

take material form - either as *hard copy* (an image on paper) or as a simulation of a three-dimensional space. *Hyper-text* can store data which can be produced both as written text or as visual simulation. But the only "hands-on" is hands on the computer keyboard, which plays a mediating role between human beings and electronic impulses.

(Whilst on the subject of simulation of concrete objects, architects using Computer-Aided-Design, where you can rotate your building through 360° in hyper-reality, have perhaps been in hyper-reality in the Baudrillardian sense - a universe composed entirely of surfaces, signs and images circulating with no reference to any "real world" outside themselves - when they have found that their constructions, perfect in simulation on the screen, resemble prisons when inserted into their real (and social) context.) [5]

These systems, the intangible technologies which surround us, these features of the non-objective world have been called "*Softtechnica... the coming of live objects, a new presence in the world*" [6] Perhaps their development is making us rethink our philosophical materialism concerning matter and what it consists of.

I would suggest that a name be given to express some angst about both the existence of these new systems and technologies and the implications of the "softening of the economy" in general and possibilities offered by automation: *Softtechnica-angst* (because it sounds like a plausibly related symptom). It is both philosophical and sociological, and I have it, and I have caught it along with others who have worked in the "information field". It is not an anti-technology stance; it isn't just angst about an intangible, non-material phenomenon but concerns the implications of these new systems within a global capitalist economy.



#### Automation and the "Softening of the Economy"

Both phenomena are related and inter-related to the changes in the economy on a global scale, affecting work practises and future deskilling as the nature of capitalism is shifting (or mutating) into another phase.

The micro-processor, "*a formless representation of the real*", a space "*in which things are stored and transferred [and which] is beginning to determine the real, to be the real*" [7], has enabled the development of Flexible Manufacturing Systems (FMS) within Computer-Aided Manufacture (CAM), assisted of course by CAD (Computer-Aided Design). Flexible Manufacturing Systems are controlled by software written in specialised programming languages.

The significance of the application of software to manufacturing is that, firstly, the movements of a single machine can be varied without alteration to its mechanical structure. Robots, the first machines on the path to FMS, unlike conventional mass production techniques, are particularly applicable to the production of small batches of varied products. The earliest robots' movements were controlled by altering electrical connections on a plugboard. Later versions (the continuous path playback

robot) are programmed by a playback system or by a "teach box" which uses buttons or a joystick to define the machine's movements. [8]

This means that, mainly in the areas of aeronautics, car manufacture, shipbuilding and architecture, the repertory of forms needs no longer be limited to keep within the computer's range. Flexibility is thus greatly increased: "*Objects and transmutations to which they are subject can now be simulated by altering just one variable; their volume can be represented as revolving in 3-dimensional space; different instructions for their fabrication can be automatically programmed.*" [9]

This in turn increases ability and potential for "niche marketing" (as opposed to global markets) - post-modern consumers "expressing" their different and perhaps ever-fragmenting class, gender and ethnic identities through consumption, or even perhaps through active participation in the design process?

The second implication (as Tessa Morris-Suzuki points out) of the application of software to manufacturing is that "*the worker's knowledge may be separated from the physical body of the worker and may itself become a commodity*" [10] Robots are an early form of expert system, endlessly able to replicate the precise and complex motions of (for example) a highly-skilled car spray-painter. How much control will the person whose skills are being learnt have over this commodity? Will it be even as much as that other prime commodity - labour power?

Morris-Suzuki sees the separation of knowledge from labour and machinery and its emergence as an independent commodity and element in production as a gradual process dating back to the very beginning of capitalism. "*The special properties of knowledge (its lack of material substance; the ease with which it can be copied and transmitted) mean that it can only acquire exchange value where institutional arrangements confer a degree of monopoly power on its owner.*" (i.e. copyright)

"*Software represents a special form of the commodification of knowledge... in essence [it] consists of instructions for performing a particular task, and a major technological key to the growth of computing was the creation of means by which these instructions could readily be stored and fed into a machine*" [11] (i.e. the microchip)

This poses problems about the **labour theory of value**. For Marx, surplus value is the difference between the selling price of the product and labour costs (variable capital) and initial capital outlay for machinery, etc. (fixed capital) With the use of software in automation "*Surplus value is extracted from the labour of workers who prepare software for an automated production system, but this surplus value only acquires meaning and substance when the software is brought together with machinery and the production of goods begins. Once this happens, however, the value of labour embodied in the software becomes subdivided between a potentially infinite number of products (since software as such can never wear out). Unless the manufacturer can maintain total monopoly over the technique, spreading automation will rapidly reduce the value of the product, and profits will dwindle to nothing.*" [12]