

**Fujifilm Recording Media Division
FUJIFILM ATOMM TECHNOLOGY**

FUJIFILM



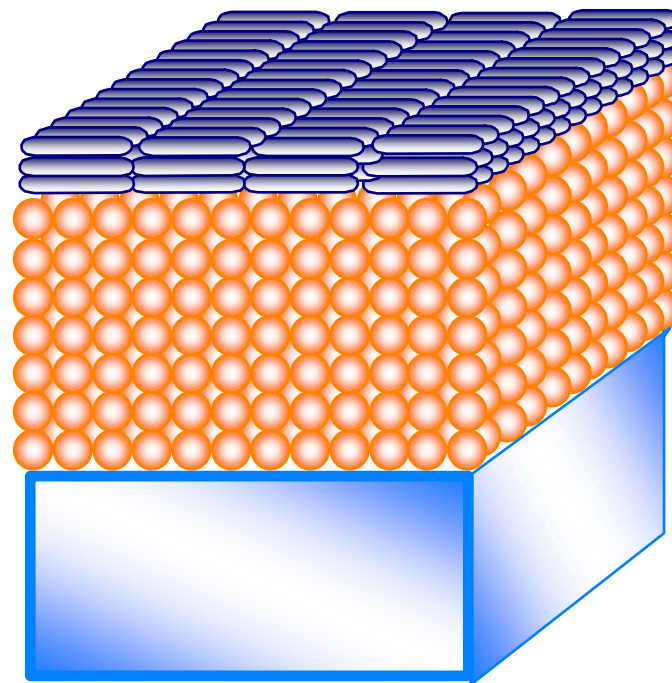
-- Its Benefits and Applications --

**Fujifilm ATOMM Technology Seminar
March 10, 2008**

**Fujifilm Recording Media Division – Fujifilm U.S.A., Inc.
For Additional Information Call 1-800-488-FUJI (3854)
Visit Our Website: www.fujifilmusa.com/tapestorage**

Developments in Ultra Thin-Coated Media

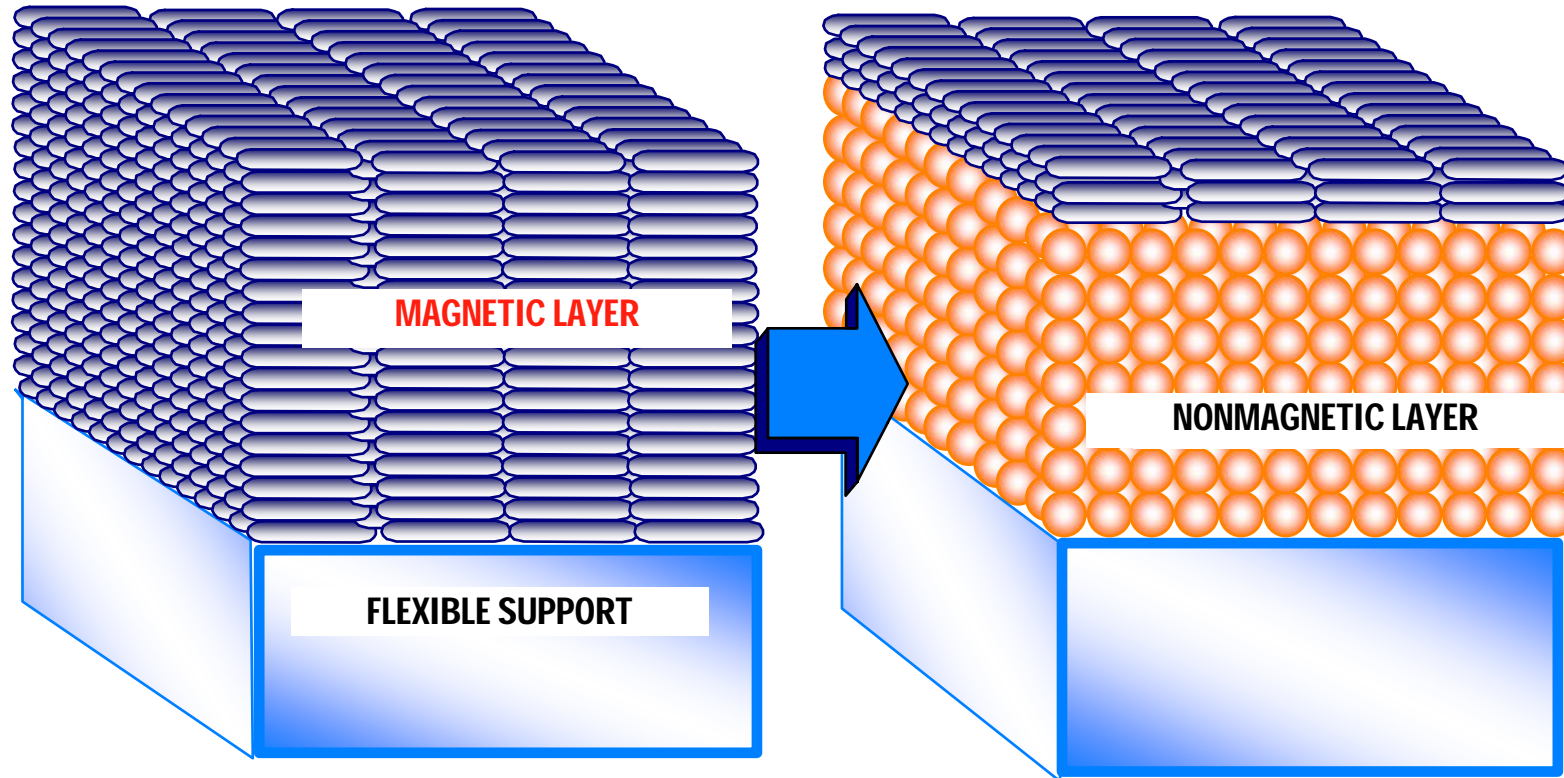
Fujifilm ATOMM Technology



Advanced super
Thin-layer and high-
Output
Metal
Media

ATOMM TAPE TECHNOLOGY

Ultrathin magnetic layer with double layer structure



Standard MP

ATOMM

ATOMM APPLICATIONS

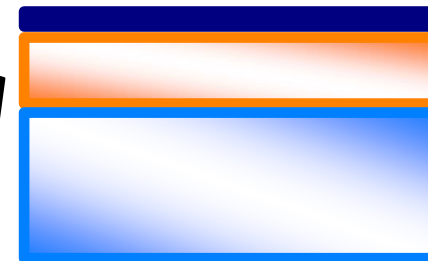


Advanced MP Tape

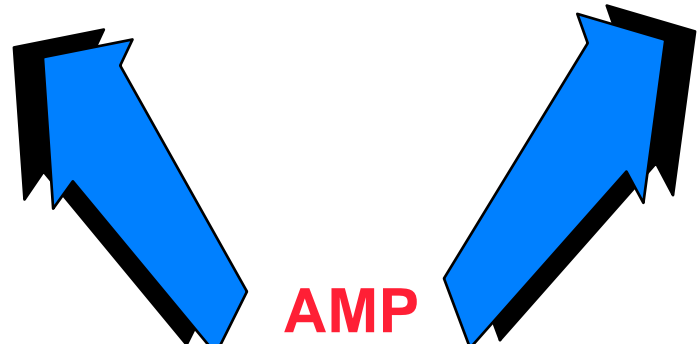


- DDS3
- DDS4
- LTO Ultrium 1
- Super DLT tape I
- LTO Ultrium 2
- DTF-2
- DAT-72
- LTO Ultrium 3
- Super DLT tape II
- DLTtape S4

