

**NORTON**

# NORTON BACKGRINDING WHEELS BEST IN CLASS FOR THE ELECTRONICS INDUSTRY

**new**

**FAVS™ ADVANTAGE**  
(FIXED ABRASIVE VERTICAL SPINDLE)

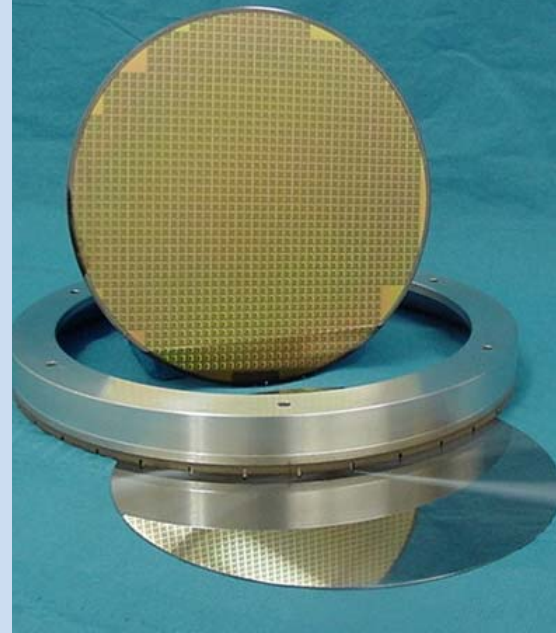
**LOWER SUB-SURFACE DAMAGE**

**INCREASED YIELD**

**AND REDUCED COST OF OWNERSHIP**

## Grind with Reduced Force, Lower Cycle Time and Wear Rate

The continuous growing needs for higher yields, shorter cycle times and lower abrasive cost necessitate optimization of the grinding process for manufacture of thinner and larger diameter semiconductor wafers. Norton application engineers can provide the solutions you need, starting with the new self-dressing proprietary Norton FAVS™ backgrinding wheels. Norton backgrinding wheels are produced with an engineered bond system specifically developed to reduce wafer sub-surface damage, increase wafer and die strength improving yield. Working with superior grinding wheels, Norton engineers can help you meet and exceed your quality targets and production goals on a wide range of materials.



## FAVS VALUE

### PART QUALITY

- Surface roughness
- Wafer geometry (bow, warp, TTV)
- Wafer/die strength
- Sub-surface damage
- Surface scratches

### PRODUCTIVITY

- Grinding cycle time
- Dressing interval
- Number of wheel changes

### ABRASIVE COST

- Wheel wear

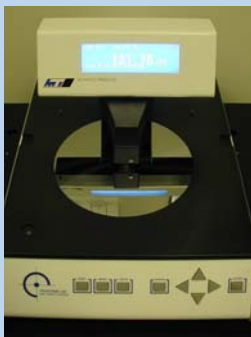
### THIN WAFER GRINDING

#### ENGINEERED BOND SYSTEM DESIGNED FOR:

- Free cutting action
- Self dressing
- Reduced residual grinding stresses
- Low forces during grinding
- Controlled wheel wear characteristics

#### RESULTS IN:

- Reduced bow and warp
- Ease of handling without an additional stress relief process
- Enhanced capability to grind thin wafers with existing set-ups (200 mm wafers to 100 μm)
- Reduced sub-surface damage perceptibly increases the wafer strength



8" Si WAFER  
GROUND DOWN TO  
120 μm THICKNESS  
WITHOUT ANY  
STRESS RELIEF

### ULTRA FINE FINISHES

#### CAPABILITY TO MANUFACTURE WHEELS UP TO # 8000 RESULTS IN:

- Improved wafer quality (finishes below 30 Å Ra)
- Increased strength and ease of grinding very thin wafers
- Controlled forces with less stress
- Possible reduction/elimination of polishing/stress relief

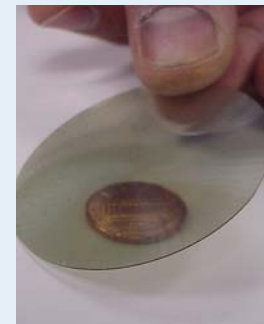


8" SILICON WAFER GROUND TO 120 μm WITH 25 Å RA SURFACE FINISH (NO ETCHING)

### HARD TO GRIND MATERIALS

New wheels specially developed to grind hard and brittle materials easily with low forces and excellent wafer quality:

