

Process Specification

LSD-100, Laser Bar Dicing, High-Throughput Method

Bar dicing is performed on laser bars after the laser bars are cleaved from the wafer and the cleaved surfaces coated. The bars are taken from coating to the LSD-100 to be peck-scribed, and broken into individual laser diodes. Peck scribing is time-consuming because an individual peck-scribe must be made for each laser diode.

The conventional LSD-100 can peck and break approximately 12 per minute. Furthermore, the bars can only be placed on the holding film in a single row as shown in Fig. 2. With the High Throughput modification, each bar is completely peck-scribed and then the peck scribes are broken all at once. The average rate is up to 35 devices per minute.

Procedural Overview

High throughput is accomplished by arranging multiple laser bars in a regular pattern of the film. Then with new software features and the vision system, all the bars are scribed at once, a row at a time; then each row is separated into dice automatically by the break wheel.

Changes to the LSD-100

Modifications are made to the standard LSD-100:

1. The breakwheel is rotated 90°.
2. The standard mandrel is replaced with a roller assembly.
3. New pattern recognition software is installed which enables the LSD-100 to automatically “peck scribe” an array of bars, and then break them.

This conversion is reversible. The machine can be returned to its standard configuration in about 20 minutes.

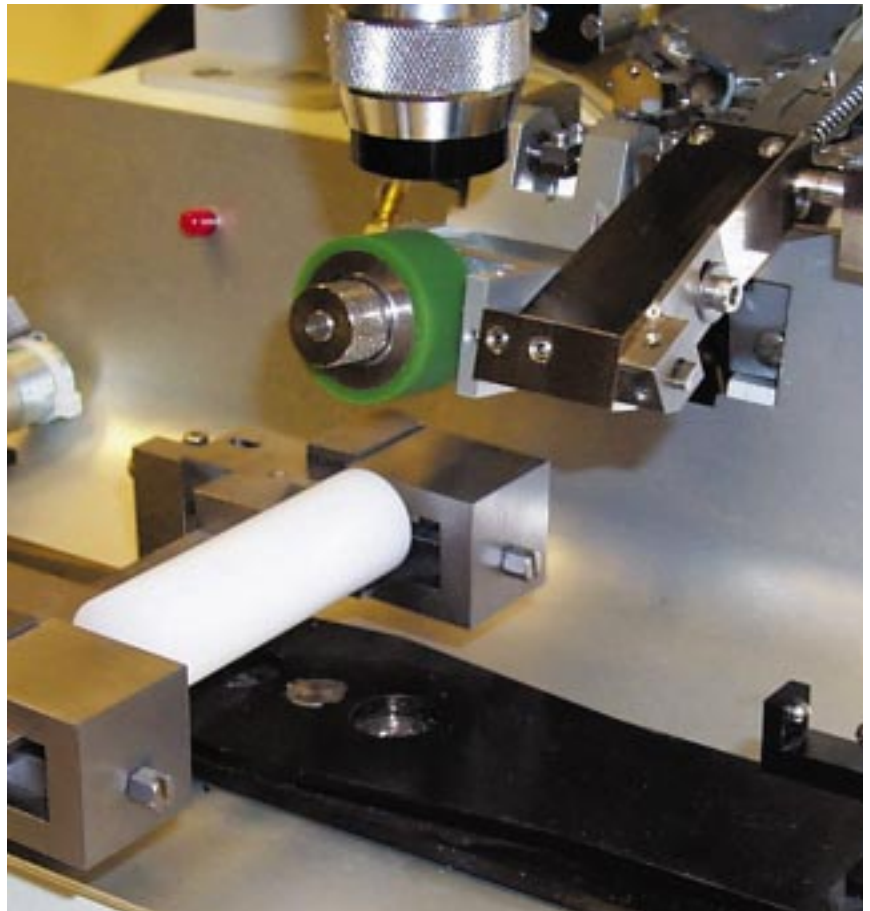


Fig. 1. Closeup of roller mandrel and break wheel rotated 90°.

Required Process Steps

Peck-Scribe Sequence

1. Laser bars are arranged on the film frame assembly (Fig. 2.). Multiple rows may be processed on one piece of film (Fig. 3.)
2. Software is set for High-Throughput mode. The Start and Finish points are also indicated in the figure. The machine will peck all of the bars unattended from Start to Finish. (See Doc. PS-1002 for details of software settings.)
3. Once the bars are pecked, the break sequence is activated.