High Density Diskette



- Zip-100
- HiFD
- Zip-250
- Zip-750



AMP



- DLTtape IV
- Improved D8



MP

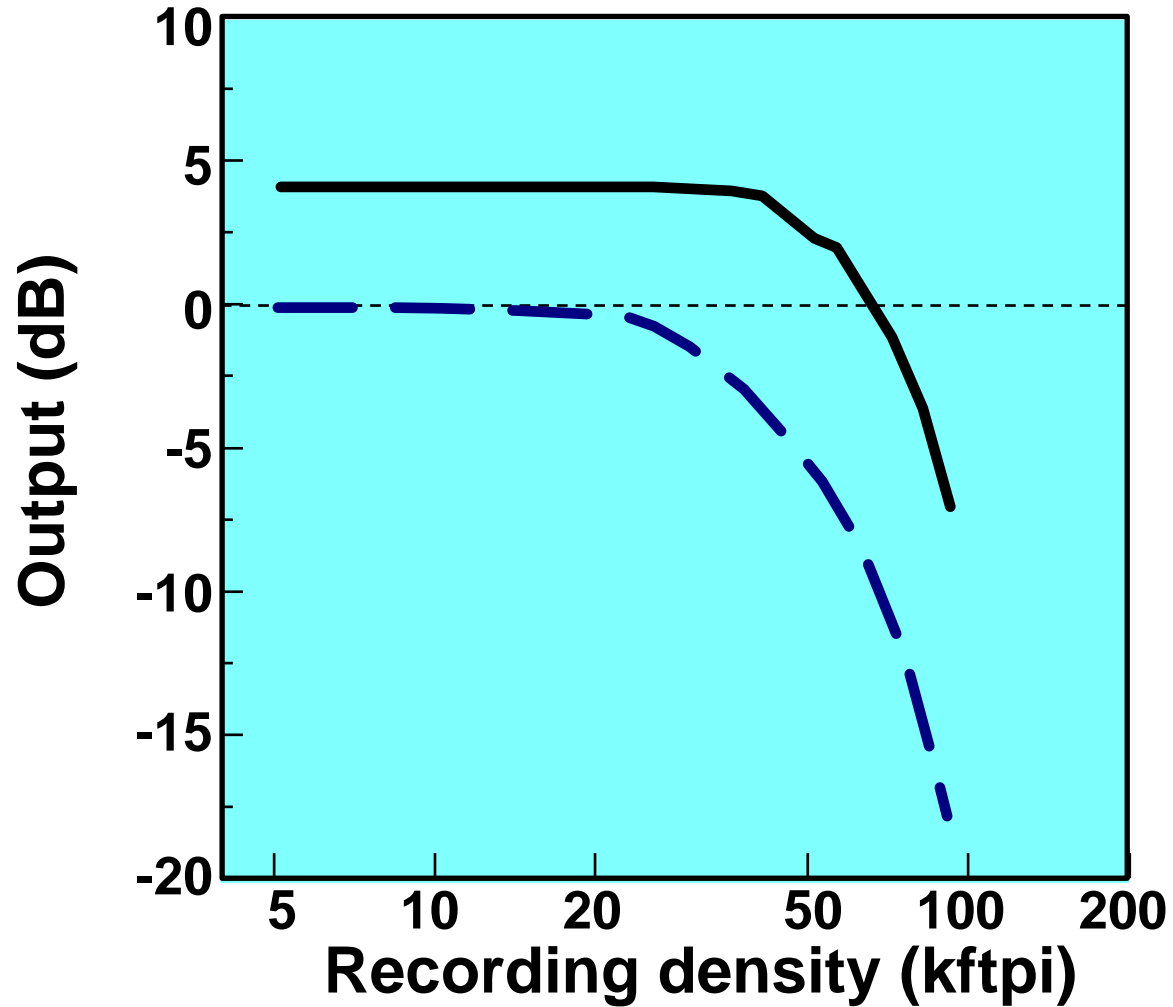


- DLTtapelll
- DDS1 & DDS2
- D8

Advantages of ATOMM

- Higher Output at Short Wavelength
- Lower Noise - Smoother Surface
- Superior Running Durability
- More Environmentally Stable
- Mass Production

Recording Density Characteristics



ATOMM

MF - 2HD

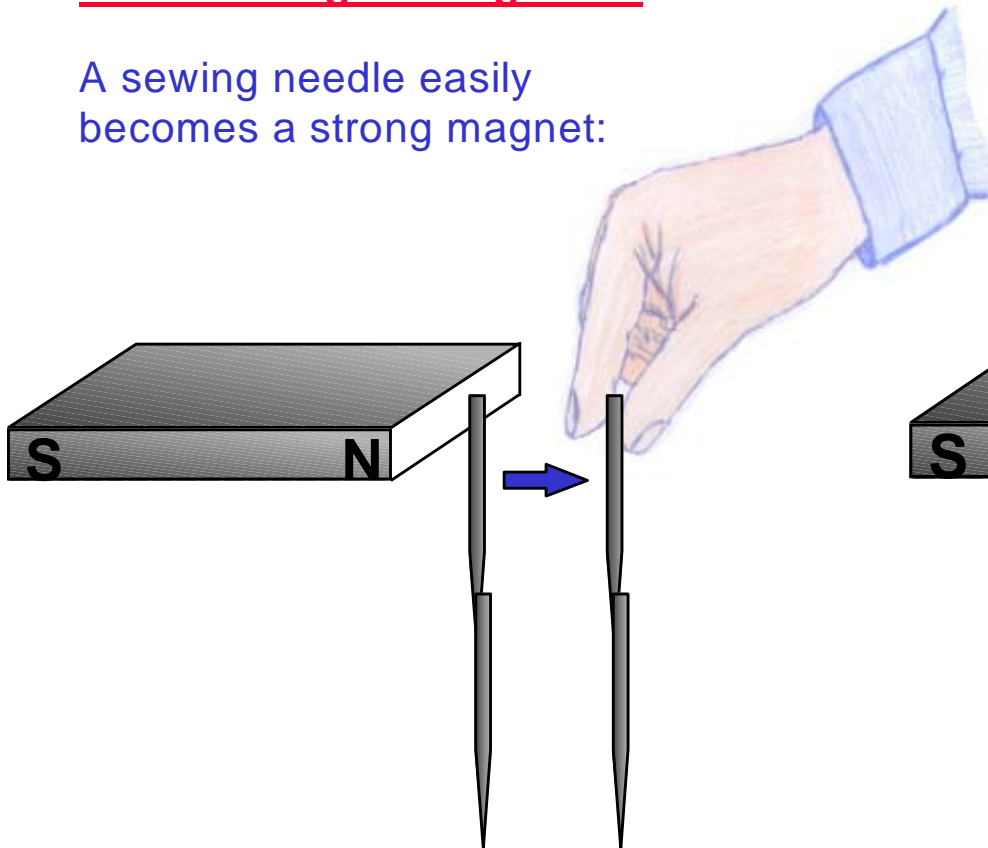
ATOMM-DISK has an 8db higher signal output than conventional floppy disks at 50 Kftpi.

A thinner magnetic layer creates a stronger magnetic signal at higher densities (short wavelength signals).

Coating thicknesses beyond a thickness equal to $1/4$ to $1/3$ of the recording wavelength (bit length) reduces the magnetic signal through the demagnetization effect.

