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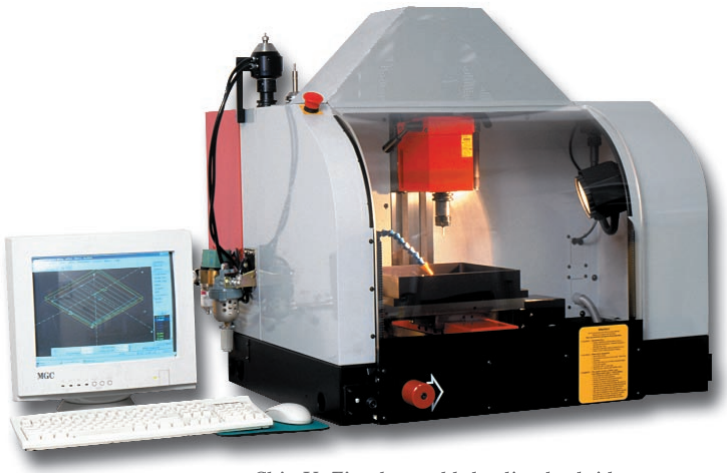


# Chip UnZip Backside Preparation Tool

Chip UNZIP

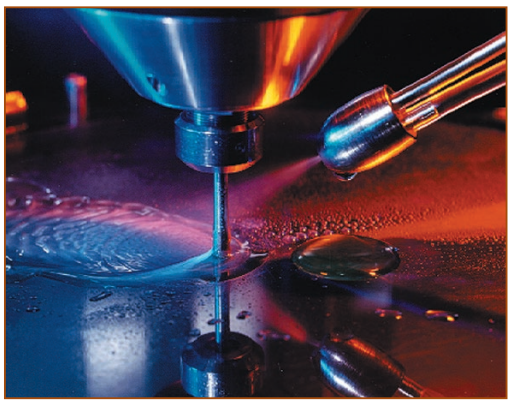
INTRODUCTION
CHIP UNZIP PROCESS
MAIN FEATURES

**State of the art package, wafer and semiconductor die thinning**



*Chip UnZip, the worlds leading backside vertical milling solution.*

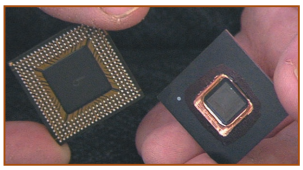
## Chip UnZip Does It All...



*Wafer milling*

**Achieving precision thinning with XYZ tolerance to 5µm**

## ... Package Removal and Backside Die Thinning on All Kinds of Material



- Plastic
- Ceramic
- Copper
- Tin
- Aluminum
- Silicon Carbide
- Aluminum
- Tungsten
- Polyimide
- $FR_4$ Green Card Epoxy

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# Chip UnZip Backside Preparation Tool

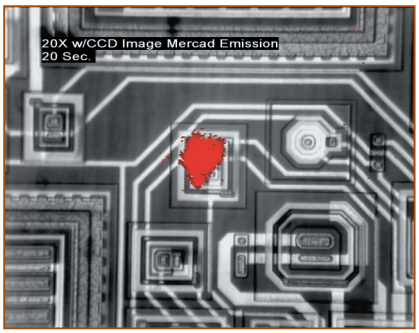
## Introduction

Chip UnZip has earned the reputation as the industry standard for backside preparation. The reduction in the intensity of light emitted by defects as the light passes through various silicon doping levels (P-, N-, P+, N+) has been thoroughly documented, and is typically between two and four orders of magnitude. Backside thinning compensates for this reduction, and is essential to provide high detection sensitivity and high spatial contrast in the illuminated image.

Chip UnZip was initially designed to work with the BEAMS backside emission analysis microscope system. However, since its inception, Chip UnZip expanded its use in non-BEAMS roles including confocal and other backside laser-related applications. These applications can be easily accommodated with slight modification of the process variables.

Unlike many other systems, Chip UnZip performs comprehensive packaging removal preserving package integrity (including plastic, ceramic, copper, aluminum, polyamide and FR4 board materials) as well as silicon thinning with positional accuracy to 5µm. The tool has become the system of choice in backside package preparation and is widely used for flip-chip, BGA and micro-BGA backside inspection.

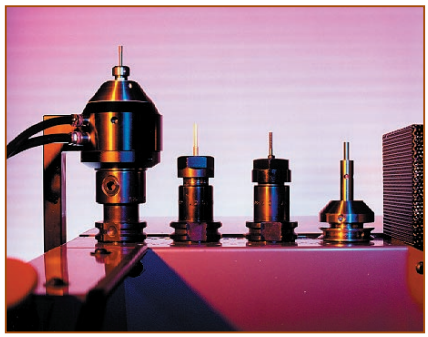
Chip UnZip's unique vertical milling mode preserves wire bonds, ball bonds and package leads while removing packaging and thinning the die over a defined XY area. Hypervision developed the low-stress milling concept, which incorporates specially designed coolants and fixturing. These greatly reduce both heat and mechanical stress during the milling process.




