



R&D Center,
Bang Pa-in, Thailand



R&D Center,
Karuizawa, Japan



PMDM GmbH,
Villingen, Germany

R&D Center



Technical Center,
Michigan, USA



R&D Center,
Chai Chee, Singapore

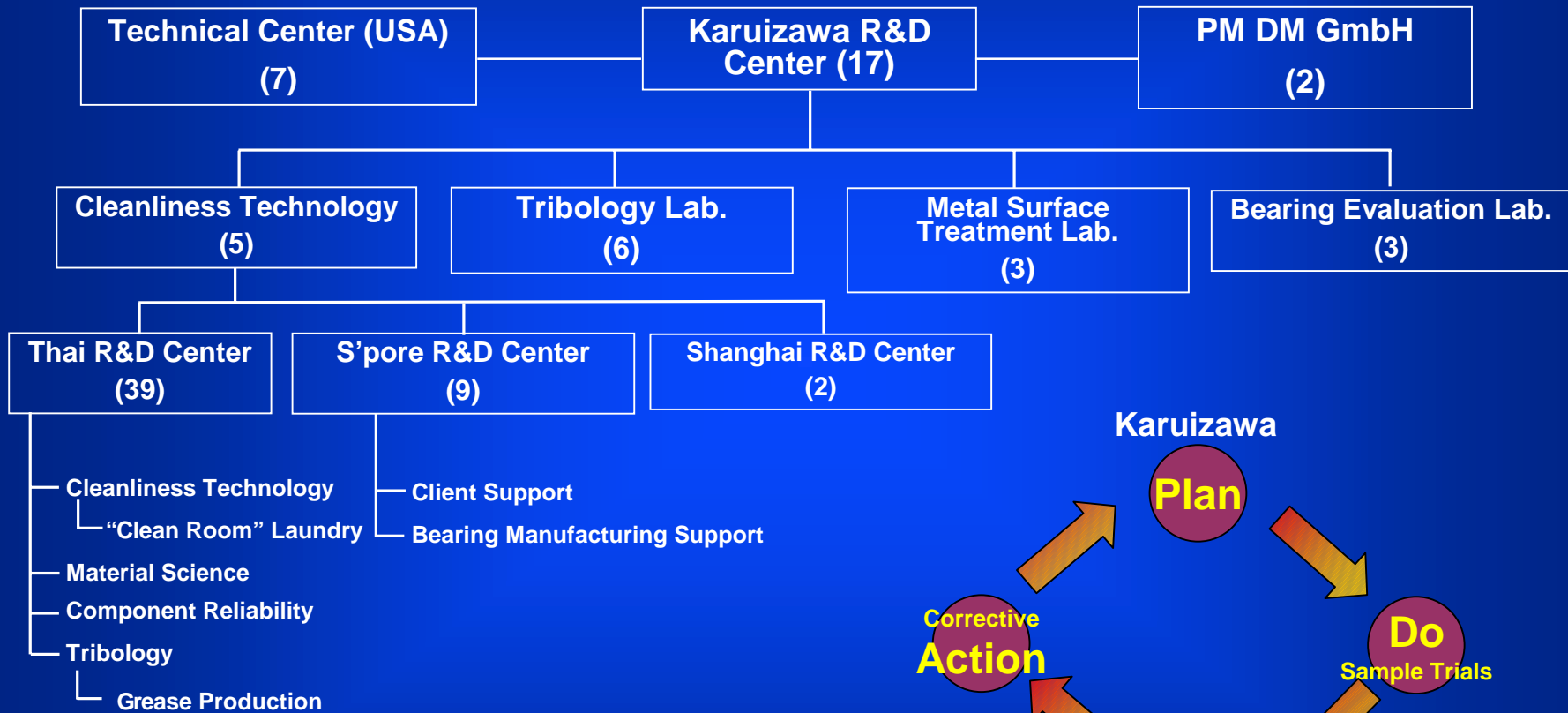
March 23, 2001

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- 1. Collaborated Organization and Its Major Activity Fields.**
- 2. HDD Major Technology.**
- 3. Sustaining The HDD Technology Innovation
(Spindle Motor and Pivot Assembly).**
 - Grease Development for RO (Ball) Bearing**
 - Steel Alloy Development
(Free-Machining Stainless Steel)**
- 4. Chemical Integration (Spindle Motor)**
- 5. Summary.**