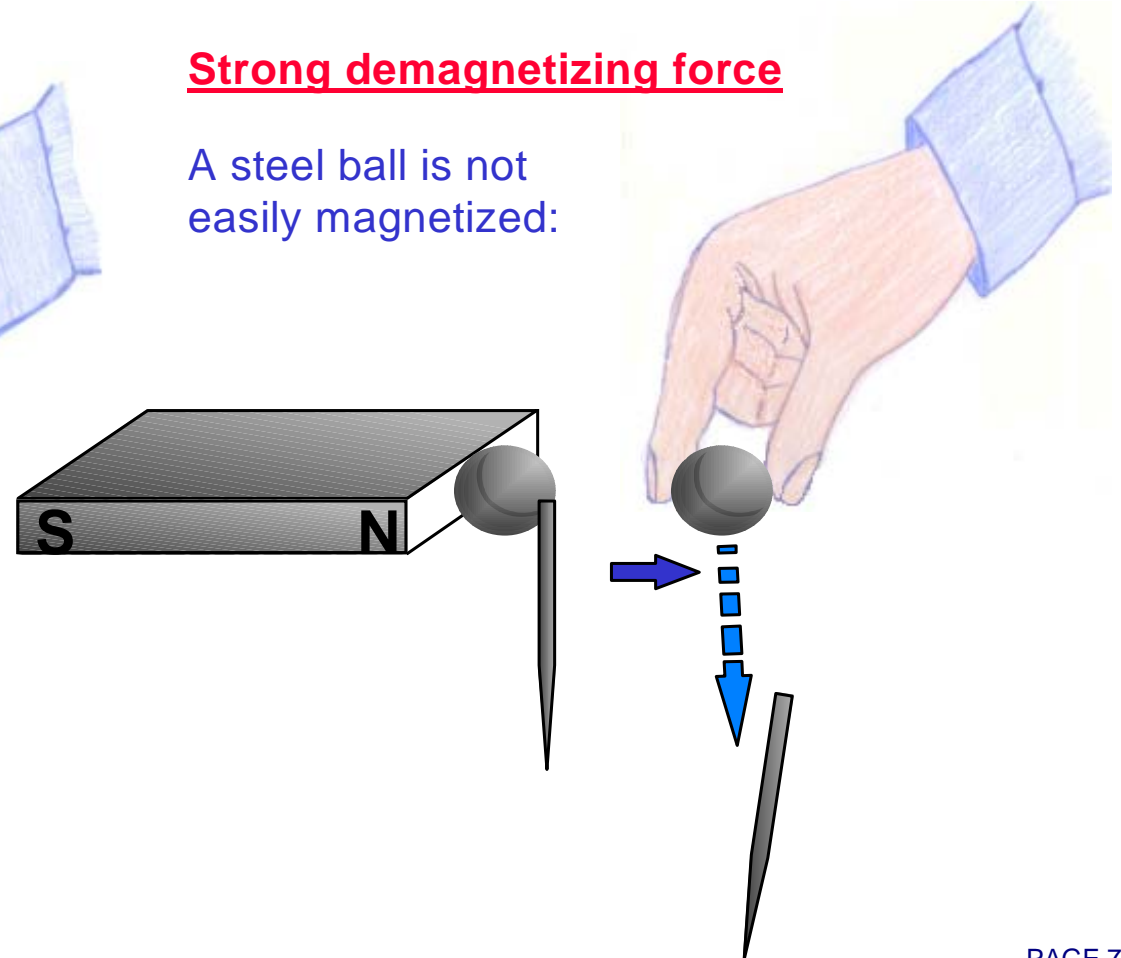
Weak demagnetizing force

A sewing needle easily becomes a strong magnet:



Strong demagnetizing force

A steel ball is not easily magnetized:

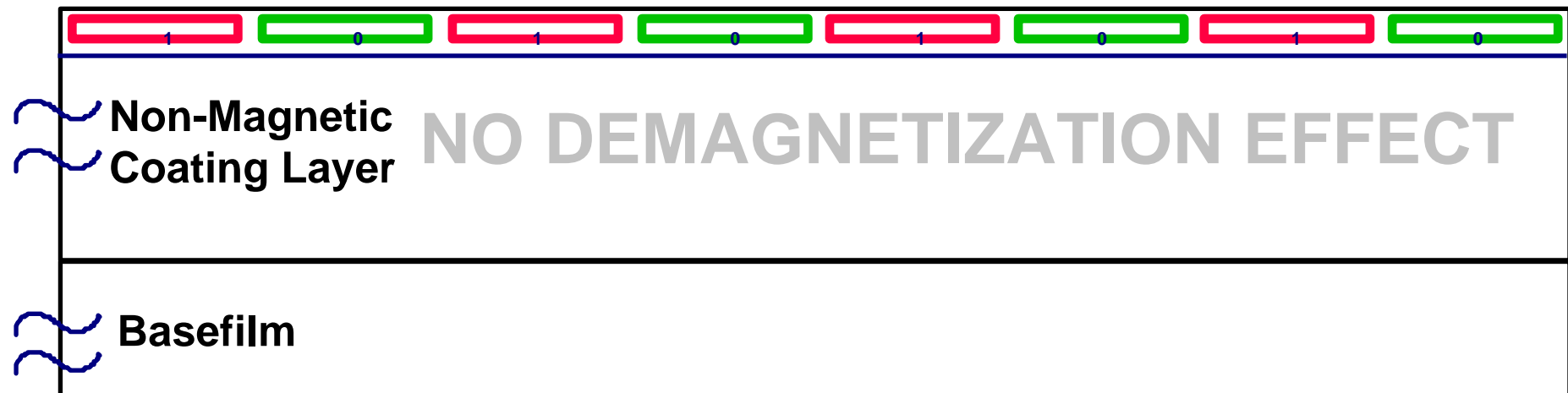
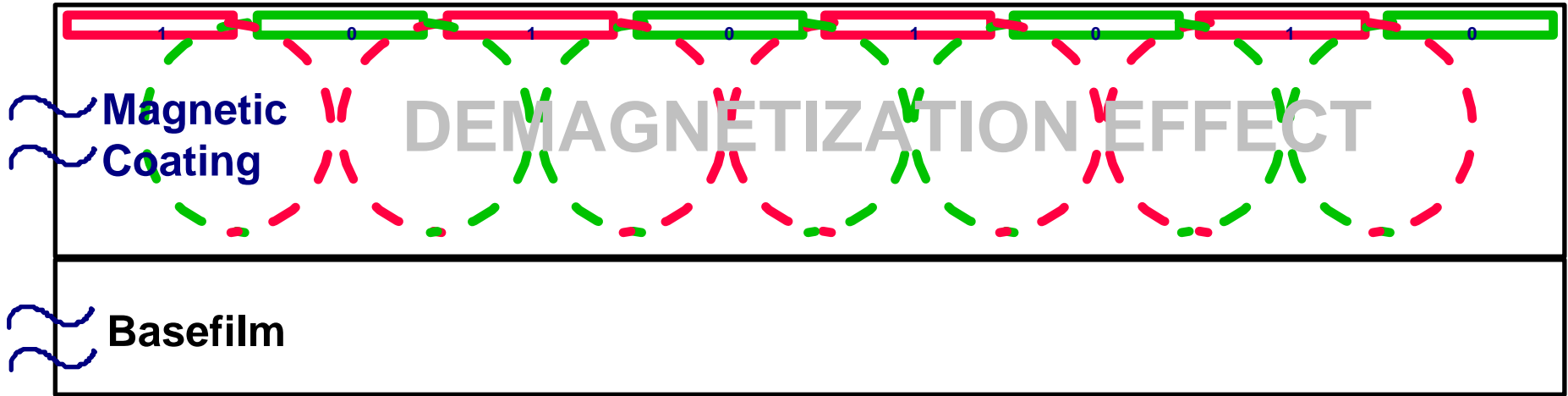


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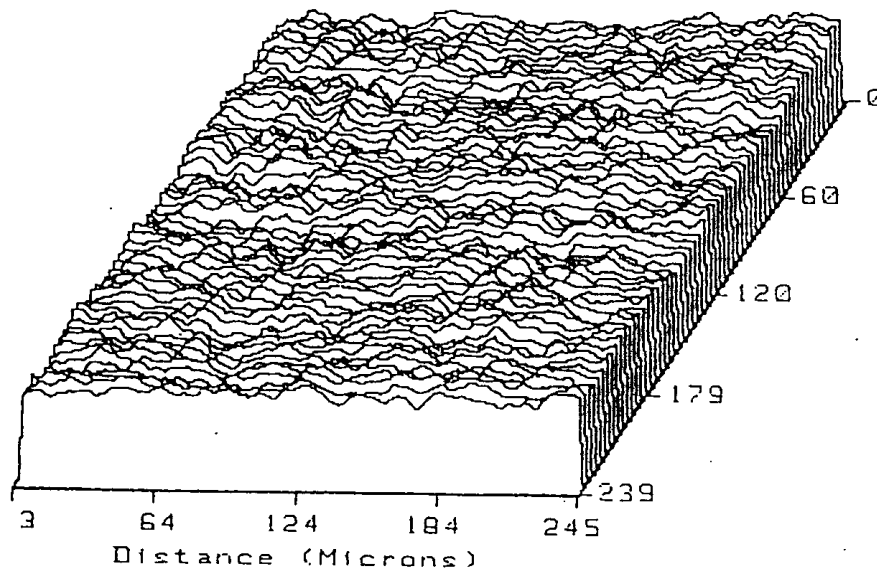


