

Back On Track

Techcet CMP Consumables 2012 Market Update

*Michael A. Fury, Ph.D.
Techcet Group LLC
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Techcet Group, LLC

*MFury@Techcet.com 415-395-6945
www.techcet.com*

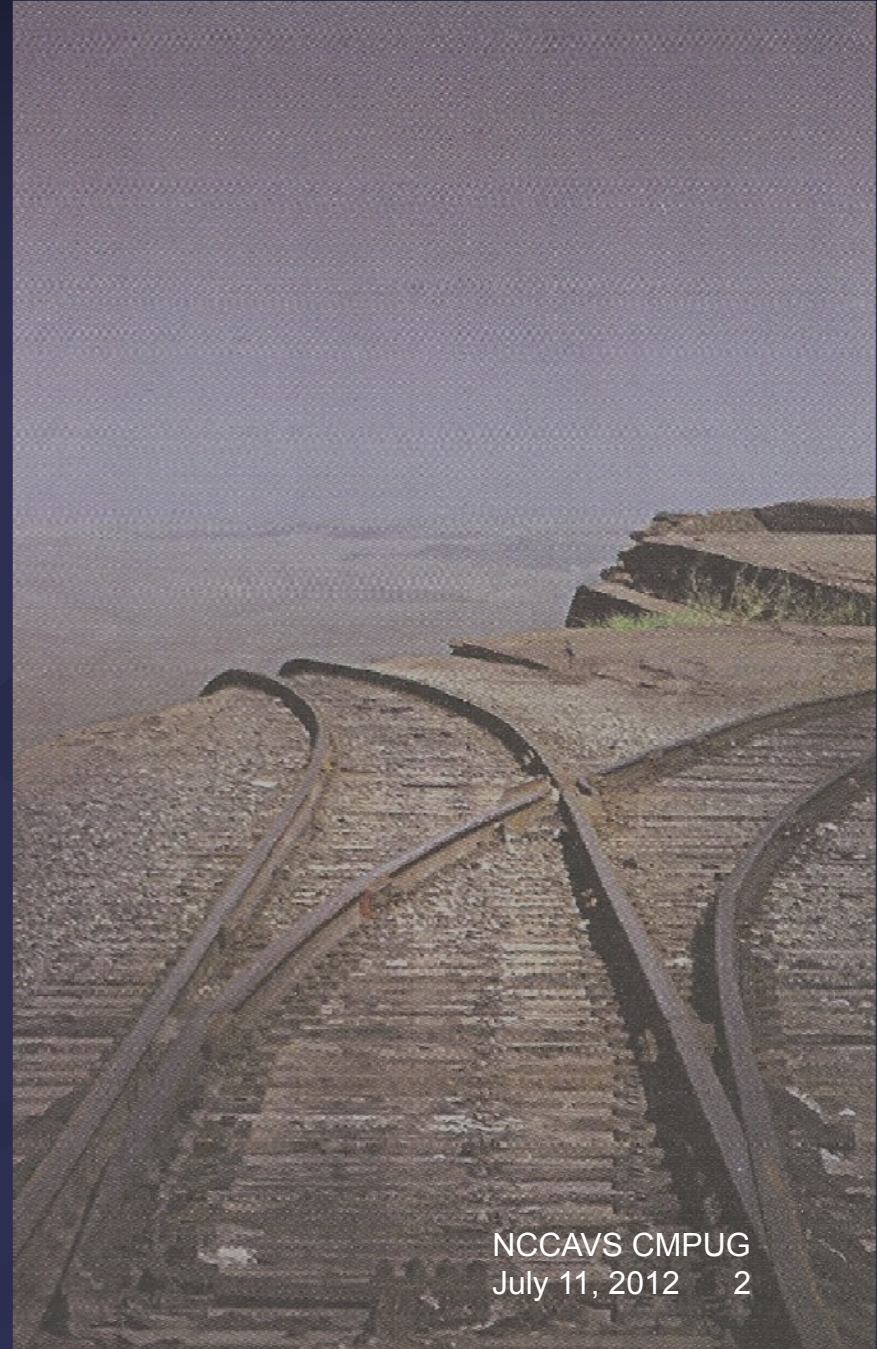
Outline

- *The Business

- *The Players

