

## **EXPLANATION OF PARTICULATE MAGNETIC MEDIA TERMS**

**Magnetic Recording Media terminology:** the following information is provided as a reference for users of flexible magnetic media disks and tapes. This technical support document describes various terms associated with ATOMM and other particulate magnetic media for data storage.

**ATOMM:** Advanced super Thin-layer and high-Output Metal Media (ATOMM) Technology magnetic media features a high-density ultra-thin upper layer of magnetic particles with a highly smooth, glossy finish, which provides superior performance for durability, dropouts and output. This is made possible by the extremely hard, smooth surface created during simultaneous coating of minute spherical particles in the “titan-fine” lower layer; these particles are roughly one-sixth the size of magnetic metal particles. Lubricants are optimized in both the upper and lower layers.

**BASE FILM:** The substrate material that supports the coating layer(s) of flexible magnetic recording media. PET (polyethylene terephthalate) is just one of several base film materials.

**BINDER:** A polymer such as polyester-polyurethane used to bind magnetic particles together and adhere them to the base film in the manufacturing of magnetic media. In ATOMM, binder is in both the upper magnetic layer and the non-magnetic “titan-fine” lower layer.

**COATING:** The magnetic layer, consisting of magnetic particles and other additives held in a binder, which is applied to the base film. For ATOMM, a special coating process simultaneously applies two separate formulation layers with different thicknesses.

**COERCIVITY:** The magnetic field strength measured in the cgs unit oersted (Oe) required to move a magnetic particle (or coating of particles) from its fully magnetized state to a completely neutral state. You can think of the coercivity value as a measurement of magnetic potency.

**LUBRICANT:** A component added to the media coating to decrease the friction between the drive’s read/write head and the media’s recording surface.

**MAGNETIC MEDIA:** Typical magnetic media, such as flexible disks or tapes, consists of a magnetic coating on base film (tape has anti-static backcoating on the base film backside). The magnetic coatings consist of proprietary ingredients, but a polyester-polyurethane binder system that is highly loaded with magnetic particles and lubrication within the binder is typical. The magnetic particles are mixed in a slurry of solvent, binder, lubricants and other additives for coating on the base film.

**MAGNETIC PARTICLES:** Iron oxide, cobalt-doped iron oxide, chromium dioxide, barium ferrite, and **pure iron** (Fe) are various examples of magnetic pigment or powder that are used in particulate media. The term pigment is a carry-over from paint technology; the magnetic coating on media is analogous to a coat of paint in which the paint pigment is the magnetic particle. The term powder is sometimes used, because large bags of magnetic particles (used in media coating plants) resemble bags of very fine powder. In magnetic media manufacturing, magnetic particles are the powder-like substance, which is mixed with binders, solvents, lubricants, other additives and coated on top of base film to form magnetic media.

**MAGNETIC PIGMENT:** See magnetic particles.

**MAGNETIC POWDER:** See magnetic particles.

**METAL PARTICLE (MP):** Metal Particle (MP) media uses pure iron (Fe) particles as the magnetic component of the coating formulation. In contrast to other particles, metal particles allow more magnetic energy to be stored per given unit of volume. Metal particle media has replaced iron oxide and chromium dioxide media as the primary vehicle for data storage. Metal particle media is the enabling technology for DLTtape III, DLTtape IIIXT, DDS1 & DDS2 4mm DAT, 5GB & 7GB 8mm, Magstar 3590, Magstar MP 3570, SD3, DTF, D2, Travan-5, etc. High-energy metal particles are the key to these products. Fujifilm uses ATOMM Technology metal particle media for LTO Ultrium, SuperDLTtape, DLTtape IV, DDS3/DDS4, DAT-72 and Zip. The key to media with higher densities and faster transfer rates is ATOMM Technology metal particle media. The pure iron metal particles are treated with a protective coating. Each particle receives a very thin outer layer of protection that shields against oxidation. Particle treatment, in combination with very careful binder design, produces media that is stable under a wide range of environments and has a very long life. Pure iron *metal particle* media is commonly referred to as particulate metal, metal pigment, metal powder, metal media or just metal particle (MP).

**Advances in MP technology:** The newer recording formats use higher bit packing densities and narrower track widths to improve volumetric data storage densities. To record and playback the smaller data bits with acceptable signal strength, smaller metal particles are employed. It's very simple; higher density recording media stores smaller data bits (shorter wavelength recording) and small metal particles are needed for this task. Many descriptive terms have been used for designating larger to smaller metal particles, such as MP to MP+ and Fine MP to Superfine MP, etc. Some may just say MP; because it can be expected that smaller particles are employed for the higher capacity (higher aerial density) recording media. Pure metal particles exhibit high coercivities, high retentivity and remain ferromagnetic even when they are extremely small.

**The capacity potential of MP:** Metal particle research has produced smaller and well-configured particles which have very high coercivities and intensities of magnetization for short wavelength, high-density recording (when coated in a thin layer). Particle technology is not a limiting factor for future high capacity data storage media. However, implementation of a particle's capability requires a thin magnetic coating layer; this is where ATOMM Technology comes in. It is well known that decreasing the thickness of the recording layer will improve performance of higher density recording. With the super thin-layer coating capabilities of ATOMM's simultaneous dual-coating process, the full advantage of metal particle technology can be achieved.

**OUTPUT:** The magnitude of the reproduced signal. Output is normally specified by the pulse height as a percentage of the output obtained from a *reference media* under the same conditions.

**RESOLUTION:** The degree to which the distance between different magnetic states can be reduced and still be usefully distinguished on reproduction.

**RETENTIVITY:** The ability to remain magnetized after the magnetizing force is removed.

**SURFACE TREATMENT – CALENDER:** A process by which the surface smoothness of the coating is improved after it has been applied to the base film. Typically, coated magnetic media is run between rollers of a calender machine to give the recording surface a smooth glossy finish.

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