

The media manufacturing industry is on the verge of another milestone in its history. The introduction of the next-generation format of the optical disc is imminent, and I take a tremendous amount of satisfaction in having participated in the entertainment industry's participation in this format, from the introduction of the CD in 1982 and a decade later with DVD, as Senior Vice President and General Manager of Warner Advanced Media Operations (WAMO), where I led WAMO management and engineering as it developed and marketed the DVD format worldwide. I was later the CEO of Ritek Global Media and President of Deluxe Global Media Services.

That's why I feel that I have to speak out at this point. In order for people and companies to invest enormous amounts of money, effort and intellectual capital developing new products and formats that will move the industry forward, they need accurate information and data to make an informed, objective assessment. And as someone intimately familiar with the economics of physical media manufacturing, I can tell you that the numbers I'm seeing – or more importantly, not seeing -- don't add up for a proven manufacturing process

The rate of DVD sales is beginning to flatten. That's inevitable, as it is with any format over time, and the average price of DVD discs continues to decline, as it would with any commodity product. At the same time, major film studios continue to reap increasingly larger percentages of their profits from DVD home video sales. Why, at this critical time of transition, would an entire industry want to radically alter its manufacturing infrastructure, incurring massive new tooling capital costs and a huge new learning curve in the process?

The Blu-ray Disc Association (BDA) has long asserted that its Blu-ray (BD) format is superior to the rival HD DVD format, and BD's "revolutionary" buzz has understandably caught the fancy of certain technologists. But it should scare CEOs,

because what the BDA does not sufficiently address is what lies behind those assertions. The numbers are stark: manufacturing BD discs will require an estimated \$1.7 million cost per manufacturing line. Per line! Then, each major manufacturing facility would require the implementation of a minimum of two mastering systems, at a minimum cost of \$2 million per system. DVD, at the height of its success, resulted in an estimated 600 manufacturing lines globally. Even allowing for a decline in systems costs over time as the manufacturing base expanded, the tab for radically overhauling the media manufacturing industry would approach a *billion* dollars worldwide or more. Already-beleaguered CFOs will be challenged to raise –and risk – this significant amount of capital.

Compare this to the estimated cost of retooling for the HD DVD format compared to BD ROM. HD DVD is able to utilize virtually the entire existing manufacturing infrastructure. The cost of upgrading an existing DVD line is about \$150,000 – less than a tenth the cost of a BD line. A DVD mastering system can be upgraded for \$145,000. Basically, HD DVD is a DVD-9 – a version of DVD we have enormous manufacturing experience with already – with a denser pit structure.

The manufacturing process of the BD format is not fully evolved. For instance, there remains a significant debate regarding the best way to create the 0.1-mm layer that forms the top layer of the disc. Both BD and HD DVD offer content owners and consumers dramatically larger amounts of digital real estate, which will be necessary to match the high-definition programming that is the future of entertainment media. But the BD format will require an already strained manufacturing base to invest massive amounts of capital in new manufacturing technology even as disagreements about just what that technology is rages around them. If consumer demand for HD is what projections predict, the simple fact is

that BD will not allow the manufacturing base to retool fast enough to keep up with the demand curve.

Furthermore, there is little in the way of statistical verification of any actual production data for BD. Major disc manufacturers are still far from collecting statistically-significant samples with BD production lines that prove that BD ROM can be mass produced in a typical 6-sigma capable process, and there is virtually no previous experience upon which to base manufacturing. High production demand on an unstable manufacturing process significantly increases the risk of consumer failures. On top of that, those same replicators will still have to continue to operate their existing DVD lines as the market makes its transition from standard-definition formats to high-definition ones, even as that same market continues to mature and experience ever-tighter profit margins. You don't need a degree in engineering or economics to realize that this is a recipe for disaster.

On the other hand, there is a wealth of manufacturing data available on DVD, virtually all of which is applicable to HD DVD manufacturing. DVD and HD DVD can be manufactured on the same line with only minor adjustments. This enables replicators to maximize the productivity of their equipment, altering it to the ebb and flow of demand for either format.

Strong home video titles require the ability to manufacture huge quantities of discs in a very tight time window. Failure to meet that demand because the industry is struggling to learn and refine manufacturing on a radically new format can not only jeopardize the sales of that title – it can strangle an entire industry that depends on hit titles. Inability to meet demand could ultimately sink the format and vastly diminish consumer confidence in any new format. As we've learned, new formats drive this industry in the long term.

With HD DVD, we understand all the critical variables in manufacturing discs already. That verifiable productivity means that the cost of manufacturing the format is estimated to be only 15 to 20 percent higher than that of standard DVD.

Given all this information, why risk the fortunes of an entire industry on a potentially disruptive, incompletely tested format when a highly reliable evolutionary format, one already familiar to tens of millions of consumers, is readily available? The amount of time, money and effort to so dramatically alter the manufacturing infrastructure has been substantially underestimated for BD. In fact, it's responsible for delaying the roll-out of a much-needed upgrade for the home video industry, and has in effect held a portion of the industry resources hostage as a result. Thus, it's disingenuous to suggest, as some in the BD camp have, that the competition is over. Once people realize the hidden costs of the Blu-ray format, they will also realize the extent to which it actually endangers their very industry.

Blu-ray is the Emperor's New Clothes – it advances the agendas of a few select companies instead of the market's and that of the consumer. No one – the studios, the disc manufacturers, the consumer electronics manufacturers – can afford a format war today. Consumers want a format that's familiar and reliable. Shareholders want to see unhindered growth in packaged media, which remains a multi-billion-dollar-a-year industry. Game developers are targeting home video demographics. Cable and satellite delivery is betting big on high definition. HD DVD offers predictable, reliable manufacturing; high capacity; predictable, manageable costs; verifiable quality, enormous familiarity worldwide, and billions of dollars that the consumer will not have to pay that will instead be converted into profits for the entire home video entertainment industry. Even the name of the format is highly consumer-friendly -- any brand marketer will tell you that it would

take millions of ad dollars and years of promotion for Blu-ray to build the caliber of brand equity enjoyed by a familiar sounding HD DVD brand.

We got DVD right and it gave the entertainment media industry a windfall. Right now, the process of introducing the next generation of entertainment media is spinning dangerously out of control and we are running out of time. Consumers are fickle. We better make sure we get HD right.

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