7. R&D Center

1. Collaborated Organization and It's Major Activity Fields.



Figures in () are the numbers of HDD Related R&D Engineer : total 76 Staffs



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● **CHANNEL INTEGRATION**

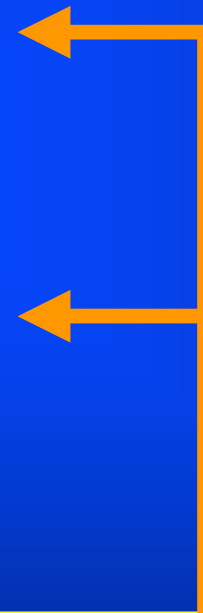
- R/W CHANNEL
- CODING
- SERVO

● **MECHANICAL INTEGRATION**

- HEAD/DISK TECHNOLOGY
- OTP/TMR

● **CHEMICAL INTEGRATION**

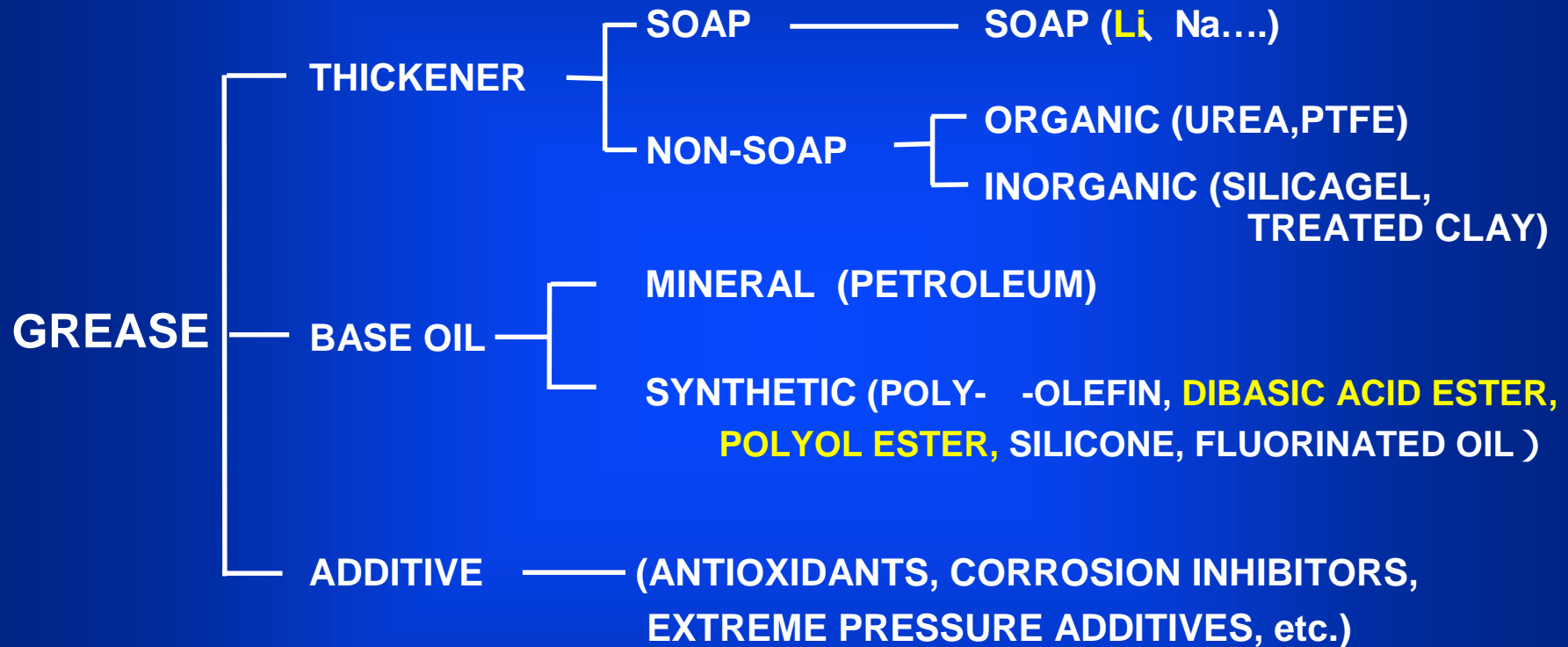
- RELIABILITY
- CLEAN TECHNOLOGY



Spindle Motor/Pivot Assembly

SPINDLE MOTOR	PIVOT
<ul style="list-style-type: none">● Higher Rotation (Bearing) Steel Ball, Grease Development Ceramic Ball● Low Noise Bearing Cleanliness Improvement● Low NRRO (Lower Than 