

DNP Photomask Strategies

Technology Focus

DNP is dedicated to maintaining our top position as the leader in photomask technology. To this end, we are consistently accelerating next generation development through continued focus on “in-house” and collaborative R&D efforts. Through significant investment in R&D and advanced manufacturing capacity, DNP is able to maintain its technological expertise to satisfy the complex technical demands of today and well into the future. As an example, DNP was the first company to co-develop 50KeV writing tools and introduce them to the industry, enabling smaller feature sizes for the most advanced semiconductors.

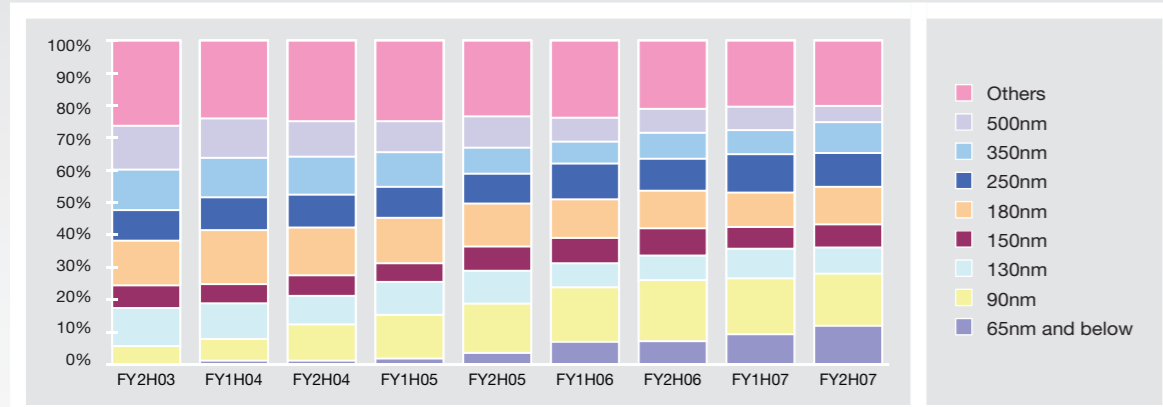


Figure 1: DNP has continuously focused on the leading edge of photomask technology.

Reticle Technology Roadmap

As technology complexity increases, quality is an absolutely essential element in photomask production. By leveraging relationships with the industry's leading equipment manufacturers and using the latest inspection and repair equipment available, DNP is able to consistently deliver quality products to our customers worldwide. We are working closely with leading foundry and fabless customers to provide cutting-edge technology answers for the industry's ever-growing photomask demands and are also leading the way in the introduction of the industry's first 65 nanometer and 45 nanometer photomask solutions.

C.Y.		2008				2009				2010				2011			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
65nm Logic (1/2 pitch 90nm) 90nm Memory	193nm dry	Production															
45nm Logic (1/2 pitch 65nm) 65nm Memory	193nm dry, 193nm immersion with water	Production															
32nm Logic (1/2 pitch 45nm) 4xnm Memory	193nm dry, 193nm immersion with water, (DPL)	Qualification				Qualification				Production							
3xnm NAND Flash Memory	193nm immersion with water DPL	Development				Qualification				Production							
3xnm DRAM	193nm immersion with water DPL, EUV	Development								Qualification				Production			
22nm Logic (1/2 pitch 32nm)	193nm dry DPL, 193nm immersion with water DPL, (ML2)	Development												Qualification			
2xnm Non Volatile Memory	193nm immersion with water DPL, EUV, Nanoimprint	Development												Qualification			
Reticle type/RET for 32nm (1/2 pitch 45nm)																	
6% Att PSM	193nm Wet	Qualification				Production											
Binary Mask	193nm Wet	Qualification				Production											
Alt-PSM	193nm Wet	Qualification				Production											
Double Mask (DE/DPL)	193nm Wet	Development				Qual.				Production							
Reticle Specifications																	
CD Uniformity (nm, 3s) Dense line		3.4				3.0				2.7				2.4			
CD Mean to Target (nm, +/-)		4.5				4.0				3.6				3.2			
Difference in CD MTT for DP(nm, +/-)		2.3				2.0				1.8				1.6			
Image Placement for SP (nm, max. error)		6.8				6.0				5.4				4.8			
Image Placement for DP (nm, max. error)		4.8				4.2				3.8				3.4			

