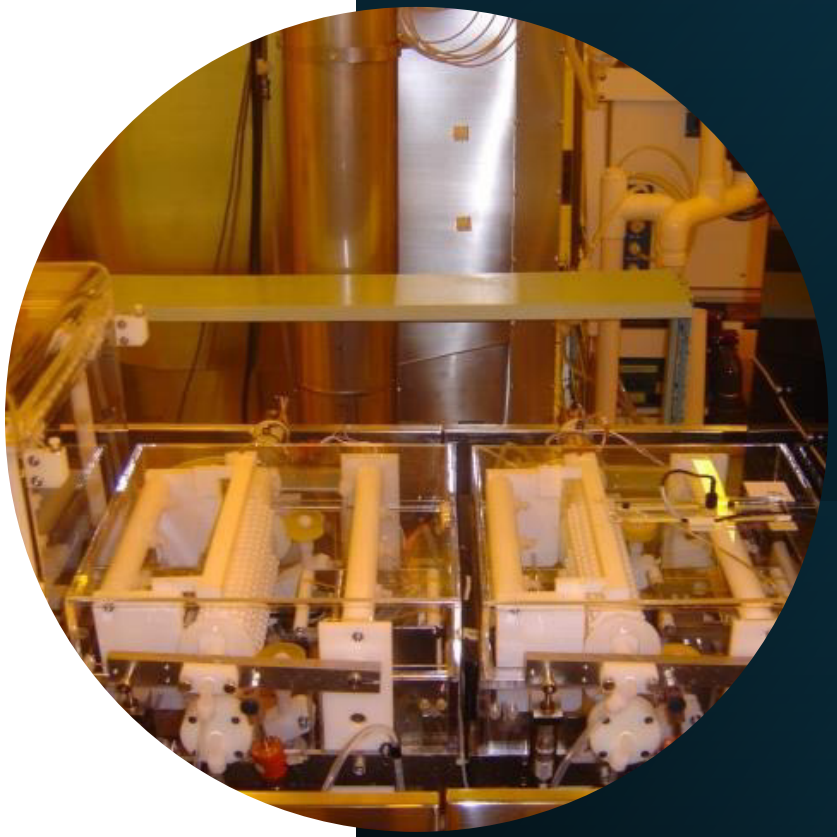
Post-CMP Cleaning
The Early Years
1991 - 1997

Double-Sided Scrubbers…The Technology Nobody Wanted

Jerry Cutini & Willy Krusell, Ph.D.

SEMATECH –
c. 1992

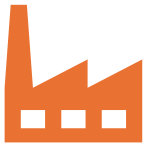
Brush scrubbing does not work for CMP cleaning



So begins the story of OnTrak Systems and the creation of the post-CMP cleaning market

There was something Sematech didn’t know….we already had machines running at MEMC

Why We Knew It Would Work



DSS had been used in prime silicon manufacturing for years – the Original DSS was developed by SVG in the early 80's

In 1985 SVG made the 1st "vertical" dual brush box design…sorry AMAT

SVG

Both prime silicon and post-CMP oxide are flat hydrophilic surfaces thus, cleaning was easy

The OnTrak DSS cleaned the edges much better than a wet bench, this convinced Intel to throw away their wet benches and go with OnTrak…sorry FSI

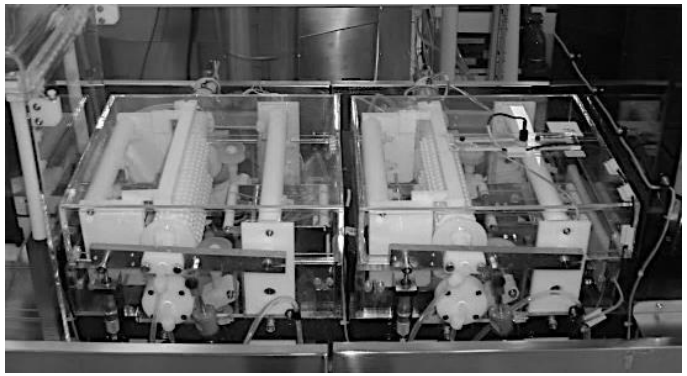
FSI International, Inc.