*Backside thinned semiconducter with 100µm residual silicon.*

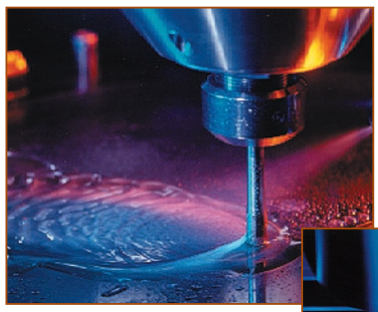
**The industry standard in backside vertical milling or backside preparation**

## The Tools...

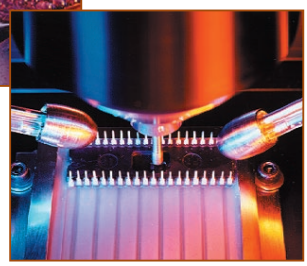


*Custom advanced composite diamond tooling for package removal and die thinning is available from Hypervision.*

## The Technique



*High-speed Chip UnZip wafer thinning operation.*



*Chip UnZip packaged device die thinning.*



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# Chip UnZip Backside Preparation Tool

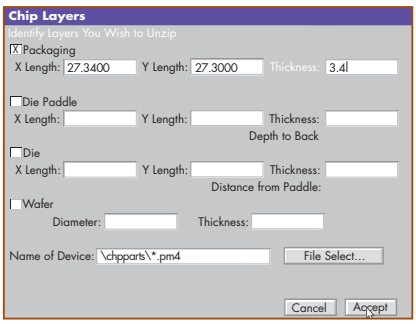
## Chip UnZip Process

The Chip UnZip process is controlled under U.S. patented technology developed at Hypervision. Users simply provide detail on the dimensional properties of their packages. Separate computer-controlled Computer Aided Design (CAD) software generates 3D wire and solids models, which simulate the package and animate the milling operation. These programs, once created, can be recalled and used as needed for repeat preparations on wafers or packages. All aspects of the systems operation from setup packaging milling, die thinning and polishing are under computer-controlled operation. Custom diamond-based composite grinding tools and polishers are included in the package.

Newly developed software has simplified the mill interface, and a Windows 98 graphical user interface is now standard on the Chip UnZip system. Its intuitive operation is further enhanced by the addition of a laser alignment tool for the XY offset and a computer generated probe for the Z axis. These two new tools simplify user input required by the mill for determining part location before milling. The Chip UnZip software offers a higher degree of precision due to accuracy of the new tools. At the same time, the level of operator knowledge necessary for system operation is reduced dramatically.

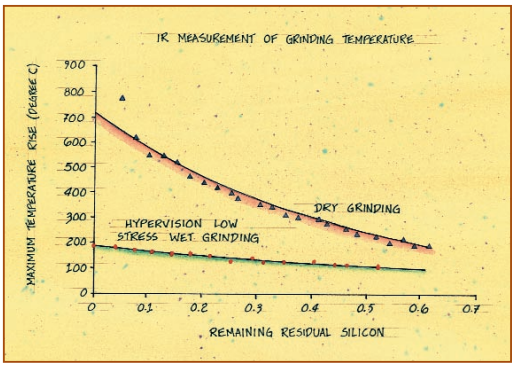
An optional CMP polish system is available. Based on the familiar Chemical Mechanical Polishing (CMP) process, the CMP polisher is ideally used on very small die, or in recessed cavities where hand polishing is difficult.

Another optional feature is the backside wafer kit, which provides the complete technology for individually thinning die in wafer form down to 80µms. Glass reinforcements are then used to bring the mechanical strength of the thinned die back to the original wafer stiffness. This is the primary preparation method for high pin-count backside wafer inspection.

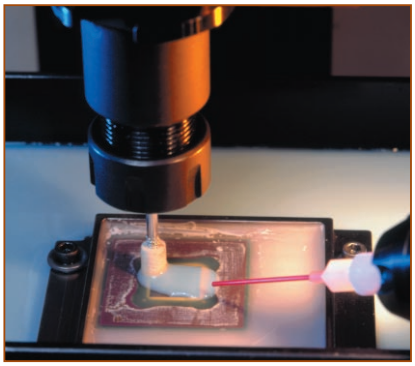



*Chip UnZip dialog boxes transform simple part dimensions into detailed wire and 3D models.*