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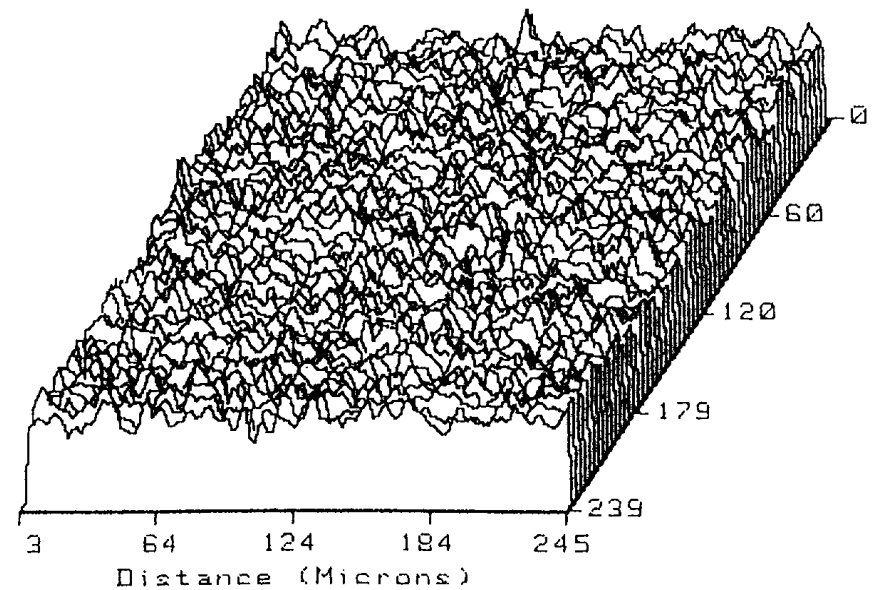
FUJIFILM



Smoother Surface of **ATOMM** Technology



Thin layer MP
(ATOMM Media)



Conventional MP

Superior Wear Resistance

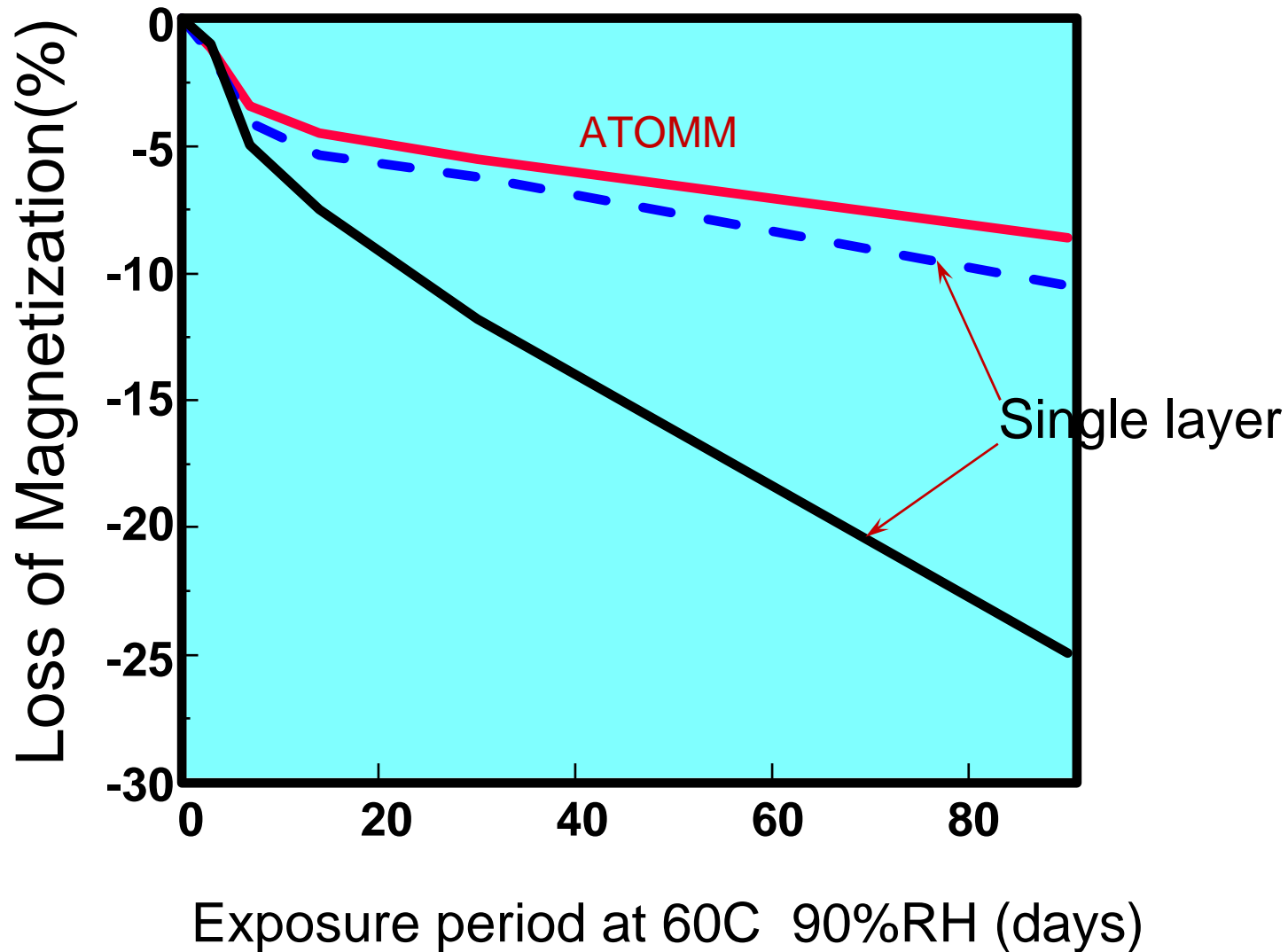
ATOMM's Smoother Surface → More stable clean running performance.

Fujifilm's High Molecular Weight Binder with Advanced Stability → Resists time fatigue and environmental effects.

ATOMM's Better Lubricant Replenishment → Lubricant optimization in both layers with lower-layer reservoir function for longer lasting protection.

ATOMM's Lower-Layer Cushioning Function → Better head-to-media contact and durability.

Storage reliability of ATOMM

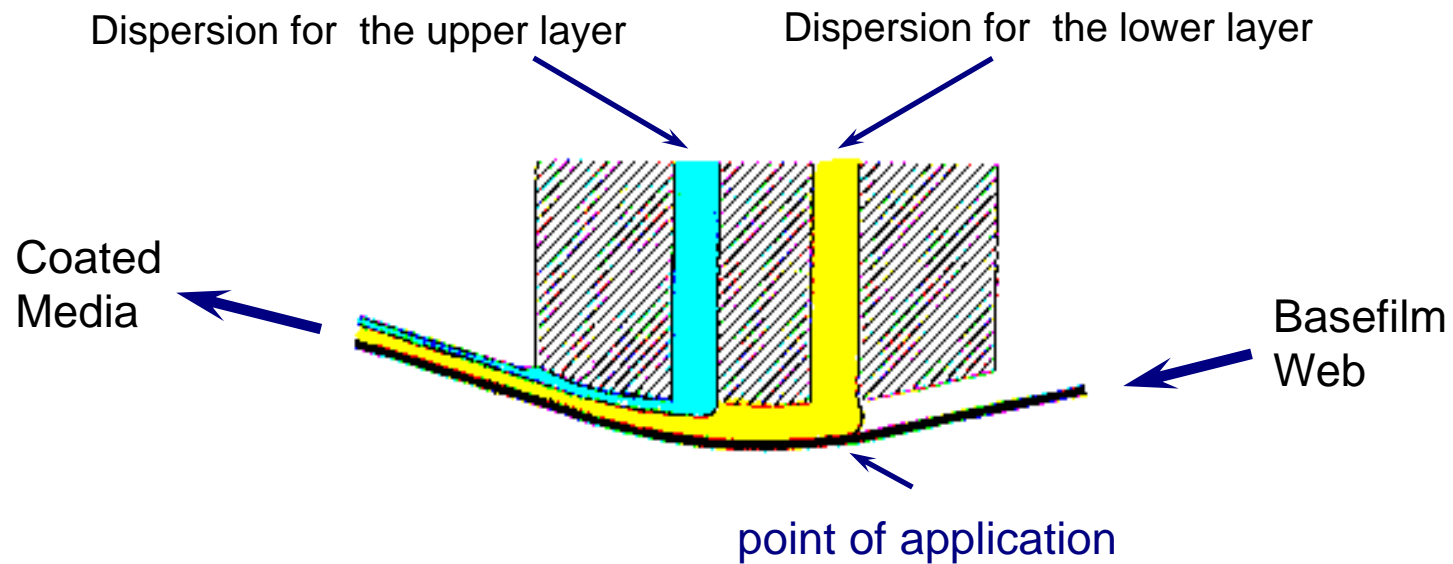


ATOMM - TECHNOLOGY

Performance Benefits

- **High Capacity** - Achievable by Upper Layer with Dual Coating
- **High Output** - Attributable to Thin Magnetic Upper Layer
- **Excellent Durability** - Attributable to MP with Titan-Fine Lower Layer
- **Better Archival Life** - Attributable to Thin Magnetic Layer