Lastly, Dr. Willy Krusell was already consulting to us and later became a partner at OnTrak and had developed MEMC's 150mm/200mm cleaning technology

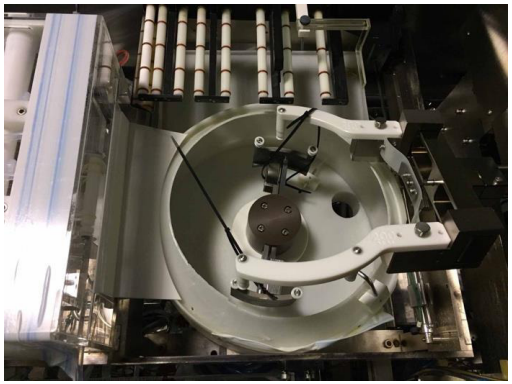
We had the best cleaning technologist, and he ultimately built a great team

The OnTrak DSS - 200

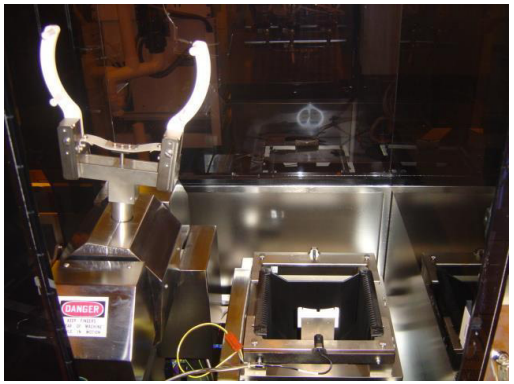
Origin Stories of the DSS-200



Dual Brush Box Design
SVG 18DWC c. 1981
Johann Tam



Edge Gripping Spin Nest
SVG 18DWC c.1981
Johann Tam
Patented by SVG, licensed by OnTrak in 1996

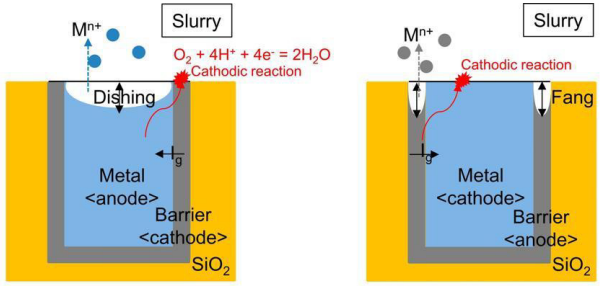


Edge Gripping Robot
OnTrak c. 1992
David Thrasher

First Big Technology Shift

W Plugs CMP

- W CMP created a dishing problem on the top of the plug and in large array areas
- OnTrak found the Pre-Tech megasonic arm and integrated it for post-CMP W clean



Second Big Technology Shift

Cu CMP 300mm

- This was really 2 shifts at once, first, Cu CMP was mostly experimental on 200mm at the time, then the industry quickly moved to 300mm wafers
- Cu CMP required a different drying technology, Marangoni drying became the preferred method

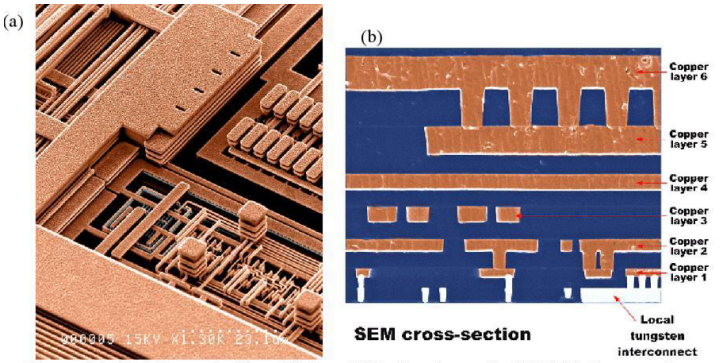


Figure 1.1 (a) Advanced chip with 7 metallization layers by IBM (b) Cross-section on

Patents and Inventions by OnTrak Team Members

- Thru-brush chemical delivery
- Edge cleaning and edge roller controls for wafer rotation
- HF cleaning for post-CMP cleans
- Megasonic pre-cleaning for post-CMP wafers
- Brush cleaning to prevent load-up on the brushes
- Wet submersible indexer
- Method for cleaning after copper polishing
- Method to remove metals from a scrubber
- Slurry Dip test procedures
- Numerous Linear CMP patents including in-situ endpoint detection

