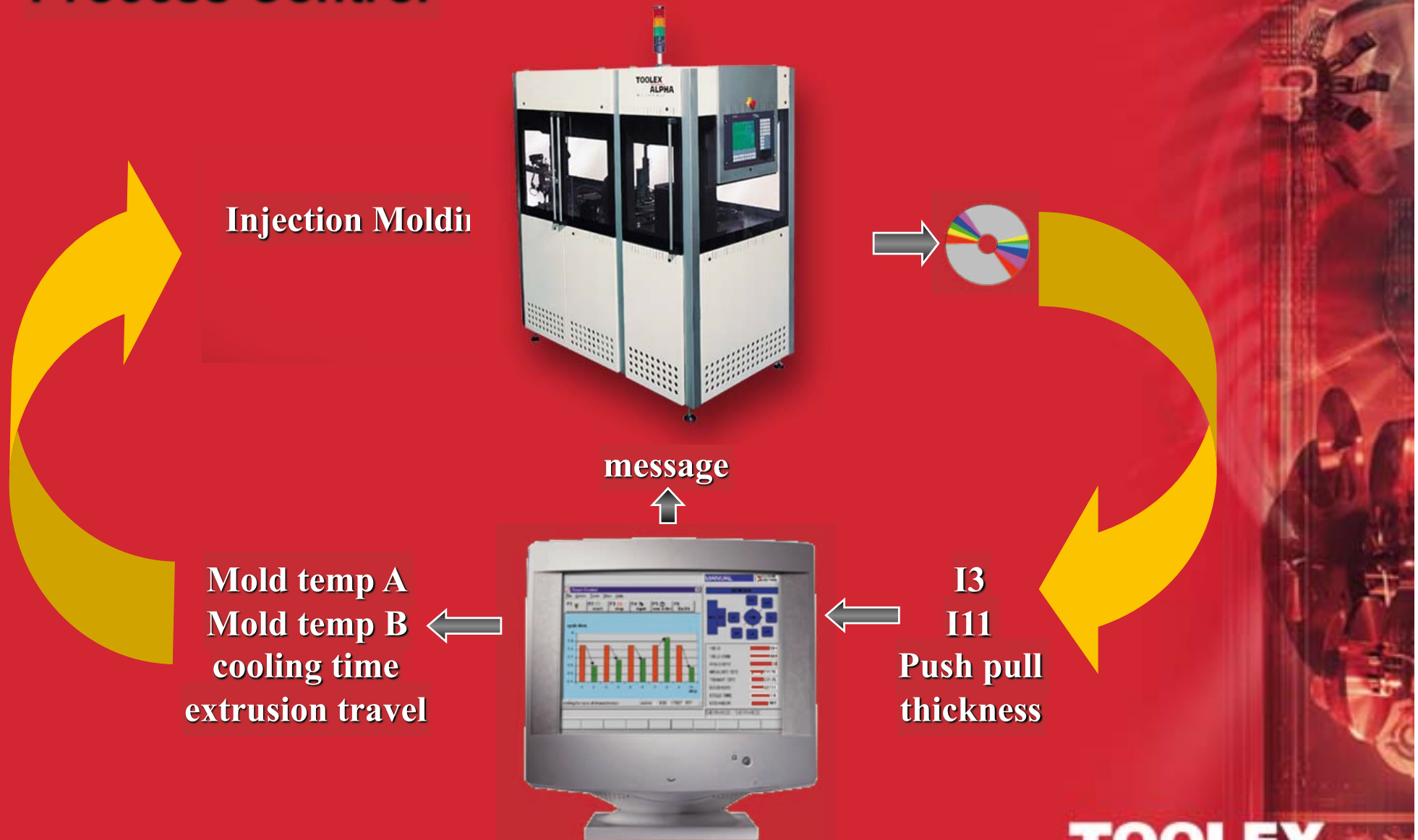
## *Process Control*

For CD, DVD and CD-R production

- **Extended Fuzzy Logic**
- **Mathematical functions**
- **Process monitoring**
- **Manual input**
- **Automated input**
- **Automated set point change**
- **Integrated (Win/NT)**
- **Configurable for different processes**



# Product Unit Process Control





# **Product Unit**

## ***Metallizing***

**Goals for the DC sputter equipment:**

- **Provide Toolex with state-of-the-art sputter equipment**
- **Provide continuous product optimization and evolution**

# Future technologies



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# Next generation data distribution and data storage concepts