0.3 μ m) RO Bearing rather than Conventional (Discrete) Bearing● Low Friction Torque And high Anti-Fretting Grease Development● Less Outgassing Polymers Sulfur Contained Free-Machining Steel Improvement	<ul style="list-style-type: none">● Shorter Access Time Low Hysteresis Thermal Expansion Matching● Low Friction Torque Grease Oil● Outgassing Improvement Sulfur Contained Free-Machining Steel Improvement Low Outgassing Adhesive Less Outgassing Grease Development● Light Weight Stainless Steel Nonferrous Metals

LUBRICATING GREASE STRUCTURE

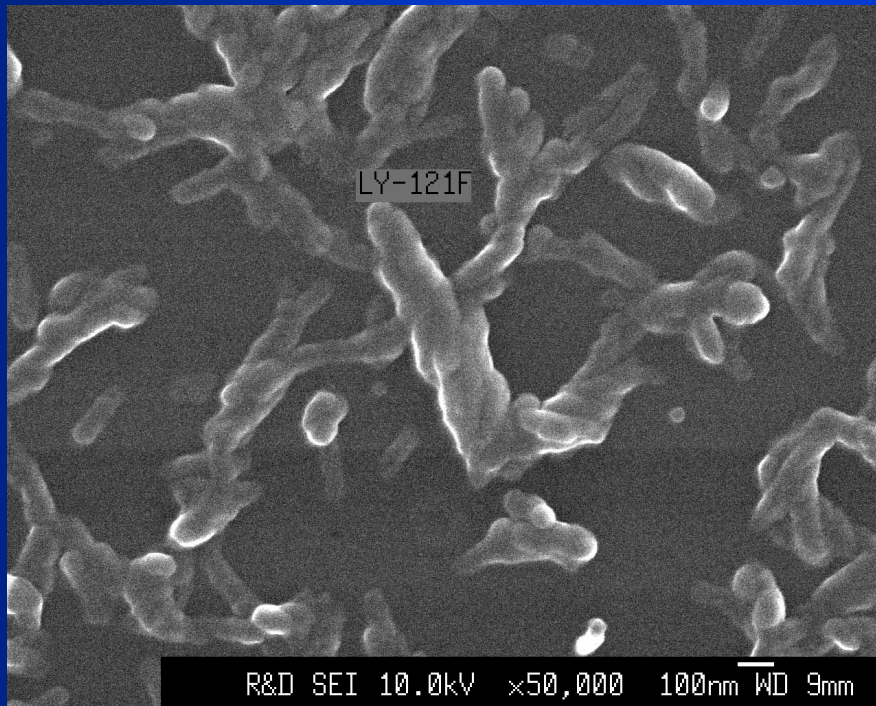


GREASE CONSISTS OF APPROX. 80% TO 90% OIL, APPROX. 10% TO 20% THICKENER AND APPROX. 1% TO 5% STIFFENER ADDITIVES.

