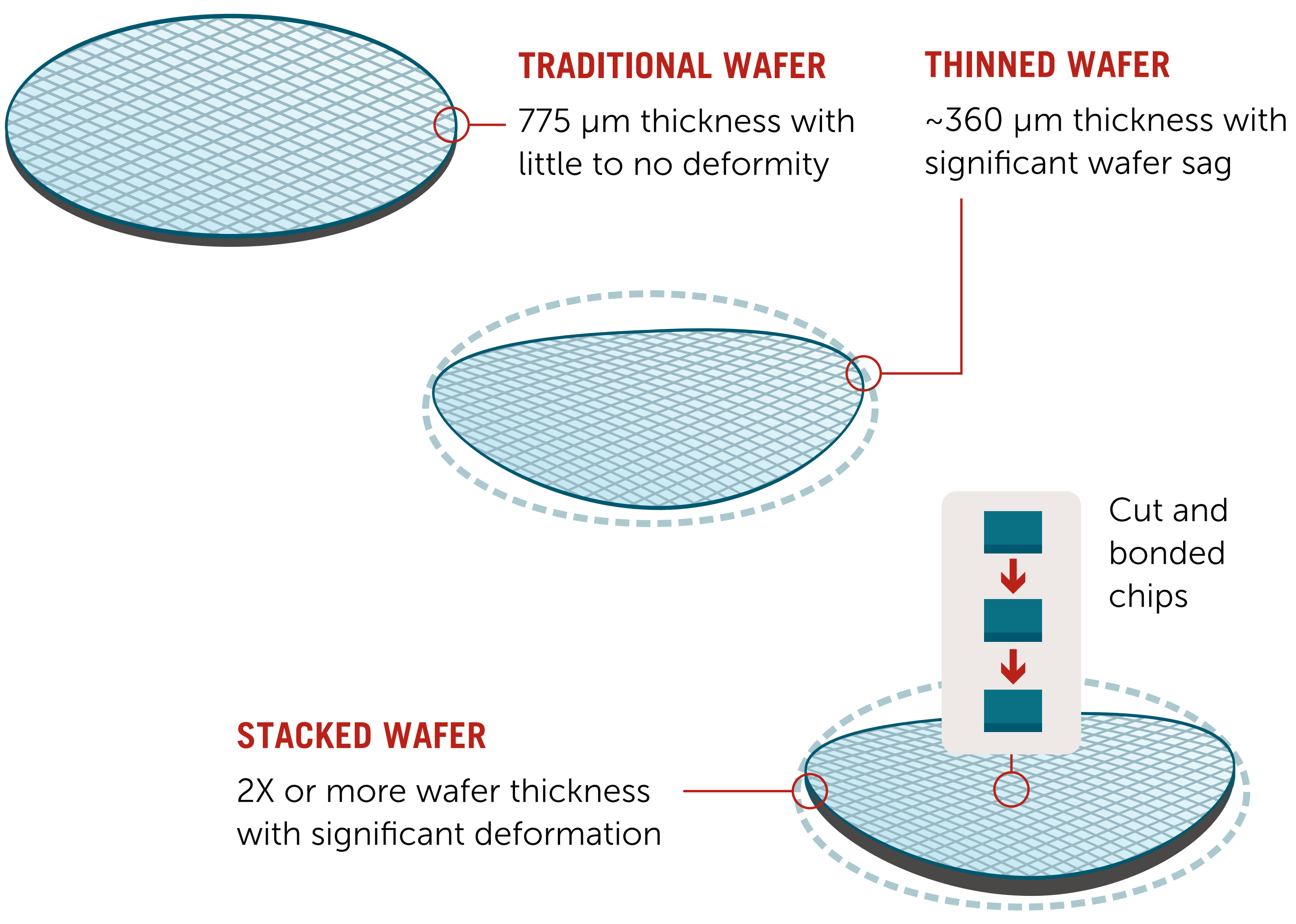
Advanced Back-End Packaging Solutions

Supporting Specialized Wafer Handling Needs

To enable 3D-IC and system-on-a-chip designs, device manufacturing involves increasingly complex processes of thinning wafers and stacking devices together to create complex architectures. Both thin wafers and stacked/bonded wafers present unique wafer handling challenges that traditional wafer handling products such as front opening unified pods (FOUPs) and wafer shippers struggle to handle. Here is how Entegris engineers have advanced back-end packaging solutions.