- Silicon carbide
- AlTiC
- Glass
- Quartz
- Sapphire
- Other hard materials

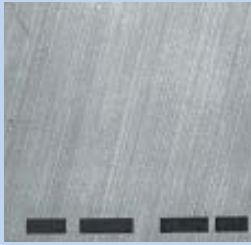


FINE GROUND 2" SIC WAFER TO 20 Å Ra

**NORTON**

## IMPROVED SURFACE ROUGHNESS

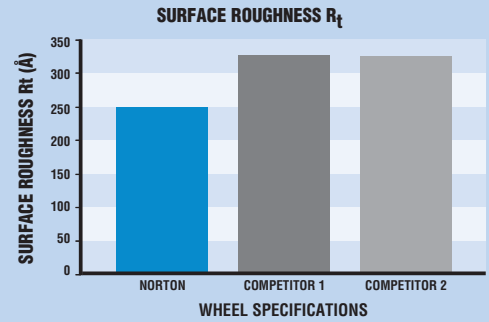
- Engineering capability to develop wheels to grind wafers to 20–30 Å Ra on Silicon



SEM MICROGRAPH OF A FINE GROUND SURFACE (30 Å Ra)

### CASE STUDY

Wafer:	8" Si
Wheel size:	8.22" x .887" x 6.23"
Total stock removal:	470 µm
Coarse wheel spec.:	Coarse #3H1BXL9002-5mm
Coarse wheel speed:	4800 rpm
Coarse infeed rate:	6 µm/sec
Fine wheel spec.:	Polish #3KR1.92BX623D-5mm
Fine wheel speed:	5500 rpm
Fine infeed rate:	0.33 µm/sec

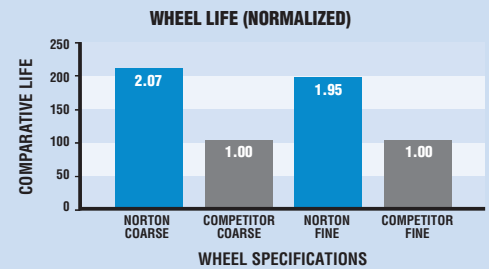


## REDUCED ABRASIVE TOOL COST

- Engineered bond system
- Free cutting action
- Self dressing
- Controlled wear resulting in high life

### CASE STUDY

Wafer:	8" Si
Wheel size:	10" x 1.302" x 6.1"
Total stock removal:	350 µm
Coarse wheel spec.:	Coarse #3H1BXL9002-5mm
Coarse wheel speed:	2400 rpm
Coarse infeed rate:	1.8 µm/sec
Fine wheel spec.:	Polish #3JP1.28BX623D-5mm
Fine wheel speed:	3800 rpm
Fine infeed rate:	0.33 µm/sec

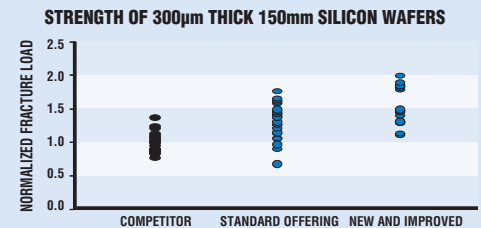
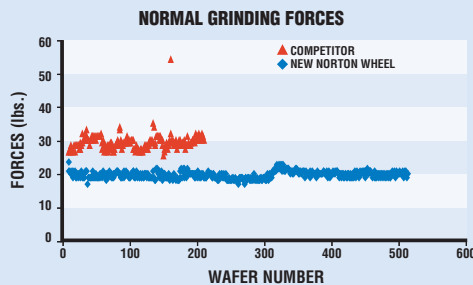


## NEW AND IMPROVED WHEELS FOR SILICON BACKGRINDING

- Reduced normal forces resulting in improved wafer strength
- Increased life means lower cost of ownership

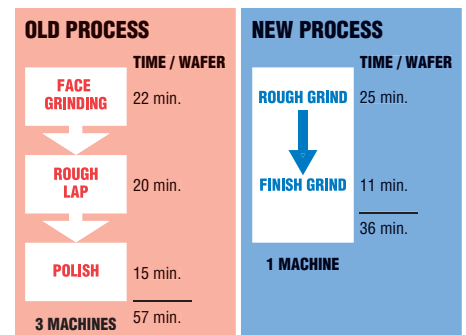
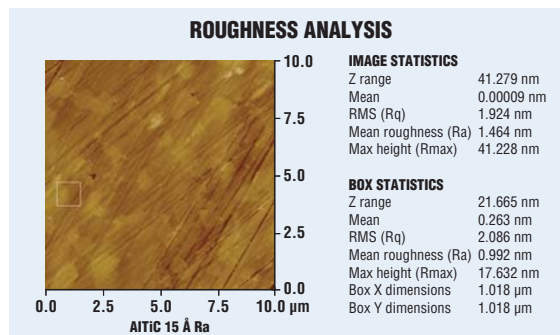
### CASE STUDY