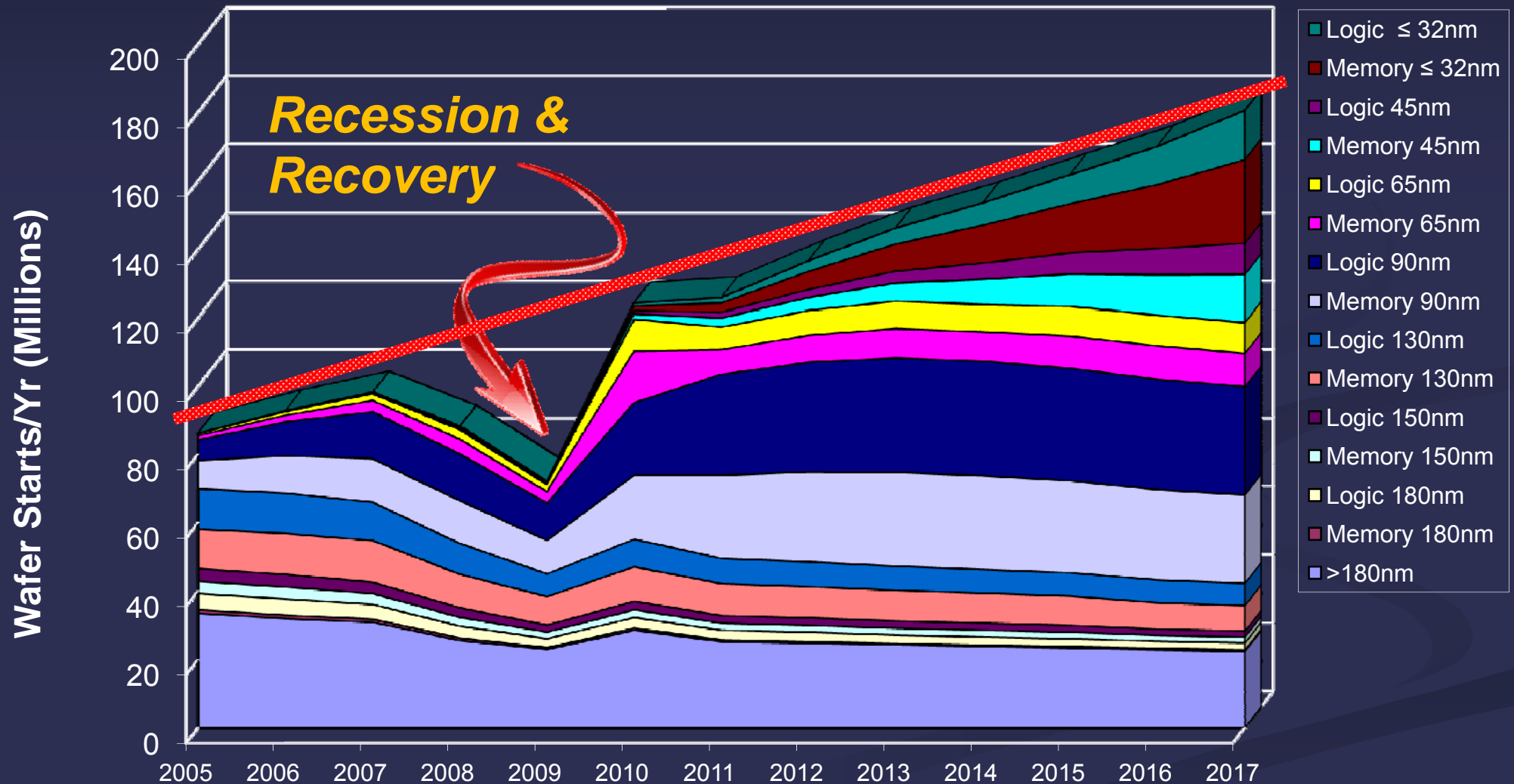
- *The Buzz

- *The End



The Business of Semiconductors

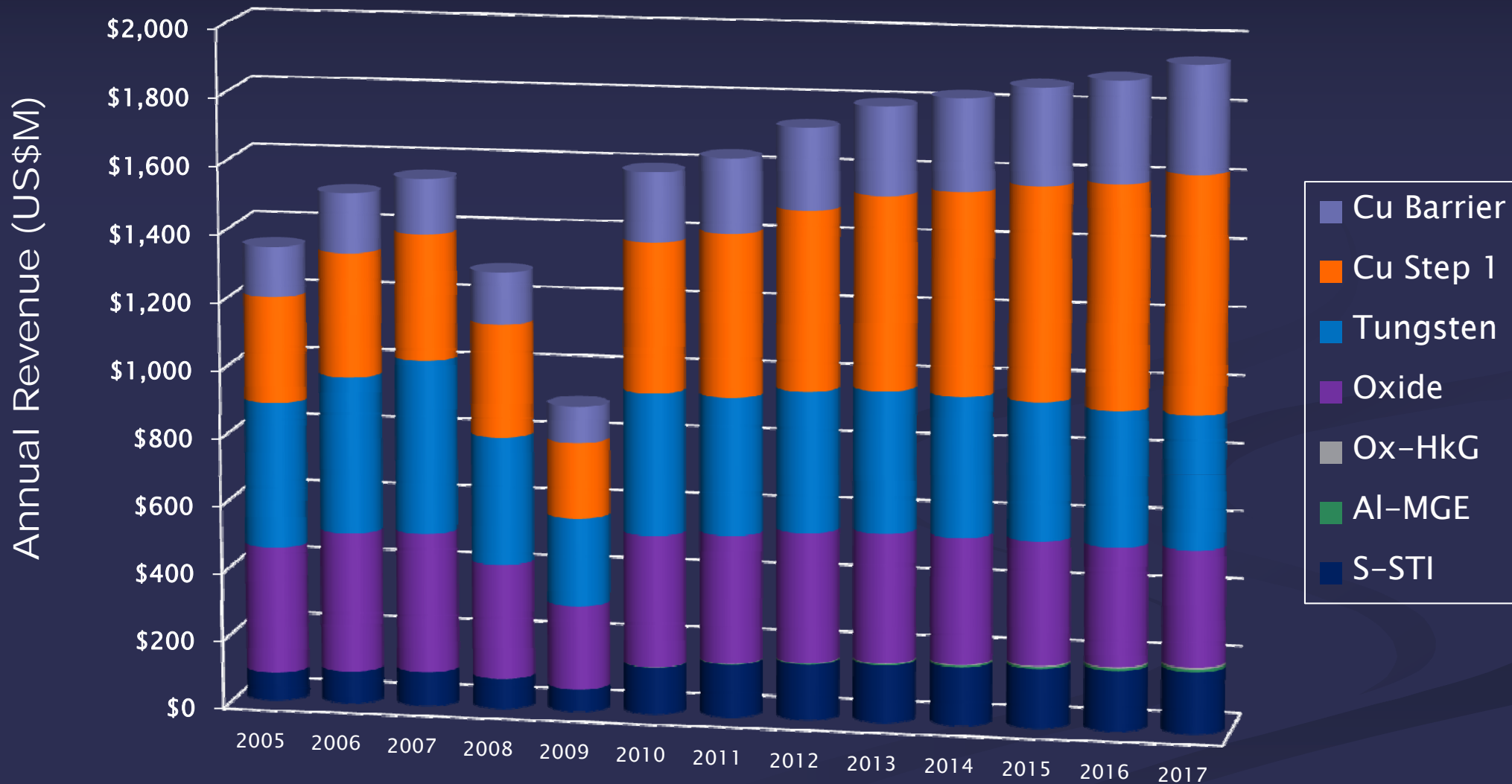
Annual Wafer Starts (200mm equivalents)