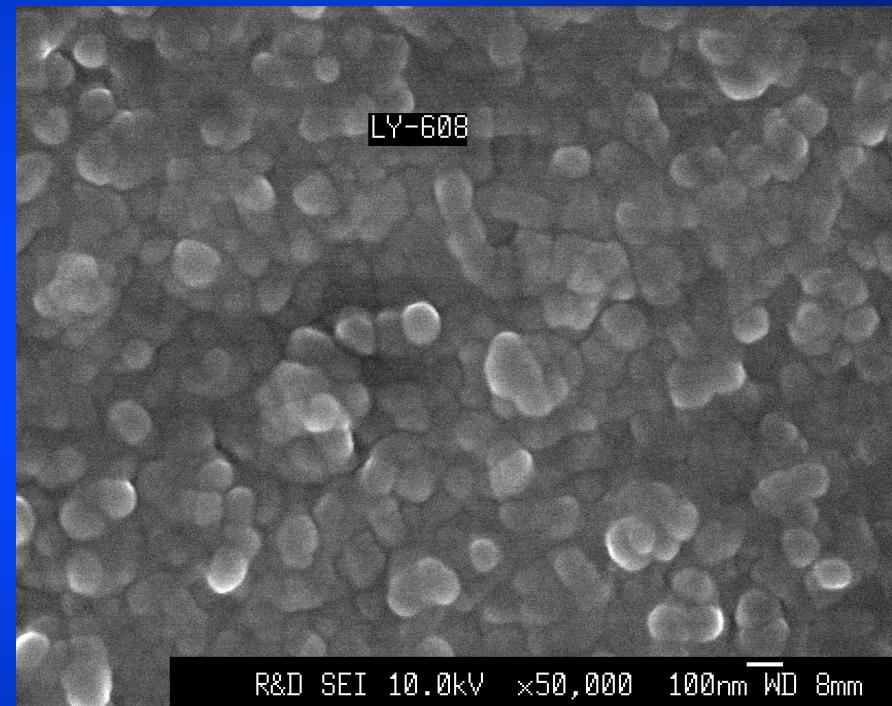
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3. Sustaining The HDD Technology Innovation (Spindle Motor and Pivot Assembly).