THE CHALLENGE: CHANGING WAFER SHAPES

A traditional wafer has the structural stability to stay flat. However, wafer thinning can reduce thickness by 50% or more, and stacked 3D-IC wafers may reach over three times their original thickness. Additionally, these wafers may deform due to lack of structural stability or built-in stress from the process required for device stacking.



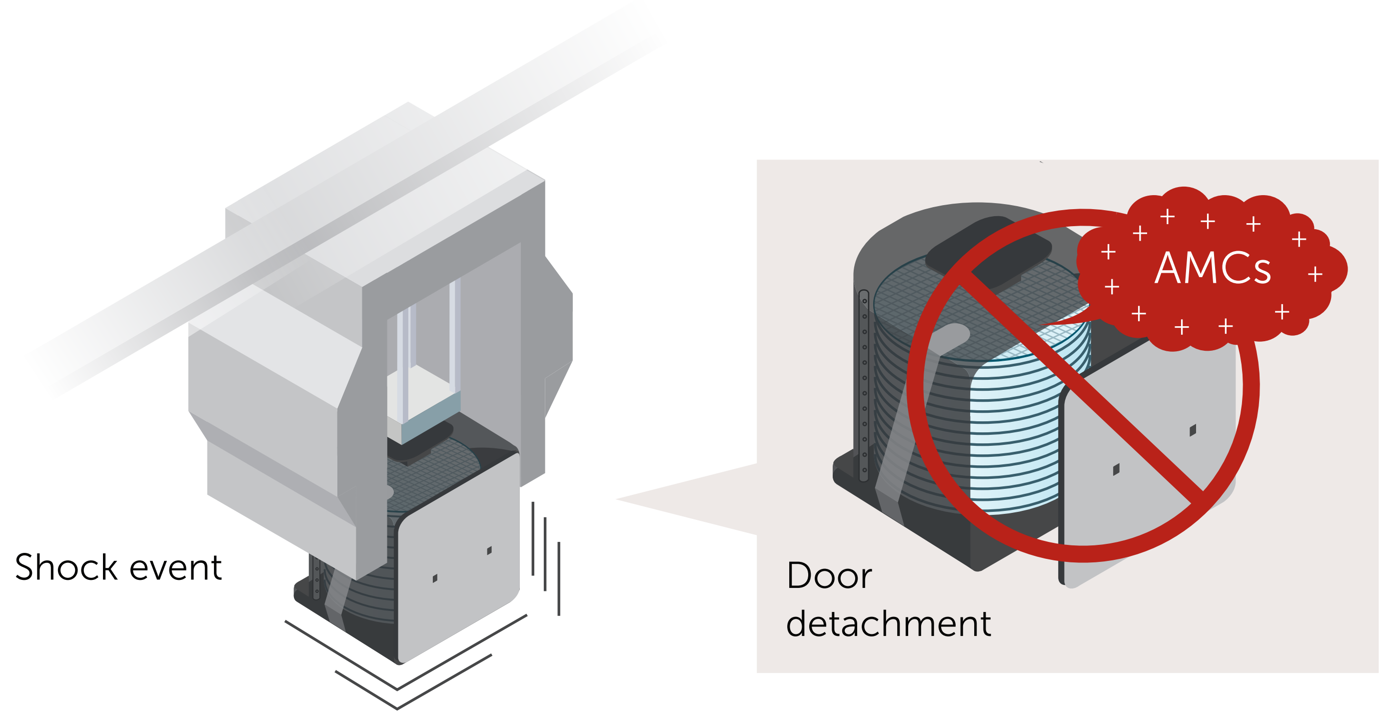
TRADITIONAL WAFER
775 μm thickness with little to no deformity

THINNED WAFER
~360 μm thickness with significant wafer sag

Cut and bonded chips

STACKED WAFER
2X or more wafer thickness with significant deformation

Additionally, stacked and bonded wafers weigh more than traditional wafers, which can lead to stress being placed on FOUP handling in overhead transport systems. A sudden shock or emergency stop event can lead to wafer damage, FOUP door breakage, and exposure to airborne molecular contaminants (AMCs).