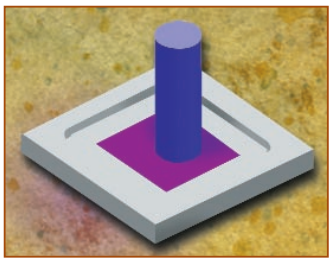
## Low stress milling conditions are critical




*Dry grinding conditions can exceed 650°C in parts thinned to 100µm or less. Cooling reduces the risk of temperature stress. Even at 250µm, remaining silicon dry grinding temperatures exceed 400°C. Hypervision's wet process keeps chip temperature under 200°C.*



*Chemical Mechanical Polishing (CMP) performed in Chip UnZip for final polish.*



*3D modeling and animation digitally simulate the entire material removal process before actual device grinding to ensure correct cutting parameters.*



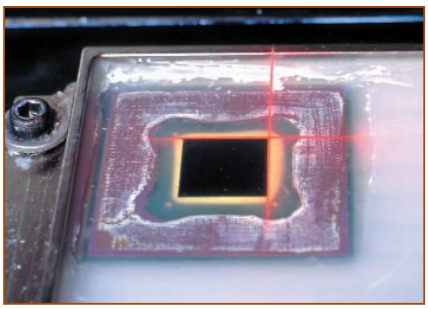
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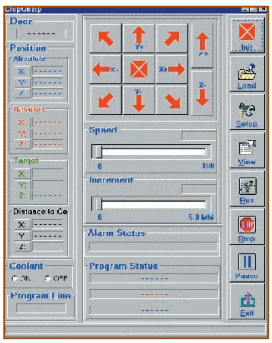
# Chip UnZip Backside Preparation Tool

## Main Features of Chip UnZip include:

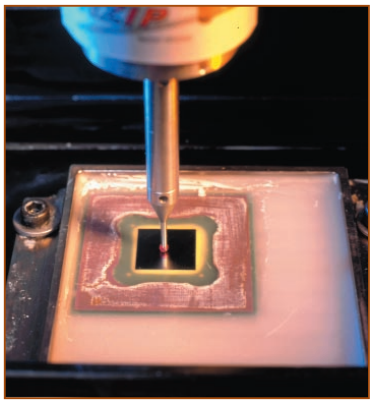
- **Windows® 98 Operating System**
- **CE, UL and Semi S2-93 Approved Design**
- **CAD Software Interface—**based on simple operator input, this interface automatically generates U.S. patented code protocols for the mill.
- **CAD Automation—**a 3-D animation of the entire milling process is provided before milling even begins.
- **Custom Diamond Composite Tooling—**this special tooling was designed for silicon removal.
- **Custom Packaging Removal Tools—**these tools allow for easy removal of plastic, metal leadframes and heatsinks, and ceramics.
- **Custom Coolant Chemicals And Recirculator—**reduce surface hardness, creating a low-stress and low-temperature milling environment safe for the semiconductor chip.
- **Computer Aided Mill (CAM)—**the CAM provides 5µm precision accuracy of movement.
- **Interlocked Design—**for safety, the interlocked design shuts off all tooling if the door is opened during milling operation.
- **Wax-In Fixtures—**unique wax-in fixtures developed at Hypervision eliminate the need to develop individual fixtures for each part. The wax-in process is both simple and fast.
- **Windows-Based Intuitive Graphical User Interface—**an interface specifically developed for the Chip UnZip mill simplifies the user interface and makes the milling operation much more intuitive.
- **Laser Alignment Toolset—**this Class 1-certified toolset provides precision alignment for XY offset and works with the new Graphical User Interface. The laser provides a higher degree of alignment accuracy than hand measurements and speeds the setup input needed to run the mill more quickly.
- **Optional Computer-Driven Touch-Off Probe—**the probe seeks the surface of the device to be milled and provides the critical Z-axis dimension. From this dimension, the total amount of material removed in Z (silicon thinning or package thinning) is calculated. The computer probe is both accurate and faster than hand touch-off with a shim.
- **Optional Wafer Preparation System—**this system is available for providing a complete set of tooling and materials to thin individual die on wafers. This is a primary option for backside wafer inspection users purchasing backside wafer-prober emission microscopes.
- **Optional Sound Blankets—**these are used to deaden the high frequency noise by 50% where a lower noise threshold is desired for the tool.
- **Optional CMP Polishing System—**provides a CMP-based system for polishing. It is specifically useful for devices with small die located in recessed cavities where hand polishing can be difficult to perform. CMP polishing programs are automatically generated by the U.S. patented CAD program and downloaded to the mill for operation. Users simply load the CMP polish tool and recall the program for accurate programmed polishing.



*Laser cross-hair on BGA.*



*New simplified user interface speeds setup and makes training simple.*



*Computer driven touch-off probe.*

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