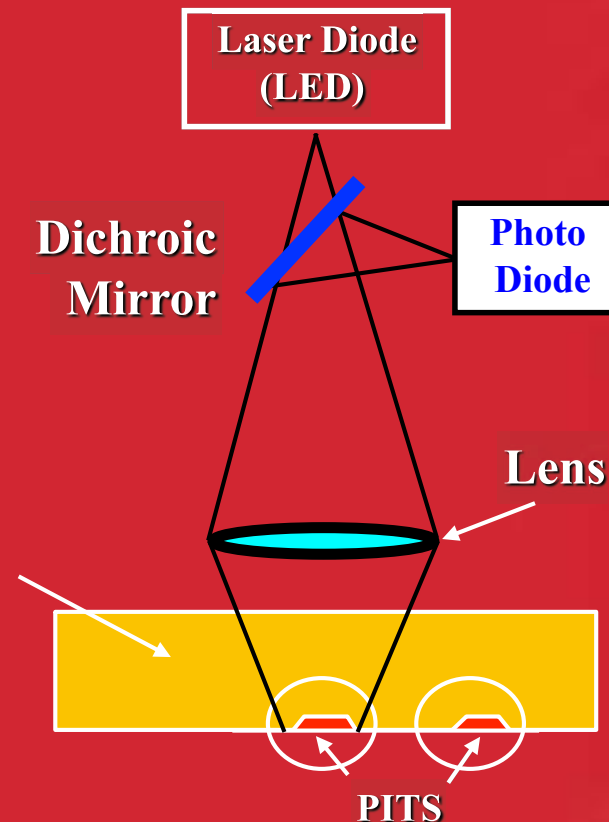
- **Typical requirements**
  - > 100 GB
  - > 100 Mb/s ?
  - Portability
- **By high-resolution mastering & high-density replication**
- **Multi-layer and image technologies**
- **Potential developments (for example):**
  - Fluorescent layer concept
  - DVR



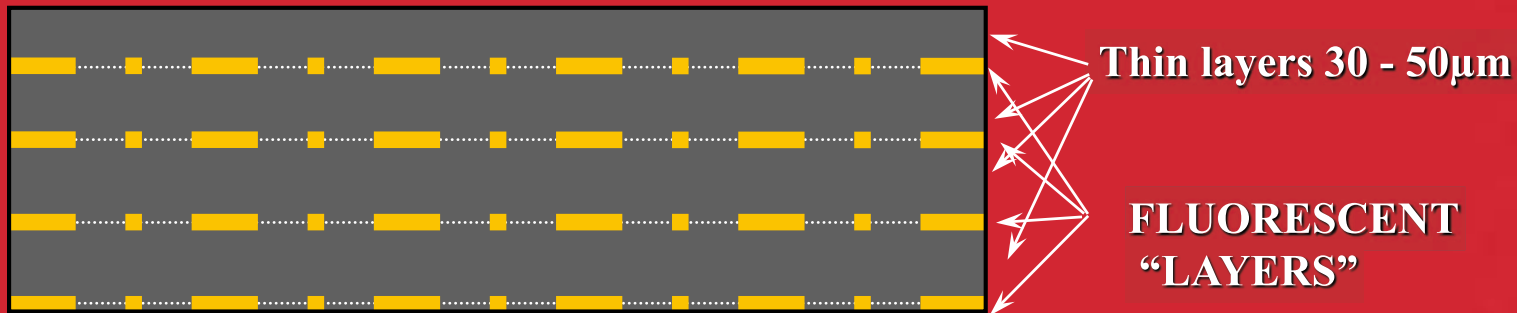
# MFD

## *Theoretical Background*

- Detection at **different wavelength** - no interaction of media with read-out light, no cross talk, no reflection, no scattering, no refraction
- **Non coherent** response - no interference, wide tolerances
- High-resolution
- **Parallel reading** is feasible, CCD device type detection
- **High S/N ratio**, high contrast



# Multi-layer Fluorescent Disc Structure Concept



*Up to 40 layers ?*

## Potential MFD advantages

- **Low sensitivity** to the disc tilt
- More margin for birefringence
- Parallel reading principles:  
**multi-track** and multi-layer **reading is feasible**

# Status

- **CDDD**
- **Up to 20 layers CD density demonstrated**
- **Thin film production technologies under development**
- **Proto-type ROM systems**



# Involvement of Toolex

## Toolex involvement:

- **Supplier of dedicated stampers and provider of specific hardware modules and testers for feasibility studies and system development**
- **Exclusive partner for reviewing the associated technical issues in order to go for a cooperation for developing the production technology and equipment for large scale production**
- **Consulting CDDD on system related issues including standardization and consortium formation**



Nobody  
goes further

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