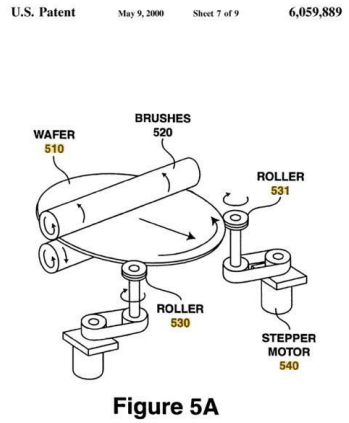


Figure 5A

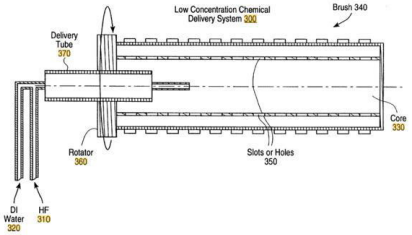
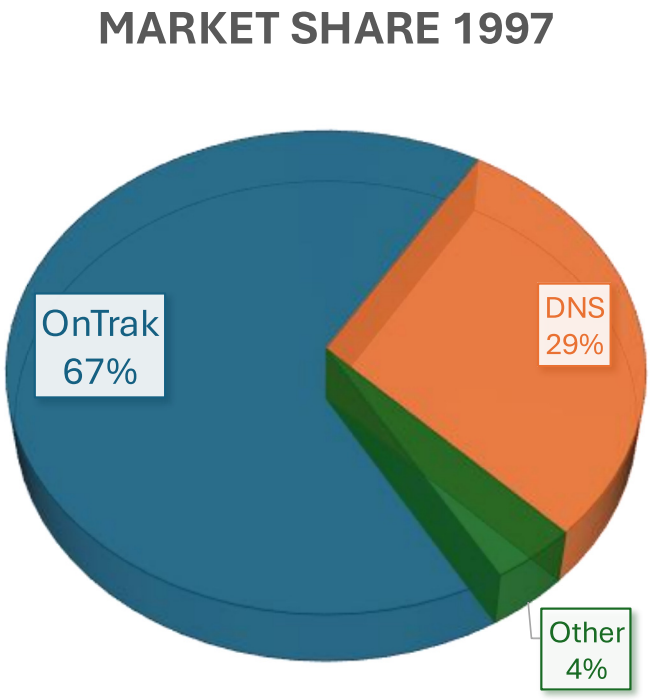
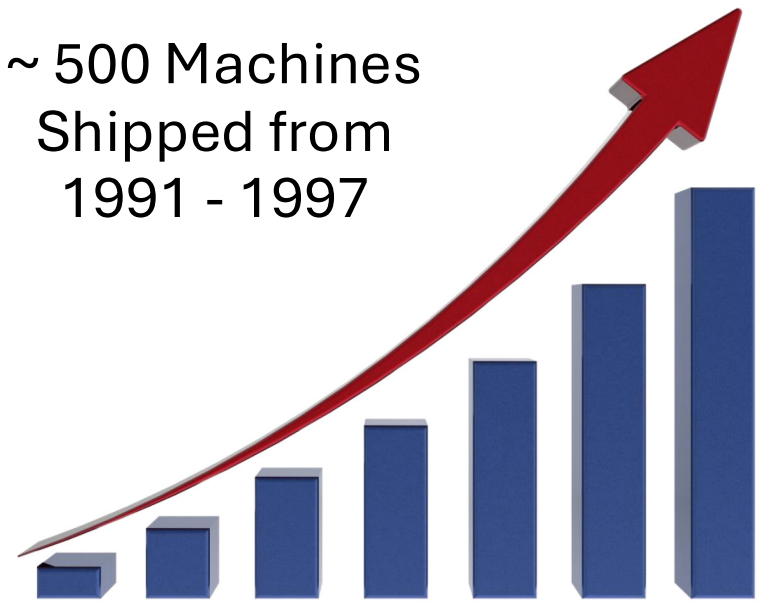


FIG. 3

OnTrak by the Numbers….1991 – 1997





25 years after we sold OnTrak to Lam Research, there are at least 3 companies building updated versions of the DSS-200

OnTrak was A Success Story Unlike any Others

- Ken Smith created OnTrak in a garage
- OnTrak created the post-CMP cleaning a market, we beat all competitors, we were 1st with HF for post-CMP cleaning, we invented the linear polisher (which died a quiet death)
- OnTrak grew faster than almost any other company at the time, ~$1m - ~$120m in 6 years
- From 1991 to 1997, we shipped nearly 500 machines, raised money from VC and had a successful IPO and were one of the most profitable companies in the industry, but still too small…
- Then we sold-out to Lam….but that's an entirely different story

THANK YOU