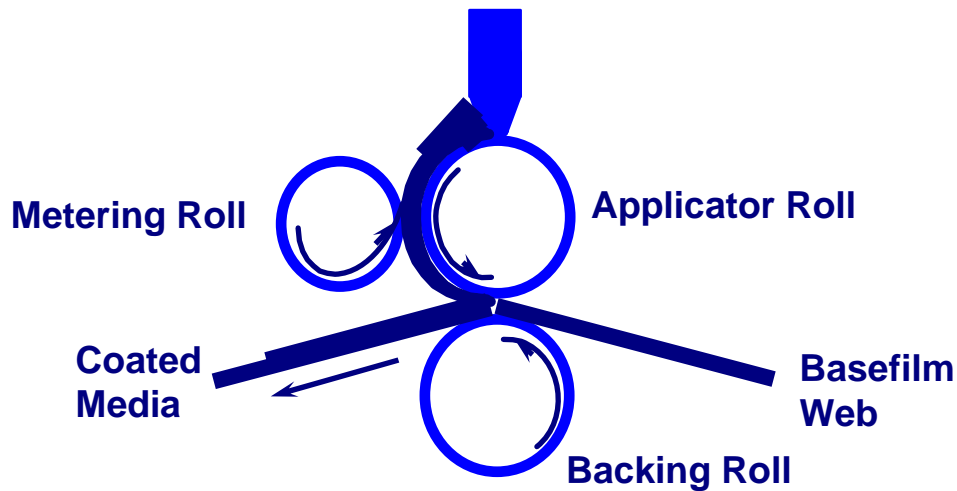
Fujifilm began coating motion picture and photographic film in the mid 1930's using die coating technology. In 1960 simultaneous multi-coating technology was developed. Also in 1960, Fujifilm produced its first magnetic tape products. In 1965, Fujifilm began manufacturing computer tape. Fujifilm's computer floppy disks were introduced in 1977. Fujifilm began manufacturing dual-coated magnetic media in 1989 and ATOMM dual-coated media in 1992. For ATOMM, Fujifilm's special die coating head applies two separate formulation layers at different depths and thicknesses simultaneously.



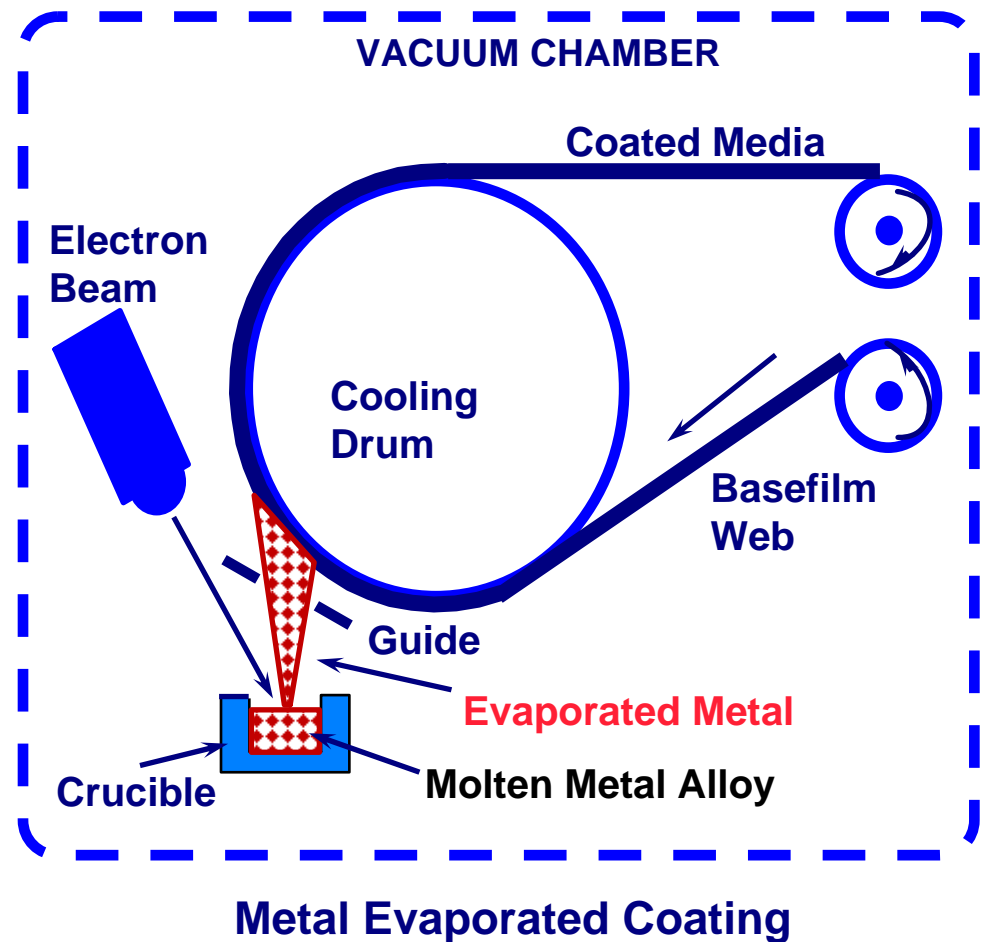
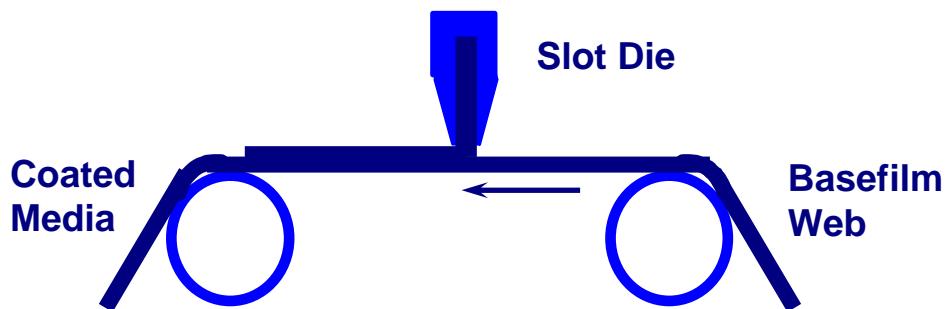
Fujifilm Simultaneous Dual-Coating Method