Old and Current Li Soap



New Li Soap

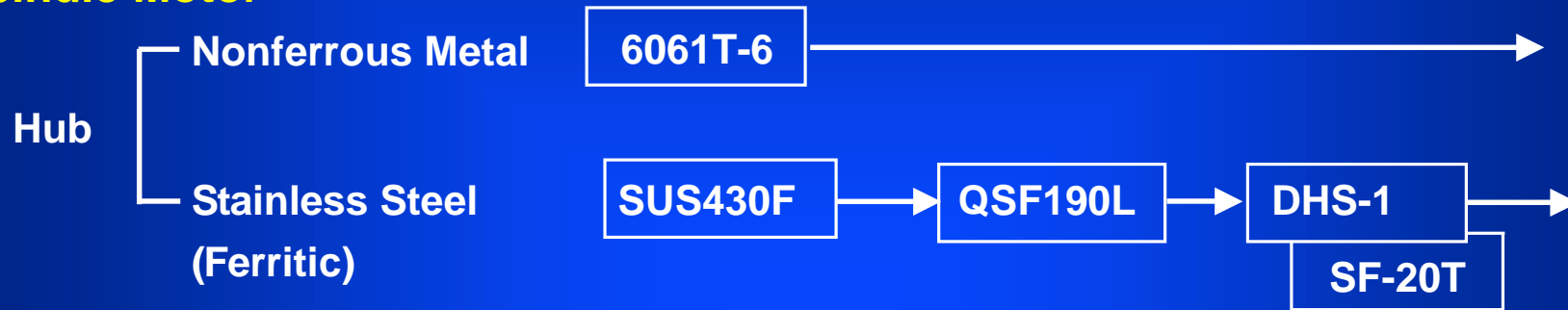


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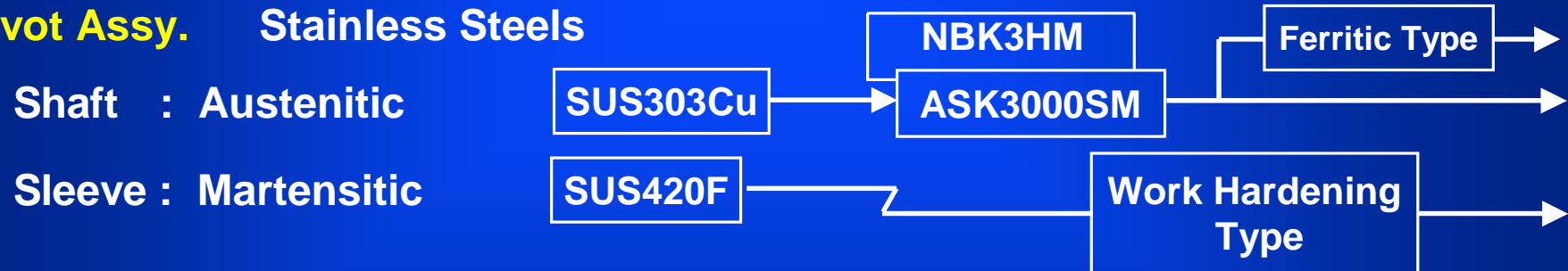
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Steel Alloy Development (Spindle Motor And Pivot Assembly)

