

Semiconductor back-end applications



Grinding tools from the semiconductor source document

Tools for thinning, finishing and singulation

The EHWA back-end documents connect back grinding, polishing and precision cutting. Material structure determines tool selection: a silicon wafer presents different requirements from a compound wafer containing moulding material, silicon chips and metallic elements. The surface after grinding also needs to suit the required cutting quality during subsequent singulation.

EHWA presents rough and fine grinding wheels, NANOPOL designs, polishing tools and thin cutting tools. Reduced grinding load, limited edge chipping, improved surface finish and effective tool utilisation are key objectives described in the sources. The actual process is matched to the workpiece, machine and following manufacturing stage.

Manufacturing stages and tools

Processing stage	Tool family	Function in the process
Z1: rough grinding	Back grinding wheel	Remove material and reduce starting thickness
Z2: fine grinding	Fine tool, including NANOPOL	Influence the surface and remaining grinding damage
Z3: polishing in the illustrated example	DP/gettering polishing tool	Finish the backside after grinding
Wafer singulation	Dicing blade	Produce a precise cut edge with limited chipping
Cutting packages or substrates	Microblade	Provide a narrow kerf and matched cutting of the material structure

Z1, Z2 and Z3 refer to stages in the examples presented. Not every machine or application requires the same tool sequence. The final surface requirement and component concept determine which operations are combined and what each stage needs to deliver.

Match rough grinding to fine grinding

For rough grinding, the documents describe vitrified and resin-bonded tools. Vitrified designs are associated with productive feed rates and consistent grinding current. Resin-bonded designs are presented for limiting edge chipping and grinding damage on thin wafers.

Fine grinding focuses on roughness and on improving the surface left by the rough operation. The sources present finer tool designs and compare grinding current, useful wheel life and roughness. These measurements must be considered together. The lowest roughness can require a different design and feed rate from the tool offering the largest processed quantity.

NANOPOL uses vitrified grinding segments with engineered porosity. Diamond distribution, pore size and pore shape can be adjusted to the application. Compound structures also require consideration of softer constituents adhering to the grinding surface. Tool design therefore combines material removal and free-cutting behaviour with the required surface result.

Example: A compound structure rather than a single material

The back-end source presents several structures: moulding material alone, moulding material with silicon chips, and combinations containing copper connections, polyimide and solder. These structures place different demands on the grinding wheel. A specification for a pure silicon wafer should therefore not be transferred simply because the component thickness is similar.

Selection considers which materials are being ground at the same time and their share of the working area. Technical assessment includes adhesion, removal, current, edge chipping and surface finish. This allows a tool change to address a specific cause, such as a grinding surface that is becoming loaded or an insufficient final finish.

Dicing and microblade processing add a distinct cutting task to the grinding stages. Cut quality is assessed at the top surface, backside and material transitions. Cooling and process control follow the actual cutting method. The older schematic illustration is not a general instruction to carry out dry wafer blade dicing.

Discuss your back-end application

Provide the material structure, wafer or substrate dimensions, target thickness and machine. Existing tool specifications, tape or mounting details and the required surface or cutting result support the technical discussion. If several stages are involved, describe their sequence and the transition to the next operation. This makes it easier to connect an individual tool requirement with the overall manufacturing goal.

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[Request tool selection](#)

Sources and original documents

- [EHWA: Semiconductor Back-End Applications](#) · PDF pages 1-11.
- [EHWA: Semiconductor Back-End Applications, alternative version](#) · PDF pages 1-6.
- [EHWA: Back Grinding, Polishing and Dicing](#) · PDF pages 1-11.
- [DISCO: Blade dicing and cooling water](#) · Cutting process explanation; no EHWA operating values.