Coating Technologies

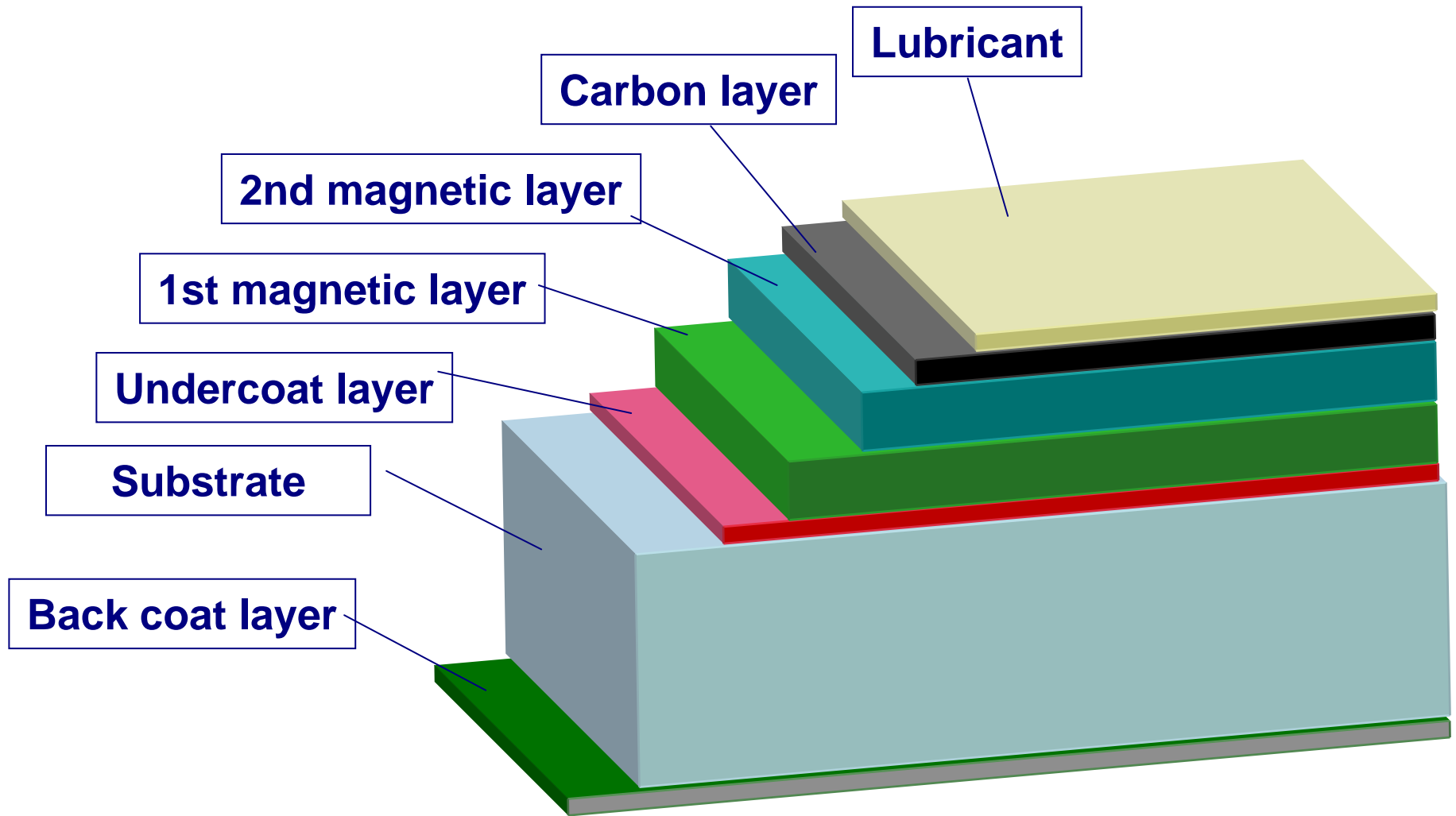
Reverse Roll Coating



Slot Die Coating

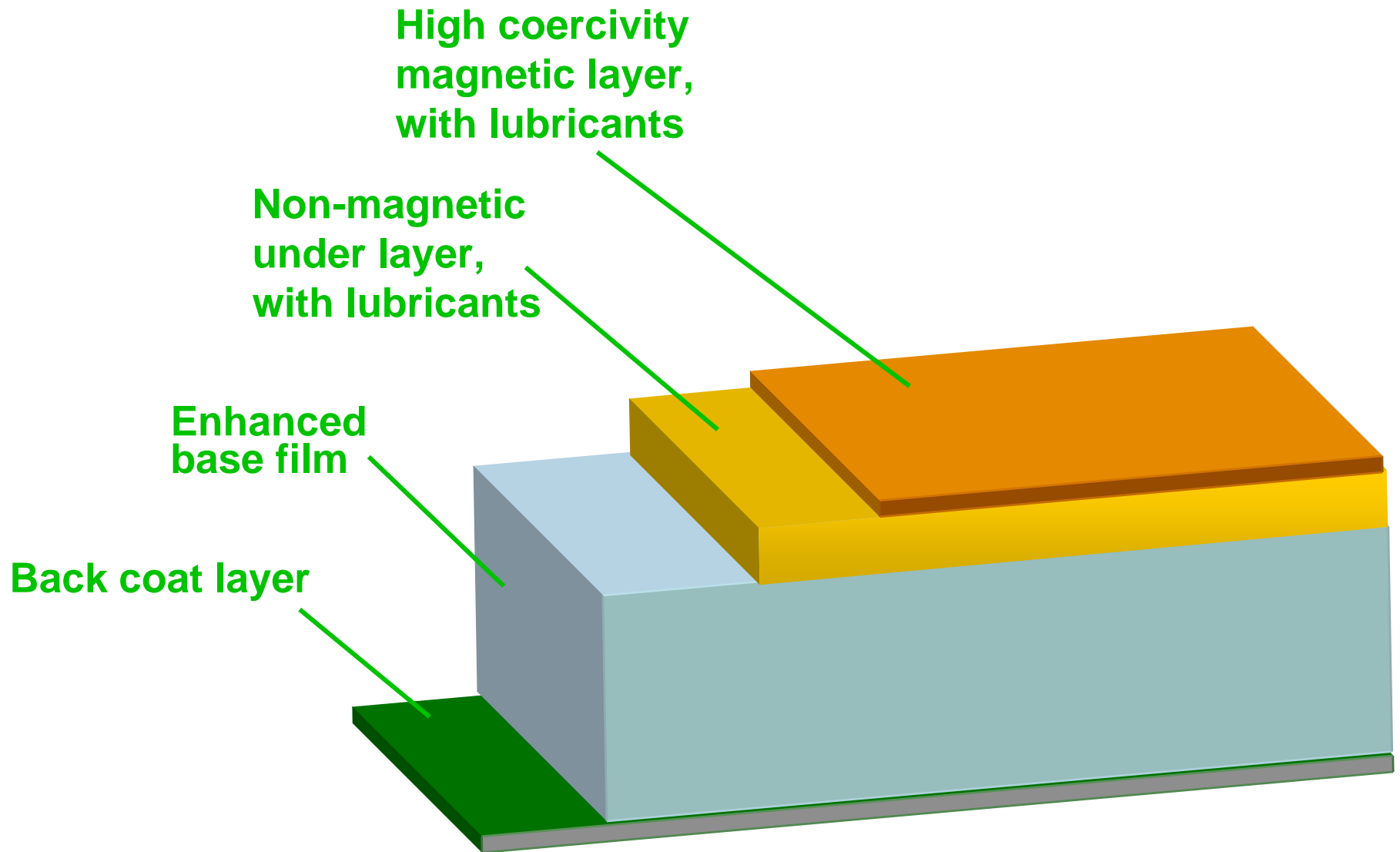


AME Media Structure*



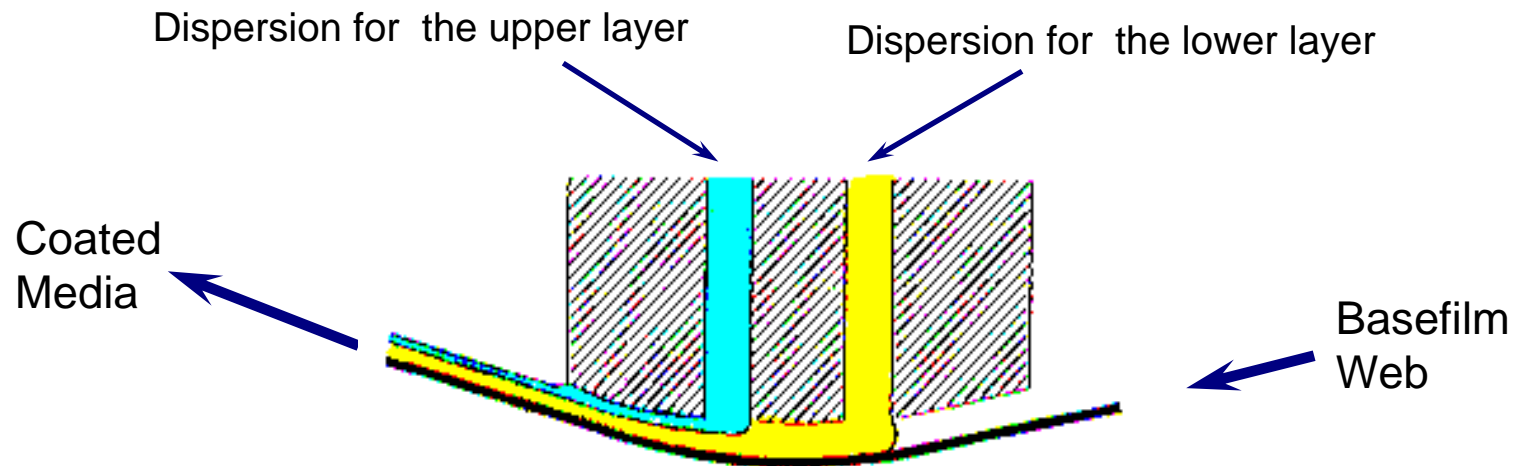
*Not to Scale

ATOMM Media Structure*



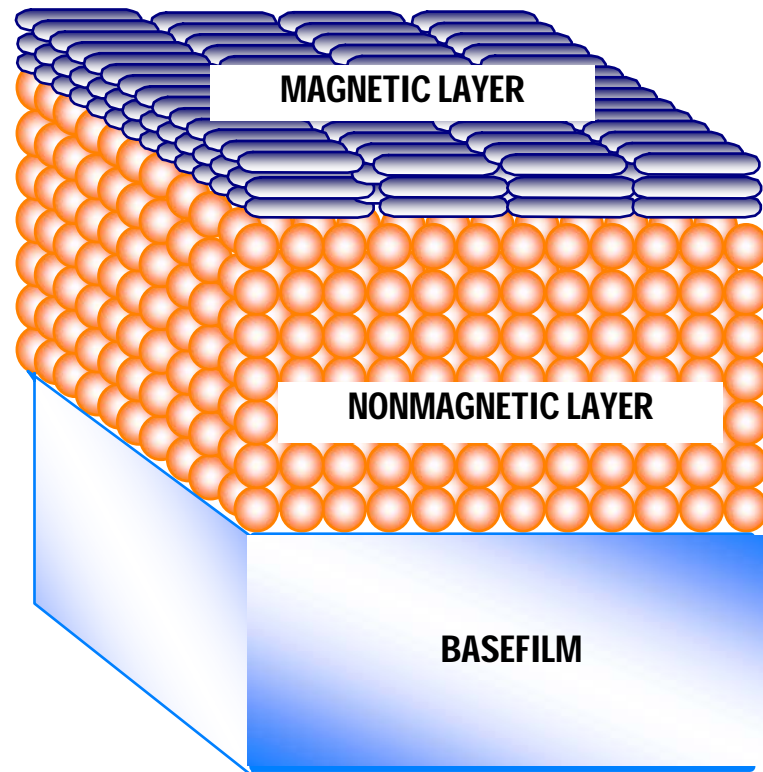
*Not to Scale

Fujifilm has *always* employed the die-coating manufacturing process!



Fujifilm Developed the Simultaneous Dual-Coating Process Technology Using a Die-Coating Method.

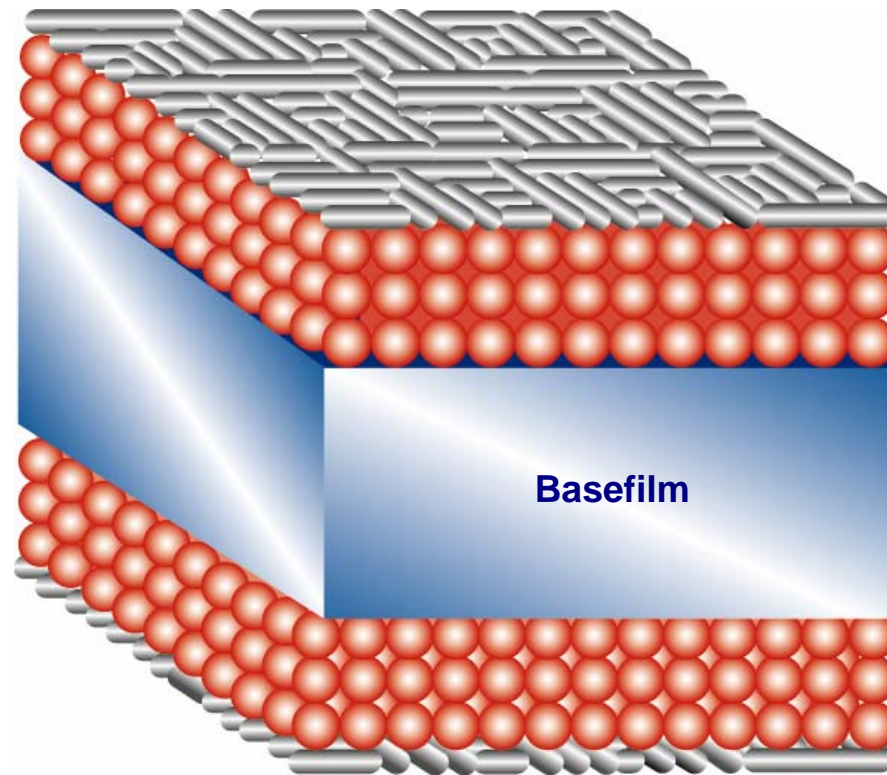
Ultrathin magnetic layer with double layer structure



ATOMM DISK TECHNOLOGY

FUJIFILM

Ultra-thin magnetic layer with double layer structure, coated on both sides of the base film material:



All Fujifilm Metal Particle (MP) Media is Designed for Minimum Errors and Maximum Durability:

◆ Coating Processes

- Superior Die Coating
- Super-calendering
- Optimized for Each Technology

◆ Advance Superfine Metallic Particles

- High Signal Strength (Output)
- Better Data Reliability (Lower Errors)
- Optimized for Each Technology

◆ Ultra-Stabilizing Particle Overcoat

- Stable Signal Retention
- Longer Data Retention (Archival Life)

◆ 3-D Network Binder System

- Resist Time Fatigue (Long Archival Life)
- Exceptional Wear Resistance (Durability)
- Clean Running (No Head Clogging)

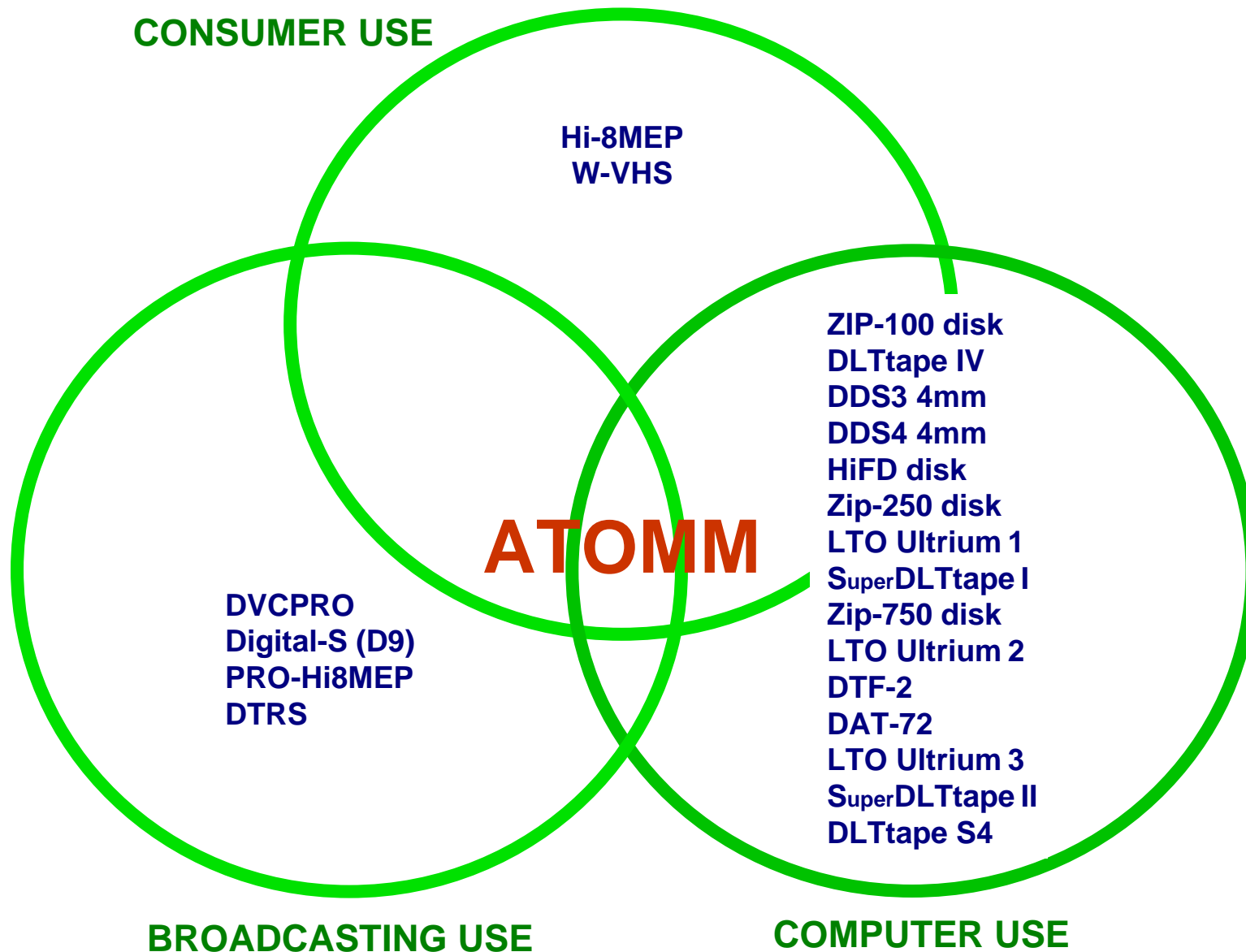
◆ Solid & Liquid Lubrication System

- Optimized for Each Technology
- Reduced Tape and Head Wear
- Superior Runnability & Durability

