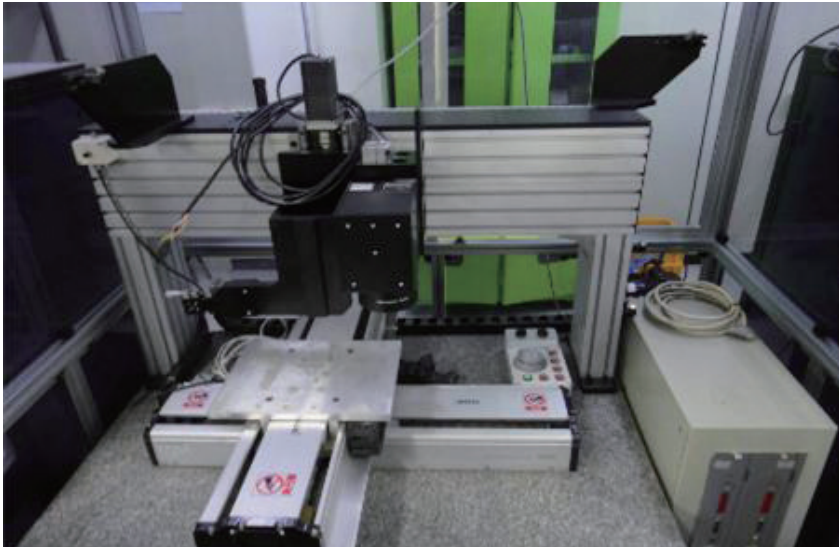


# Manufacturing Technology for Board Type Flexible Fine Die Allowing Precise Patterning and Thermal Deformation Prevention

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⇒ Technology with patterning and thermal treatment process using laser to produce precise fine die and reducing cost by minimizing the use of film and chemicals compared to existing film work



### Client / Market

- Flexible fine die manufacturer and semiconductor manufacturer

### Necessity of this Technology

- Existing fine die manufacturing method of film work requires high initial investment and material cost yet has low pattern precision and causes environmental pollution with chemicals used during process.
- Due to complex process and need for film printer for film making, initial investment is high. With massive use of films and chemicals used during process, the risk of environmental pollution is high.
- Film work cannot precisely control the location; therefore, precision of patterning is low.
- To extend the life of flexible fine die and increase its solidity, heat treatment is inevitable, but during this process, the die deformation may occur.
- There is a need for technology for creating a die at a low cost that allows precise location control and does not deform during heat treatment.
- Required conditions include cost reduction, precise location control, and die deformation prevention during heat treatment.

### DESIRED PARTNERSHIP

Technology Transfer

Licensing

Joint Research

Other



### TECHNOLOGY READINESS LEVEL [TRL]

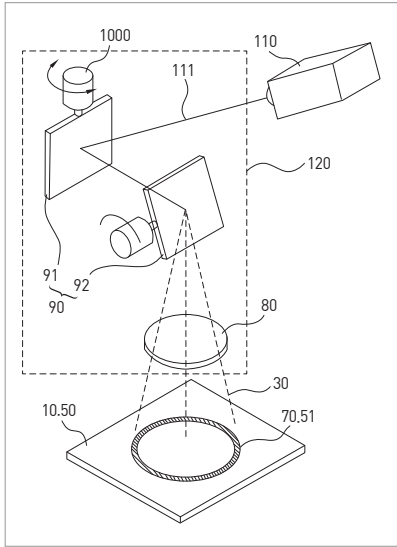
- Research, basic explanation
- Project concept or idea development
- Technology idea verification
- Prototype development
- Trial product production/evaluation in similar environment
- Pilot field demonstration
- Development and optimization of commercial model
- Commercial product demonstration
- Mass production and initial market launch

### Technical Differentiation

- Production cost can be reduced as the process does not require film, developing solution and other chemicals.
- Precise patterning is possible using laser, and the die defective rate is reduced as the life and solidity of the die is extended without deformation caused during heat treatment.
- Harmful fluid used for film printing is not required; level of pollution at the manufacturing site is improved leading to better work environment.
- The film method is replaced with the photocuring patterning method using laser, which easily enables precise patterning on thin foil.
- Heat treatment using laser is done with laser scanner; therefore, flexible fine die can be produced at minimal thermal deformation.

### Excellence of Technology

- The laser photocuring process creates a polymer pattern of desired shape and corrodes parts other than the pattern to create a bulging polymer pattern. With the primary machining, a blade is added to the bulging part and the blade is made solid with the secondary laser heat treatment.
- Laser beam emitted from the laser generator (110) is reflected on to two rotating reflectors (91, 92), which sends the laser to the die through the f-θ lens (80) to perform laser heat treatment.
- By replacing the photocuring patterning process that requires films and various chemicals and the heat treatment process requiring high-temperature heat with the laser method. Above laser beam output can be adjusted from several hundred Ws to several kW.
- The head researcher has 20 years of research experience in printing field.
- As a part of 'Customized Technology Service Project' of Korea Research Council for Industrial Science and Technology, the 'laser heat treatment and printing for flexible fine die' technology was applied at a flexible fine die manufacturer, which was proven to have cost reduction and environment improvement effect.



### Current Intellectual Property Right Status

#### PATENT

- Flexible Fine Die Manufacturing Method Using Laser (KR2012-0002666)