Spindle Motor



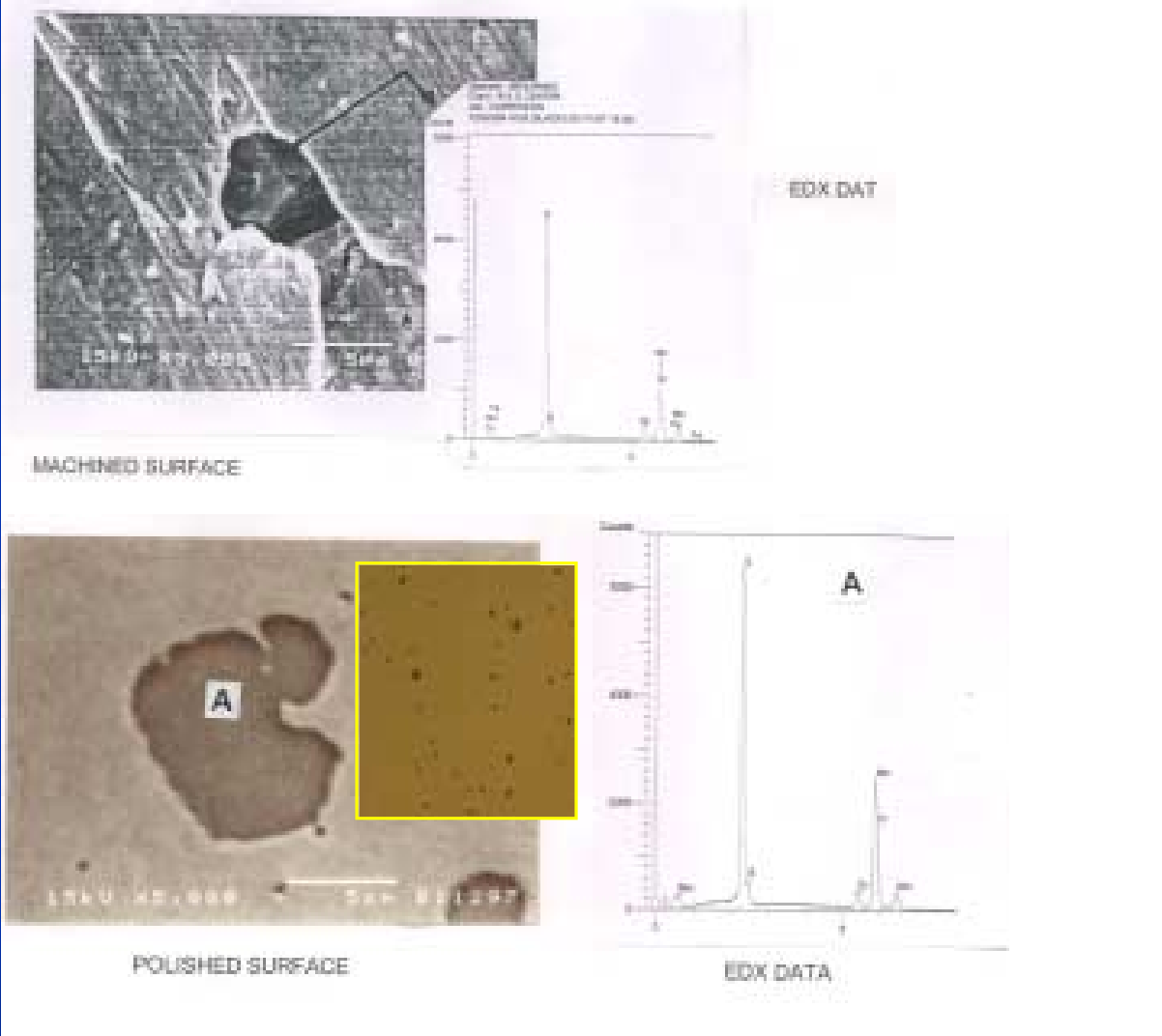
Pivot Assy. Stainless Steels



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3. Sustaining The HDD Technology Innovation (Spindle Motor and Pivot Assembly).

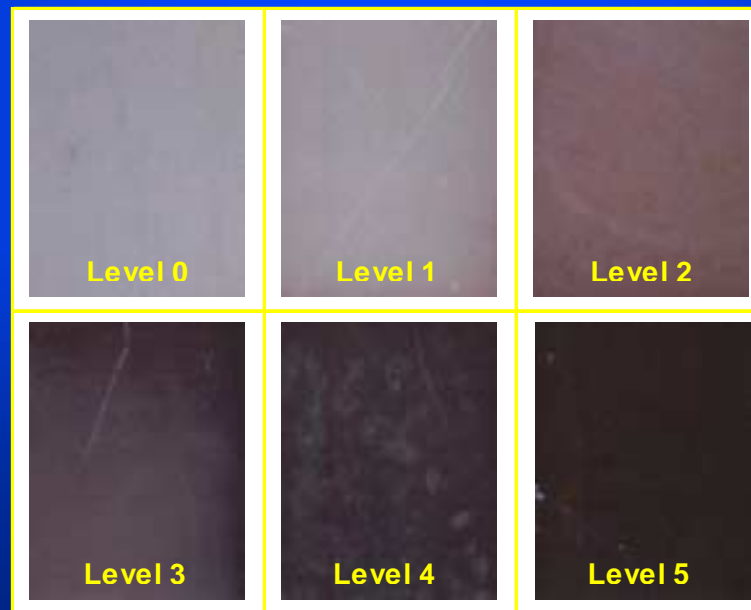
SUS 430F (Mn/S Ratio ; 4.43)