◆ SDR Anti-Static Backcoating

- * Applicable to Tape Media Only!
- Guards Against Dust & Debris Attraction
- Stable/Precise Clean-Running

Application of ATOMM Media



Application of **ATOMM** Technology



- 1992: World's First ME Position Hi-8 MP Video Tape
- 1993: World's First Hi-Definition Video Tape (W-VHS)
- 1994: ATOMM-DISK Technology Announced
- 1994: First ATOMM Computer Tape (DLTtapeIV)
- 1995: First ATOMM Computer Disk (ZIP) 100MB
- 1996: First Professional Video Tape (DVCPRO)
- 1996: Fujifilm Data 8mm Tape Renewed by Dual-Coating
- 1996: Fujifilm ATOMM DDS3 (4mm - 125m)
- 1999: HiFD 200 MB 3.5" Floppies
- 1999: ZIP-250 Disk
- 1999: Fujifilm ATOMM DDS4 (4mm - 150m)
- 2000: LTO Ultrium 1 100 Gigabyte Data Cartridge
- 2001: SuperDLTtape I 160 Gigabyte Data Cartridge
- 2002: Zip-750 Disk
- 2002: LTO Ultrium 2 200 Gigabyte Data Cartridge
- 2003: DTF-2 200 GB Large Cartridge
- 2003: DAT-72 36 GB 5th Generation DDS Data Cartridge
- 2004: LTO Ultrium 3 400 Gigabyte Data Cartridge
- 2005: SuperDLTtape II 300 Gigabyte Data Cartridge
- 2006: DLTtape S4 - 800 Gigabyte Data Cartridge

Tape & Disk Drives – Using ATOMM Media



Drive System	Tape Media	Native Capacity	Native Data Rate
DLT S4	DLTtape S4	800 GB	60 MB/s
LTO Ultrium 3	LTO Ultrium 3	400 GB	68 – 80 MB/s
SDLT-600	SuperDLTtapell	300 GB	36 MB/s
DTF-2	DTF-2	200 GB	24 MB/s
LTO Ultrium 2	LTO Ultrium 2	200 GB	20 – 40 MB/s
LTO Ultrium 1	LTO Ultrium 1	100 GB	7.5 – 20 MB/s
SDLT-320	SuperDLTtapel	160 GB	16 MB/s
SDLT-220	SuperDLTtapel	110 GB	11 MB/s
DLT1 & VS80	DLTtape IV	40 GB	3 MB/s
DLT 8000	DLTtape IV	40 GB	6 MB/s
DAT-72	DAT-72 170M	36 GB	3.5 MB/s
DLT 7000	DLTtape IV	35 GB	5 MB/s
DLT 4000	DLTtape IV	20 GB	1.5 MB/s
DDS4 4mm	150M	20 GB	2.4 – 3 MB/s
DDS3 4mm	125M	12 GB	1.0 – 1.5 MB/s
D8 EXB8505 XL	QG-160M*	7 GB	0.5 MB/s
D8 EXB8505	QG-112M*	5 GB	0.5 MB/s
Bernoulli™230	5 ¼" Disk**	230 MB	2.7 MB/s
HiFD	3.5" Disk	200 MB	3.6 MB/s
Zip 750	3.7" Disk	750 MB	7 MB/s
Zip 250	3.7" Disk	250 MB	1.7 MB/s
Zip 100	3.7" Disk	100 MB	1.4 MB/s

ATOMM APPLICATIONS

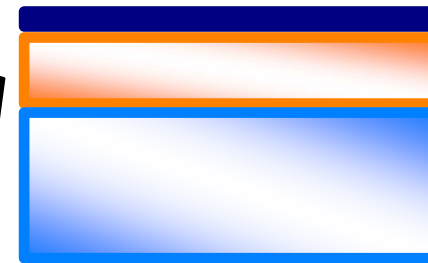


Advanced MP Tape

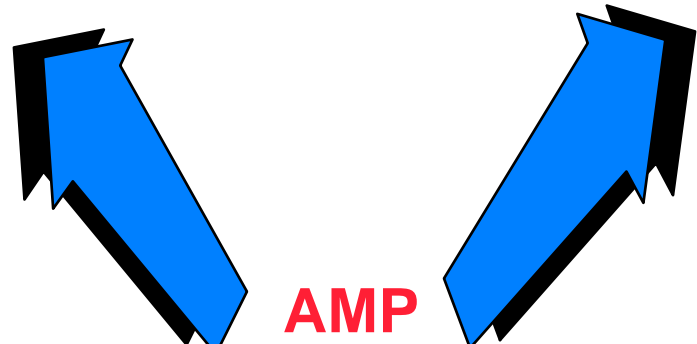


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- DAT-72
- LTO Ultrium 3
- Super DLT tape II
- DLTtape S4

High Density Diskette



- Zip-100
- HiFD
- Zip-250
- Zip-750



AMP



- DLTtape IV
- Improved D8



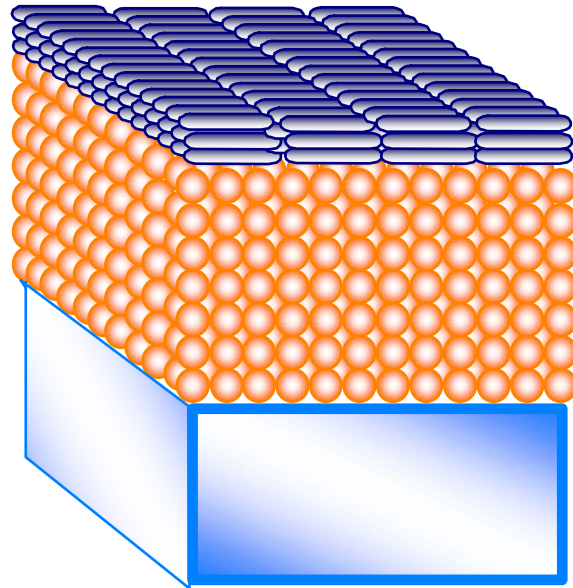
MP



- DLTtapelll
- DDS1 & DDS2
- D8

FUJIFILM

RECORDING MEDIA



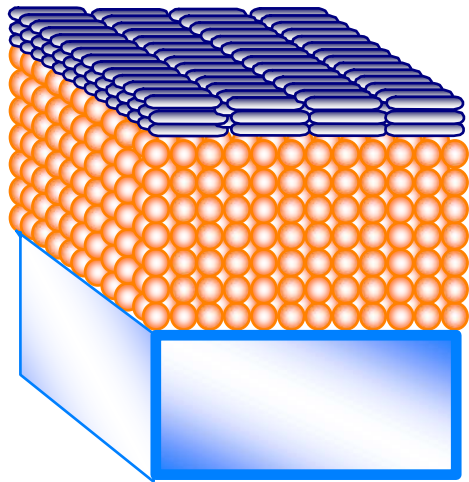
Advanced super
Thin-layer and high-
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Metal
Media

Web Site: www.fujifilmusa.com/tapestorage

Think Fujifilm Media, for Today's & Tomorrow's Most Popular Drives!

***Thank
You!***

FUJIFILM



Advanced super
Thin-layer and high-
Output
Metal
Media

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RECORDING MEDIA



Fujifilm's Coating Technology Creates Breakthrough Products

Fujifilm began coating motion picture and photographic film in the mid 1930's using die coating technology. Simultaneous multi-coating technology was developed in 1960. Also in 1960, Fujifilm produced its first magnetic tape products. In 1965, Fujifilm began manufacturing computer tape. Fujifilm's floppy disks (8-inch) were introduced in 1977. Fujifilm began manufacturing dual-coated magnetic media in 1989 and Advanced super Thin-layer and high-Output Metal Media (ATOMM) dual-coated media in 1992. For ATOMM, Fujifilm's special die coating head simultaneously applies two separate and unique layers, one magnetic and one non-magnetic. It's a dual coating system Fujifilm invented that has allowed us to continually develop the industry's "next generation" storage products and develop nanocubic™ Technology for data storage products with even greater capacities.