Break Sequence

1. The break wheel is positioned at the last row.
2. The wheel is dropped.
3. The work traverses the x-axis, squeezing the laser bars and film between the breakwheel and the roller mandrel.
4. The wheel rises and moves to its pre-break position. The break sequence repeats for each row of bars.

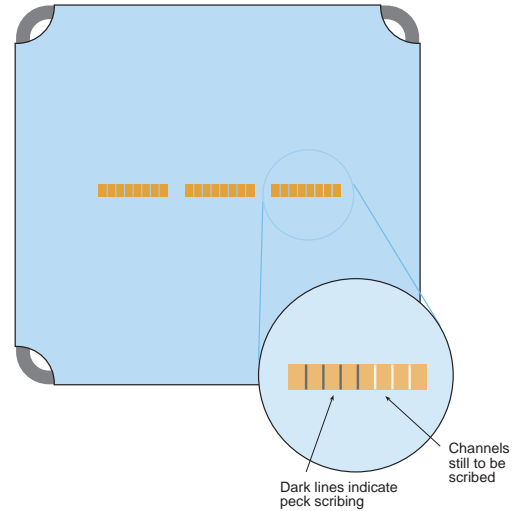


Fig. 2. Auto scribing (“Pecking”) one row with three bars of 8 diodes each.

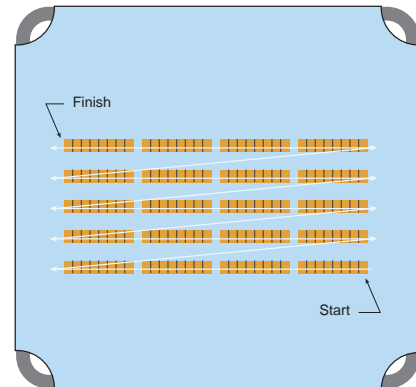


Fig. 3. New software provides semi-automatic scribing and breaking for multiple rows of regularly-space laser diode bars.

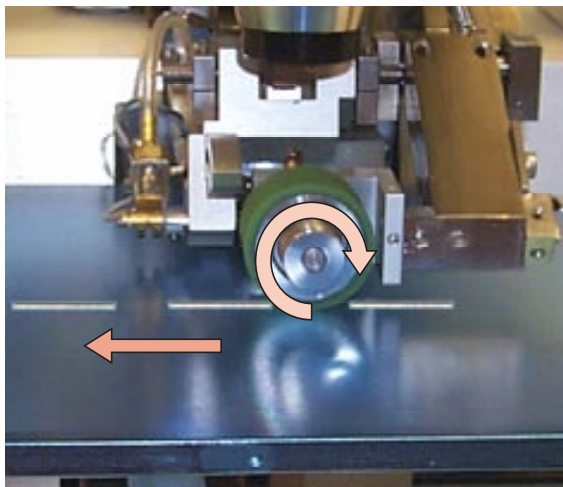


Fig. 4a. roller wheel engaged to break all three bars in one pass.

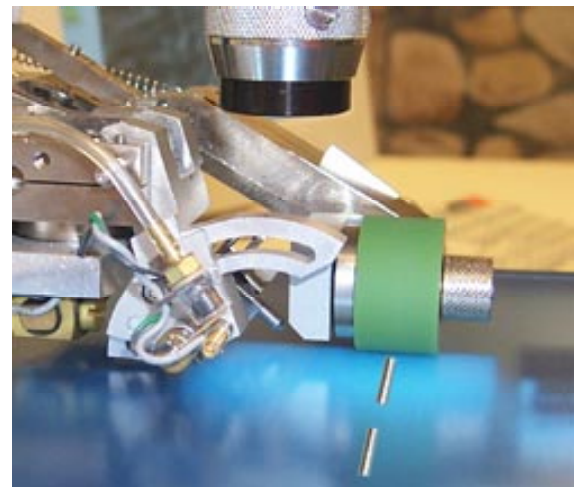


Fig. 4b. Another view of roller wheel breaking the dice of a row of bars.