IMPROVEMENT OF SULFUR OUTGAS ON ALLOY STEEL

SILVER COUPON CORROSION TEST

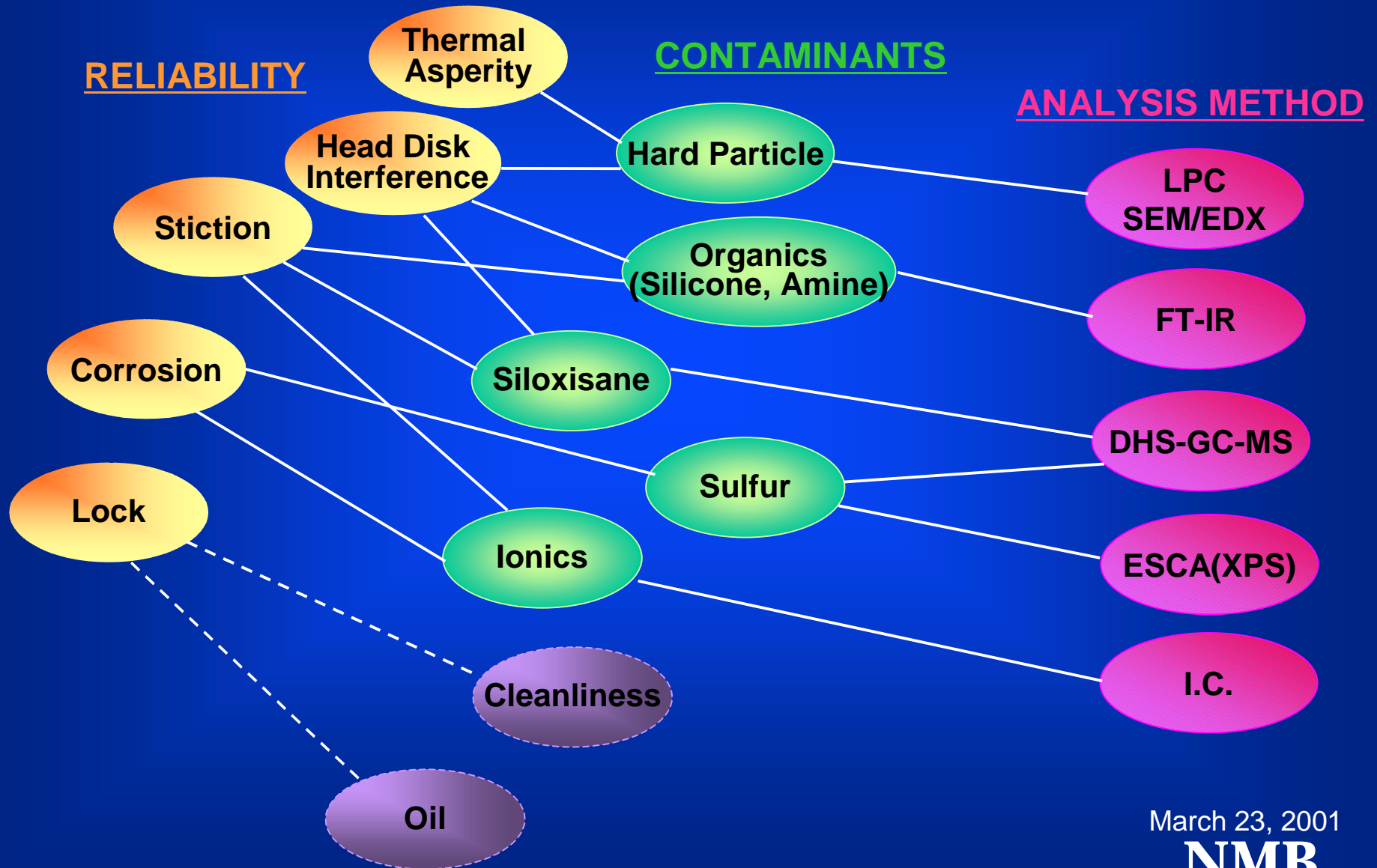
<u>MATERIAL</u>	<u>SULFUR LEVEL</u>	<u>Mn/S</u>	<u>Cr(%)</u>
Ferritic			
SUS430F	5	4.5	17
DHS-1	0	1.2	19
Austenitic Stainless Steel			
SUS303Cu	2	5.0	17.8
ASK3000SM	1	5.0	18.7



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CHEMICAL INTEGRATION AND SPINDLE MOTOR



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4. Chemical Integration (Spindle Motor)

CHEMICAL INTEGRATION AND SPINDLE MOTOR



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Chemical Integration Supports HDD Components Technology