Source: Techcet Group, June 2012

The Business of CMP

Pad & Slurry Revenue by Application



Source: Techcet Group, June 2012

The Business of CMP

- * Modest revenue growth for 2011
 - ✦ Up 3% over 2010's 76% recovery blast
 - ✦ 2012 forecast: +5.7% to \$1.73B; new processes
 - ✦ 5-year CAGR: 2.8%
- * Revenue shuffle continues
 - ✦ More copper & STI, less tungsten & ILD
 - ✦ Resurgence of premium silica markets
 - ✦ New applications emerging for ceria
- * No entries/exits in CMP supplier base



The Players - Slurry

- * Air Products buys DuPont's DANM share
 - ✦ DANM / Cabot IP settlement has had little effect
- * No significant share movement in 2011
- * >15 suppliers share **\$994M market** (est. 2012)
 - ✦ Tier 1 – Cabot Microelectronics ~40% share
 - ✦ Tier 2 – DANM, Dow, FujiFilm, Fujimi, Hitachi
 - ✦ Shares 5% to 12%
 - ✦ Tier 3 – Anji, AGC, ATMI, BASF, Bayer, Cheil, Ferro, JSR, Wacker
 - ✦ Shares <5%

The Players - Slurry

- * July, 2011: proposed a CMP slurry market statistics program
 - ✦ Modeled after SEMI silicon wafer and photoresist programs
 - ✦ All key suppliers invited to participate
 - ✦ *Zero participants signed up*
- * CMP market statistics will continue to be *consensus estimates*



The Players - Pads

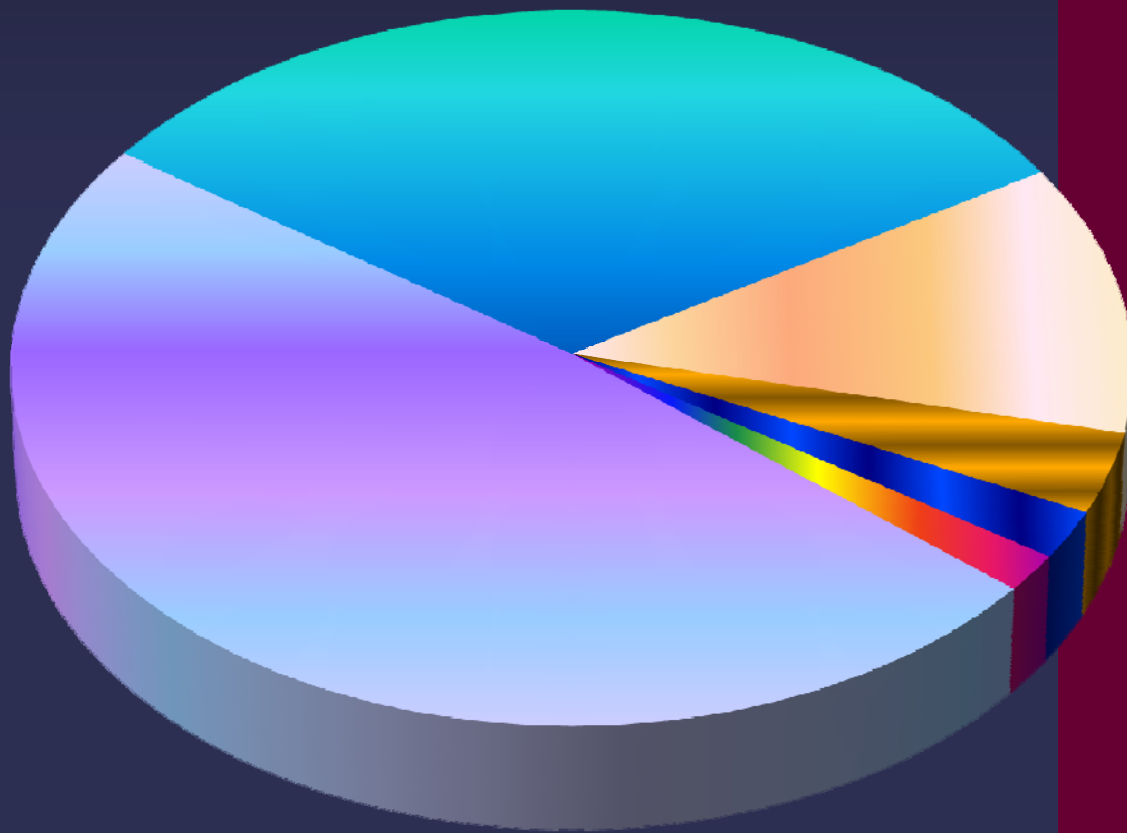
- * No significant share movement in 2011
- * >16 makers share **\$646M market** (est. 2012)
 - ✦ Tier 1 – Dow ~80% share
 - ✦ Tier 2 – Cabot ~5–10% share
 - ✦ Tier 3 – innoPad, JSR, Praxair, Thomas West
 - ✦ Shares 3–5%
 - ✦ Others – 3M, Fujibo, IVT, KPX, NexPlanar, Rogers, SKC, Toray, Toyo, Toyobo

