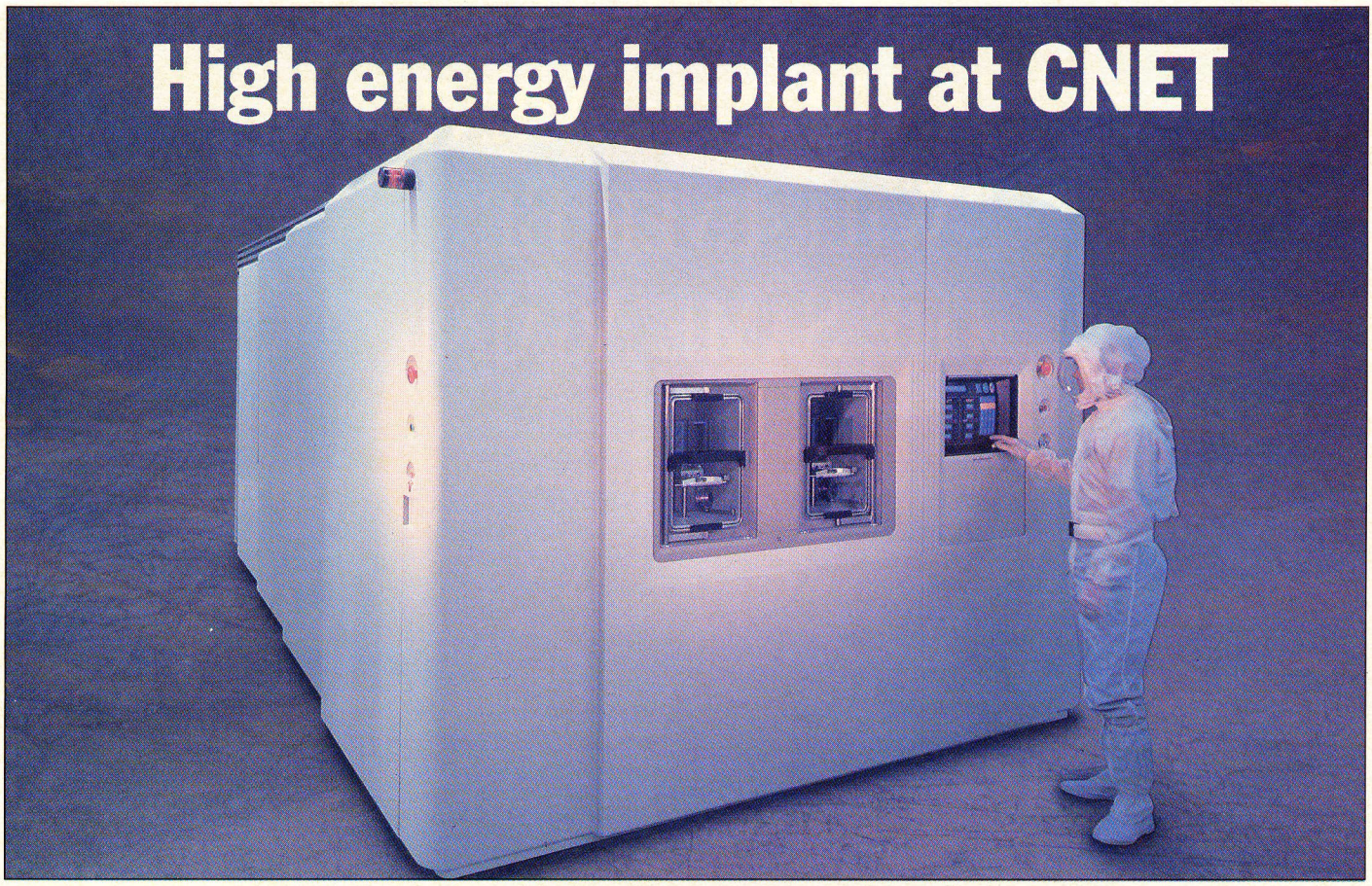
High energy implant at CNET



André Grouillet, Gerhard Göltz, and David Hacker describe the first European installation of Varian's latest implanter.

Later this year, Varian will launch formally its latest ion implantation system, E-500. Designed around the needs of some of the world's most advanced process requirements, E-500 is seeking to provide precise solutions to the needs for medium to high energy implantation based on an extension of the already well-established E-220 medium current machine. The Silicon Technology Group at CNET (Centre National d-Études des Télécommunications) in Grenoble is the first European user of this system.

Since its establishment in February 1981, the Centre Norbert Ségard has developed a reputation for work of the highest quality, and has created collaborative programmes with in excess of 50 partners representing all sectors of the semiconductor world. The overriding direction of the technology is CMOS with, as you would expect, a focus on telecommunications along with technology associated with high definition television (HDTV).

This user profile matches exactly that of the anticipated users of the E-500 with its emphasis on submicron geometries and existing circuits where high energy implantation is part of existing and future process flows. Retrograde wells form part of these processes and so the ability to implant at energies in the 500-750keV range was important in CNET's decision for E-500. This energy range is achieved through the use of multiple charged ions up to triple charge on a maximum accelerating energy of 250keV. Of course, there is nothing new in this approach, as medium current implanter users have long been able to do this. The main difference with the E-500 from previous generation machines, is its ability to measure the system's actual beam purity prior to implantation.

It is not until this ability is combined with the real-time uniformity control functions inherent in E-500's medium current sister E-220, that a production-worthy tool for this and similar applications could be claimed. The E-220 is already established with a reputation for process security and reliability and the engineering differences in the E-500 do not detract from that. For CNET, beam purity at high energy to provide profiles necessary for their existing processes and newest 0.7μm process were key to selecting E-500. The ability to measure beam purity prior to implant can only be claimed to be important if it is shown to correlate precisely with measured profiles in silicon. This has formed a vital element in the design and development.

In a paper to be published later this year, Varian will be highlighting these investigations; the conclusions here are that the beam purity does indeed correlate with the measured profiles.

Multiple charge ion implantation can thus be carried out successfully using E-500. For once, physics works with us in that as geometries shrink still further, the energy need for deeper wells decreases. What are now triple-charged applications will fall into the area where the E-500 can use double-charge ions.

This flexibility is extremely important as the E-500 at CNET will guide all aspects of ion implantation process research technology into the future. The ability to rotate with total freedom of tilt and twist wafers combined with the precision parallel beam for such applications as lightly doped drain (LDD) implants form the unique capability for the E-500. Significantly higher beam currents compared with previous generation equipment means that throughputs are achieved that are realistic for processes that will be transferred into production with CNET's industrial partners and even where developed processes are carried out on high current machines, the technology transfer from the parallel scan E-500 to parallel scan high current machines will be simplified.

This is not to say that the use of E-500 will be purely in research establishments. The automation provides the ease of operation that facilitates use in manufacturing environments. CNET is successful because its orientation is towards industrial applications; E-500, as an extension of the E-220, arrives with a production pedigree which will make it suitable in all spheres of activity.

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