designers are often encouraged to learn new ways of increasing the reliability of products. After the design has been finished, they meet with related departments like engineering and quality control. The engineers in charge of engineering and production try to prevent any trouble on the production lines and to increase production capability. The engineers in charge of design try to make designs that are well fitted to the production process.

The second step is trial production. Any abnormality is completely analyzed through statistical and physical methods. Products that could not reach the necessary level of quality are eliminated at this point.

The last step is mass production. Many kinds of faults found in this step, such as dirt on products, directly affect the yield rate and reliability of products. It is imperative that production processes give close attention to prevention of dirt contamination. Furthermore, data on the yield of products is periodically checked to improve the stability of the production process.

As part of this quality control, a very important factor is education for the workers. A wide variety of education is offered, ranging from specific production problems to the building up of morale. A QC circle, which is a small-group activity, is especially effective in strengthening morale.

For the realization of this highly reliable mass-production technique, the operations of the inspection system during the manufacturing process must be given close attention. The inspection of photomasks, for example, has been performed visually by microscope. This method, however, can hardly be applied to the current complicated mask patterns of a 2-to-3-μm minimum feature width.

Automatic inspection equipment has been developed and is being widely utilized in Japan and to some degree in the U. S. This equipment enables automatic inspection by the combined use of a TV camera, a processor, and display equipment. When a flaw is detected in a mask, automatic correction is carried out by a laser adjustment device which is directly connected to the equipment. Alternatively, flaw information is initially stored in the memory and later corrected by a separate adjustment device that has received input flaw data.

Today there are several detection methods that can screen a minimum flaw size of 1.5 to 0.75 μm at speeds between 15 and 60 seconds per square centimeter. This highly efficient automatic detection system plays a significant role in the achievement of a mass-production technique that continuously yields highly reliable products.

We have been discussing the present situation in the Japanese semiconductor industry. Now let us turn the discussion to its future, concentrating on new applications that represent increased use of ICs.

Needless to say, the major new application area is in computer products. One kind of computer development will be to shrink the computer while speeding up information processing at the same time that memory size is increased. As a result, the capability of computers will be enhanced.

Another development will be to make the computer simpler to use. For instance, it could be programmed in the spoken and