Wafer:	8" Si
Wheel size:	11.1" x 1.197" x 9.002"
Total stock removal:	470 µm
Coarse wheel spec.:	Coarse #3H1BXL9002-5mm
Coarse wheel speed:	3400 rpm
Coarse infeed rate:	6 µm/sec
Fine wheel spec.:	Polish #310.96BXL6550-5mm
Fine wheel speed:	4350 rpm
Fine infeed rate:	1 µm/sec



## SOLUTIONS TO GRIND DIFFERENT MATERIALS

- AlTiC is a multi-phase material consisting of alumina and titanium carbide which have high hardness and fracture toughness making it a difficult-to-grind material
- Able to grind to a mirror finish with better productivity



# NORTON BACKGRINDING WHEELS

## DEDICATED APPLICATION ENGINEERING WITH R&D SUPPORT

- On-site world-wide support through trained and experienced application engineers
- In-house process development capability – Latest Strasbaugh 7AF model with state-of-the-art data collection and analysis capability
- Wafer characterization capabilities
  - Sub-surface damage
  - Surface finish measurement (contact/non-contact)
  - Bow measurements
  - Wafer/die strength measurements

TRANSPARENT EPOXY

DEPTH OF DAMAGE

SILICON WAFER

POLISHED AND ETCHED WAFER CROSS-SECTION FOR SSD MEASUREMENT

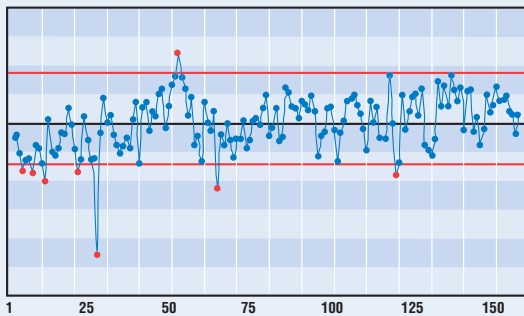
PIN-ON-RING TEST TO DETERMINE FRACTURE LOAD

WHITE LIGHT INTERFEROMETER CAPABLE OF MEASURING < 10 Å FINISHES

## STATE-OF-THE-ART MANUFACTURING FACILITY

- World-wide multi-location facilities
- ISO 9001 qualification
- State-of-the-art manufacturing set-up including class 100,000 & 100 clean spaces
- Trained and experienced manufacturing staff
- Special equipment for improved controls
- Periodic reviews and audits for the best practices followed
- Stringent quality checks to ensure product consistency
- 100% inspection

SPC CHART - PARAMETER 1



## AVAILABILITY

Common wheel sizes:	4.5", 8.22", 10", 11", 13", 14"
Grit Size:	280 to 8000
Bond:	Resin, metal, vitrified
Custom wheels:	Size/Specification can be engineered upon request for optimized process independent of machine tool platform

# BEST

For most abrasive applications, Norton offers up to three product performance levels – GOOD, BETTER and BEST. Norton FAVS backgrinding wheels are in the BEST tier. They represent products that are unmatched in the industry and provide the lowest total cost for the application.

# NORTON

## Leading Technology, Leading Solutions™

IN AMERICA

Saint-Gobain Abrasives, Inc  
1 New Bond Street  
Worcester, MA 01615-008  
Phone : 1(800)424-0800  
1(508)795-5973  
Fax : 1(800)336-9595  
1(508)795-5660

IN ASIA

Saint-Gobain Abrasives, Inc  
15 Beach Road  
#04-03 Beach Centre  
Singapore 189677  
Phone : +(65) 333 5615 (Singapore)  
Fax : +(65) 333 5160  
Phone : +(60) 4 6561711 (Malaysia)

Norton International, Inc  
Room 18, 12F, No 77  
Shih Jen. N. 1st Road  
Taichung, Taiwan  
Phone : +886 4 22550158  
Fax : +886 4 22550197

IN EUROPE

Saint-Gobain Abrasives, Inc  
Schutzenwall 13-17  
22844 Norderstedt  
Germany  
Phone : + 49 40 525 8319  
Fax : +49 40 525 8347

[www.nortonabrasives.com/electronics](http://www.nortonabrasives.com/electronics)  
e-mail: [electronics@saint-gobain.com](mailto:electronics@saint-gobain.com)

© Saint-Gobain Abrasives, Inc. July 2002  
Norton logo is a registered trademark and FAVS is a trademark of Saint-Gobain Abrasives, Inc.

FORM #7801



Certificate No. 10322

SAINT-GOBAIN  
ABRASIVES