

Predicting hard disk drive technology

Similar to the parameters for computer systems, rules of thumb are useful for predicting future hard disk drive capacities and speeds. Hard disk design is a tradeoff between recording track width, read/write channel speed, recording head flying height, rotational speed (rpm) of the disk, media radius, data encoding methods, servo control frequencies, mechanical stability of the disk stack, seek time and power consumption.

While a particular implementation requires setting specific numbers and tolerances for each of these areas, the overall trend in disk drive storage capacity per unit or per dollar of cost can be projected with good accuracy because the improvements in each of the areas tend to be on a smooth curve. When discontinuities occur, such as the introduction of a new recording head technology, it causes temporary blips in the curve, but the long-term trend is typically maintained. Because of this, we can confidently predict that hard disk storage capacity per dollar or per unit will increase at approximately 60% per year, at least until some hard physical limit is reached.

Since a hard physical limit has not been reached during the production of hard disks in the past 50 years, we can be fairly confident that it will not be reached in the next 5 years, despite the protestations of some technologists who know that a discontinuity of some sort is coming.

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