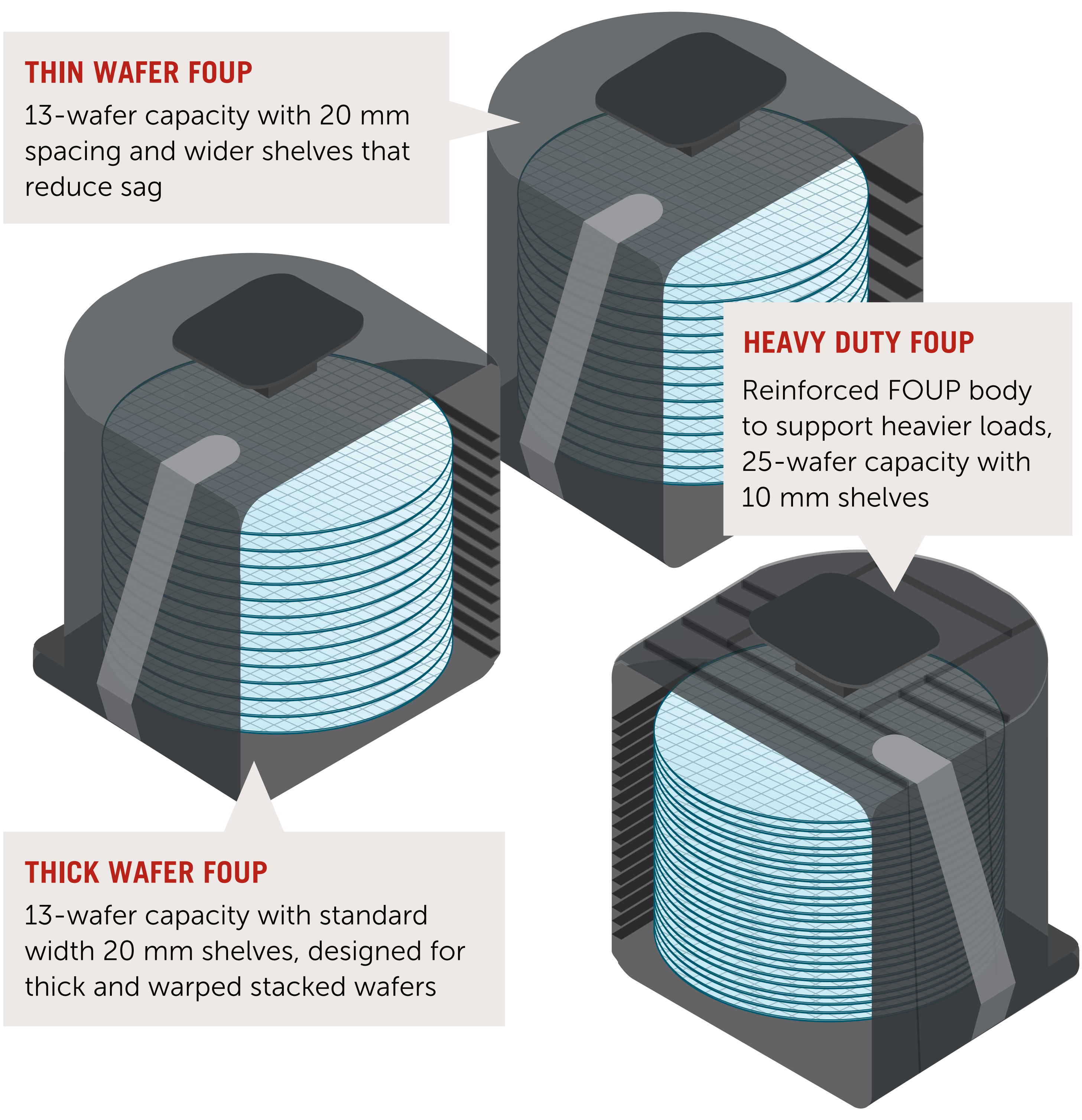


Shock event

Door detachment

SOLUTION FOR FABS: ADVANCED A300 FOUPS FOR WAFERS

New versions of the A300 FOUP are available that solve the problems of handling thinned or stacked wafers. These versions are compatible with standard 300 mm load ports. All versions are compatible with inert gas purge systems.