Figure 2: Reticle Roadmap

Total Solutions

Along with high quality photomask manufacturing, DNP offers a complete range of business solutions to meet our customers' needs. Building on our decades of experience, DNP continuously refines these services and proactively adapts them to the ever growing data handling needs of the semiconductor market. A sample of our many support capabilities includes:

DNP Data Handling Functions for Foundry Business:

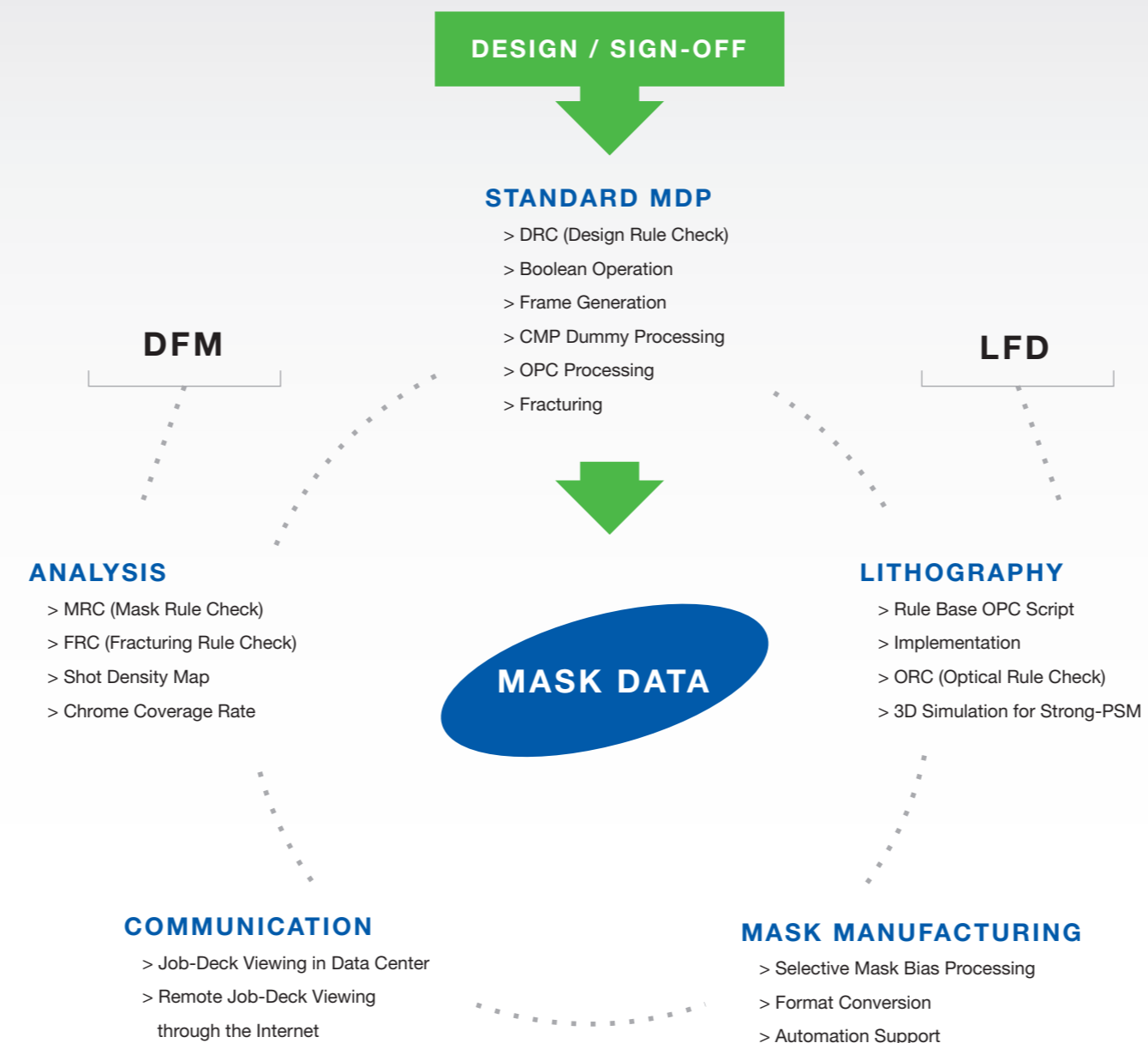


Figure 3: DNP data handling functions for foundry business

Strategic Partnerships

DNP recognizes the complexity of the semiconductor industry and has strengthened partnerships with key industry leaders to provide our customers with access to the most advanced technologies at the earliest possible date. Collaborating with both equipment and material vendors gives DNP the advantage of understanding and planning for future demands of the advanced semiconductor market.