The Players – Other CMP

- * Pad conditioners ~\$250M market
 - ✦ 3M & Kinik combined share >50%
- * PCMP Cleaners ~\$75M market
 - ✦ ATMI & Air Products combined share >65%
- * PVA brushes ~\$45M market
 - ✦ ITW & Aion combined share >80%
- * Slurry filters ~\$35M market
 - ✦ Pall & Entegris combined share >90%

CMP Consumables *Grand Total*

2012 Revenue



Total CMP Consumables: ~\$2.04B

The Buzz – Ceria & China

- * Ceria remains highly cost competitive due to China's export restrictions
 - ✦ 10–30% jump in ceria slurry prices
 - ✦ Slurry suppliers more engaged in refining
 - ✦ Alternative mines reopening globally
- * New FEOL device structures leverage ceria rate, selectivity, defectivity
 - ✦ Same abrasive, different additives
 - ✦ ~1% solids for S-STI, less for new FEOL

The Buzz – Defect Reduction

- ✧ Reducing microscratching at STI and other FEOL steps is a critical issue below 32nm – *crazy sensitive*
 - ✧ Real-time slurry monitoring brings 6σ line control capability to CMP (Vantage Tech)
 - ✧ Customers asking for post-polish debris analysis for scratching incident diagnosis
 - ✧ New metrology and hardware will need new line management protocols to be effective

The End

- ✧ CMP consumables market has returned to its pre-recession trajectory
- ✧ CMP growth rate will *once again* exceed semiconductor growth for the next 3–5 years as new device structures call for new CMP processes
- ✧ CMP process yield will benefit from metrology innovations



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Techcet Partners

Karey Holland, Ph.D.

Steven Holland, Ph.D.

John Housley

Lita Shon-Roy

Technology & Market Analysts

Michael Fury, Ph.D.

Jiro Hanaue

Maggie Lee

Gary Ray, Ph.D.

Larry Thompson, Ph.D.

Allan Wiesnoski



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✧ 2012 CMP Consumables Report

- ✧ **New:** available by individual consumable
- ✧ **New:** some content available by the page

✧ Lita Shon-Roy

- ✧ 480-336-2160 orders
- ✧ 480-275-3101 fax orders
- ✧ LShonRoy@Techcet.com
- ✧ www.Techcet.com