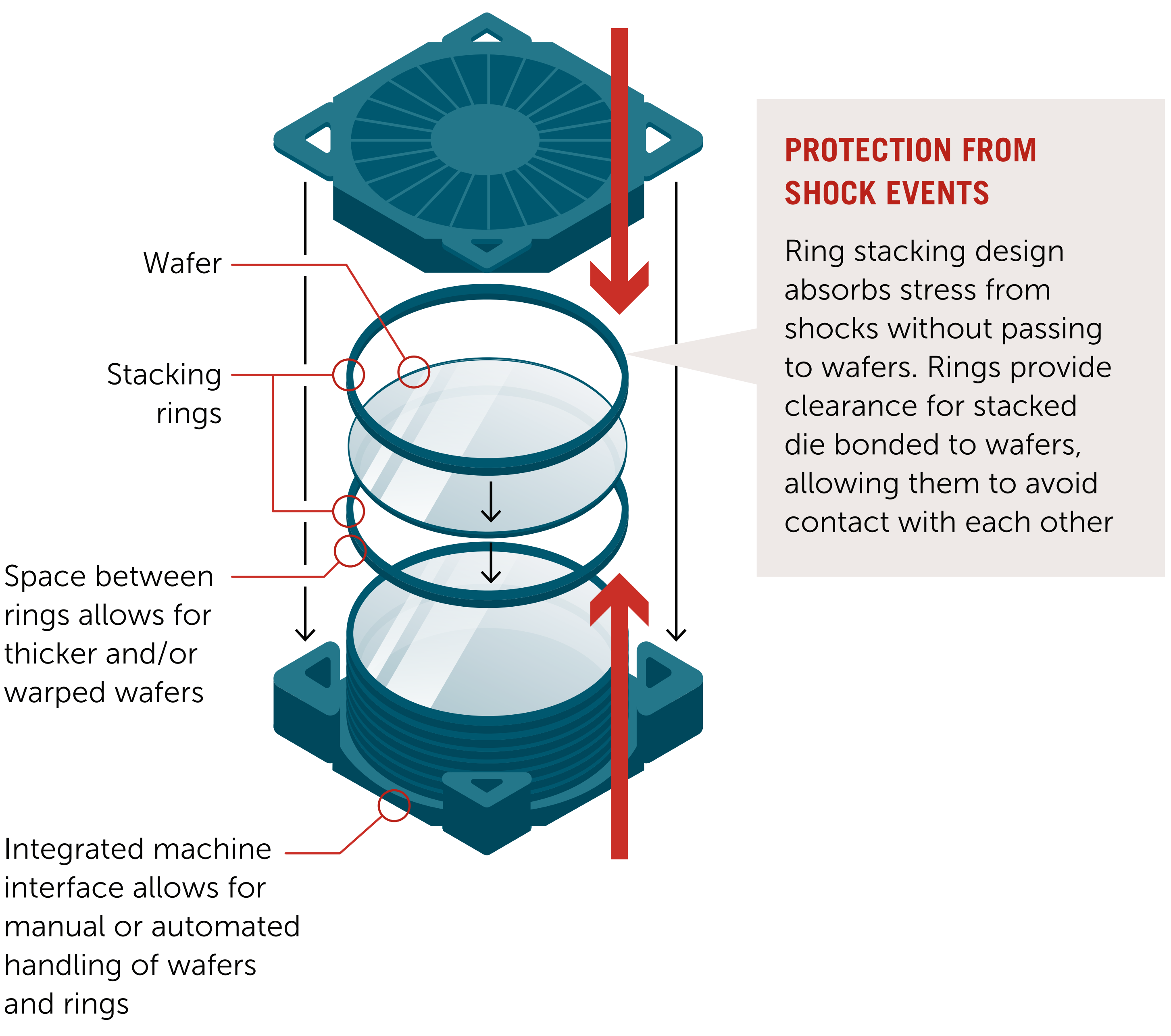
THIN WAFER FOUP
13-wafer capacity with 20 mm spacing and wider shelves that reduce sag

HEAVY DUTY FOUP
Reinforced FOUP body to support heavier loads, 25-wafer capacity with 10 mm shelves

THICK WAFER FOUP
13-wafer capacity with standard width 20 mm shelves, designed for thick and warped stacked wafers

SOLUTION FOR SHIPPING: SMARTSTACK® CONTACTLESS HORIZONTAL WAFER SHIPPER

Redesigned wafer support rings enable a contactless stack of wafers, even with increased thickness or warping.



Wafer

Stacking rings

Space between rings allows for thicker and/or warped wafers

Integrated machine interface allows for manual or automated handling of wafers and rings

PROTECTION FROM SHOCK EVENTS
Ring stacking design absorbs stress from shocks without passing to wafers. Rings provide clearance for stacked die bonded to wafers, allowing them to avoid contact with each other

COLLABORATIVE ENGINEERING YIELDS TARGETED SOLUTIONS

As Entegris introduces new product lines, we welcome the opportunity to work directly with our customers and develop solutions that meet their unique wafer handling challenges.

Learn More

www.entegris.com/advanced-packaging-solutions