DNP continues to fortify our partnerships with equipment & material vendors, re-invest in R & D, and provide total solution services to make certain our customers will reap the benefits of our leading-edge technology solutions for generations to come.

DNP Sites and Global Network Links

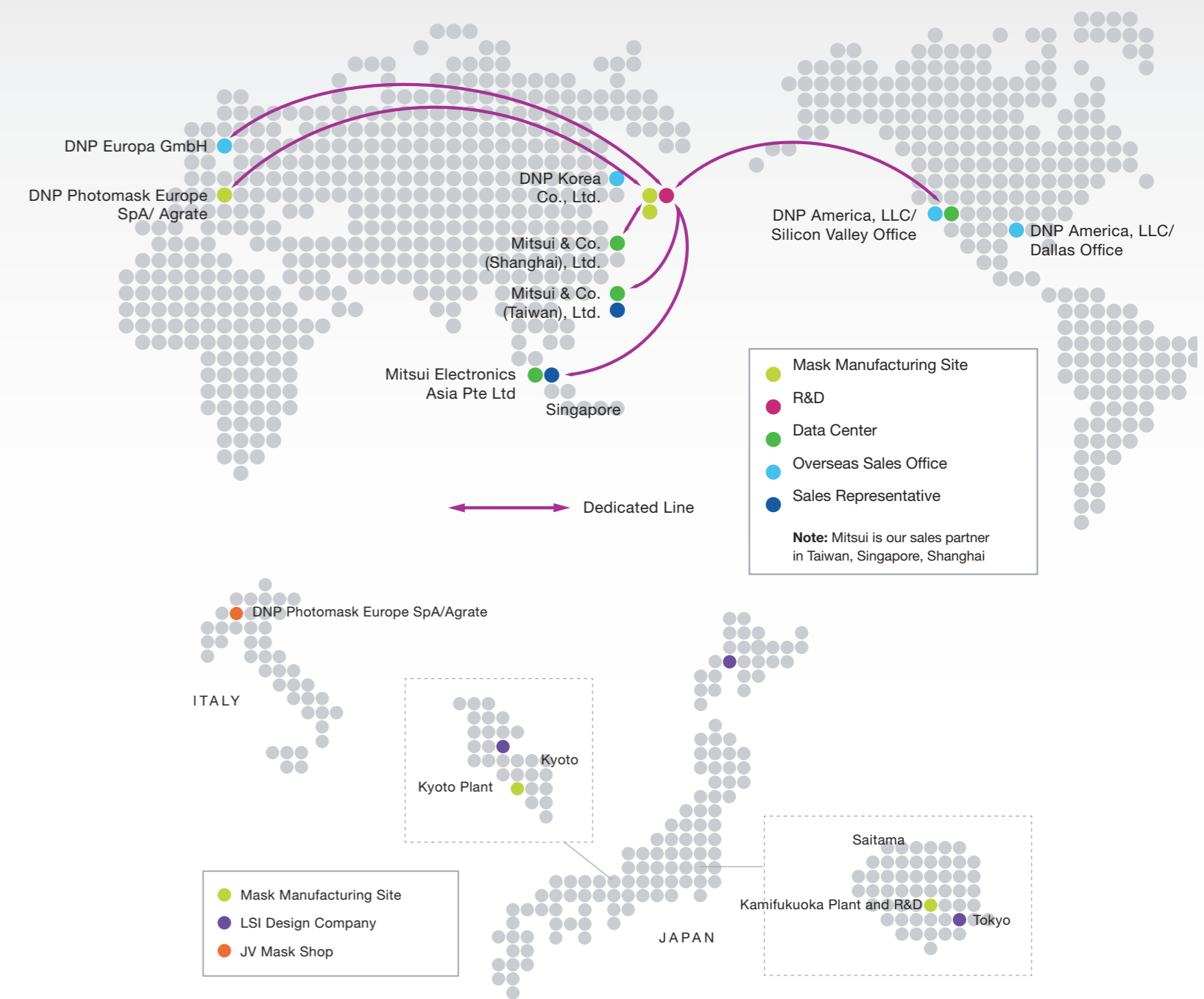


Figure 4: DNP Sites and Global Network Links