Personal Manufacturing

Extreme Manufacturing Workshop White Paper

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Sophisticated tools that have traditionally been available only to engineers in industrial settings are now becoming accessible to individuals without formal training in engineering. Most notable among these are highly functional desktop CAD systems, but most of the codified knowledge of engineering, which comprises the vast majority of what is taught in universities, has been or soon will be embodied in software that will run on desktop computers. Numerous machine shops and rapid prototyping services already accept web-based submissions of CAD files from individuals for bid and production, and low-end rapid prototyping systems can be purchased for less than $10,000.

While the argument should always be made that deep expert knowledge is required to appreciate the limitations of engineering software, the fact is that such knowledge is not a strong emphasis of undergraduate engineering education and is often not available in the commercial setting. While a higher percentage of failed designs may be expected to result in the non-professional setting, their potential impacts are likely limited to the personal financial losses, inconveniences and injuries of the designers. These constitute the traditional risks of the innovator in our culture and likely present a small impediment to innovation, since the entrepreneurial culture of the United States is quite accepting of such risks. Indeed, the lack of stigma attached to entrepreneurial failure in the US is nearly unique and may be one of our greatest advantages in global competition.

The idea of creating an infrastructure that can give the citizen-designer and teams of citizen-designers full access to the means, including expert and/or bulletin-board based consulting services, for designing, prototyping, testing, financing, manufacturing, promoting and marketing their inventions is extreme. However, the concept builds on strong precedents in journalism, music, and electronic commerce, in which computer and web-based modalities are displacing existing production, distribution and marketing schemes and dramatically reducing the costs of entry.