

# **Strategy of HDD Heads Business and Magnetic Sensors Business**

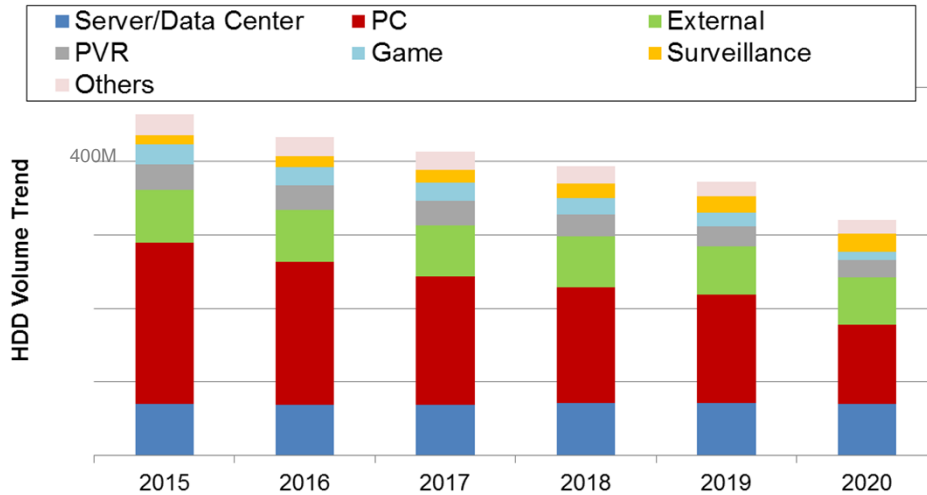
**Senior Vice President  
Shigenao Ishiguro**

## □ HDD: Maturity stage to declining stage

- 1) PC market will be decline and HDD for PC will be decline.
- 2) HDD will shift to High capacity market.

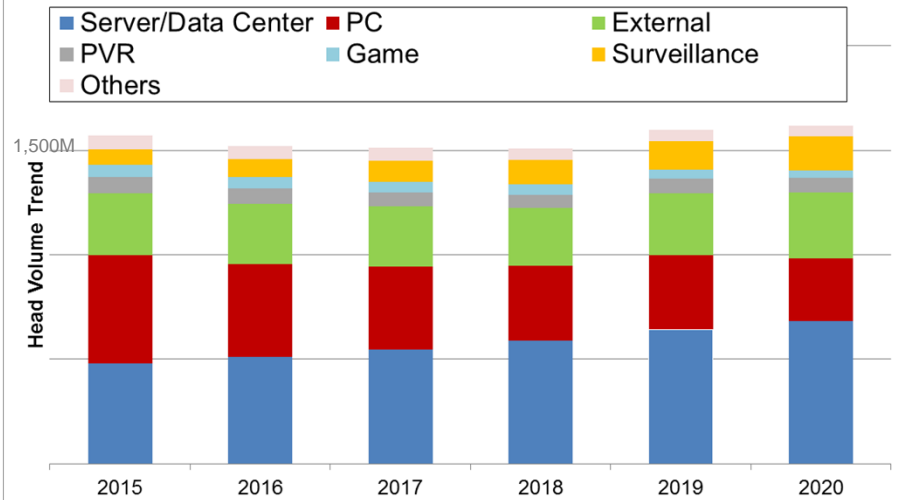
→ HDD volume will decrease. **Head volume will be flat.**

HDD Demand Forecast by Application (5 Years)



TDK's estimation

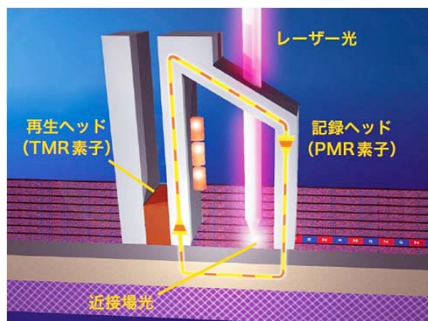
Head Demand Forecast by Application (5 years)



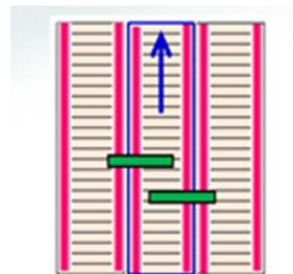
TDK's estimation

## Change and technology innovation of HDD industry

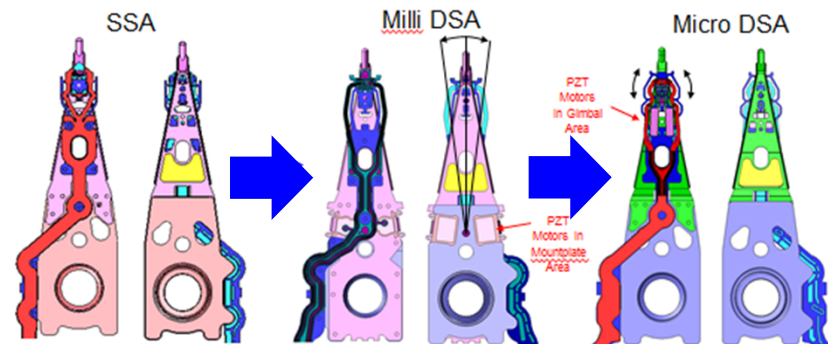
- Marge business unit and efficiency up
- It still needs R&D activities / R&D investment in HDD and HDD Head.
  - Needs multi disk technology and becomes longer testing time for reliability for high capacity HDD
  - Thermal assist Head (TAMR)
  - Two dimension MR (TDMR)
  - Micro dual stage actuator (Micro DSA)
- HDD maker did big investment into NAND industry



TAMR



TDMR



Innovation for micro DSA

- Taking strategy to develop HDD technology continuously with keeping enough profitability.
- Together with another clear strategy for growing market.

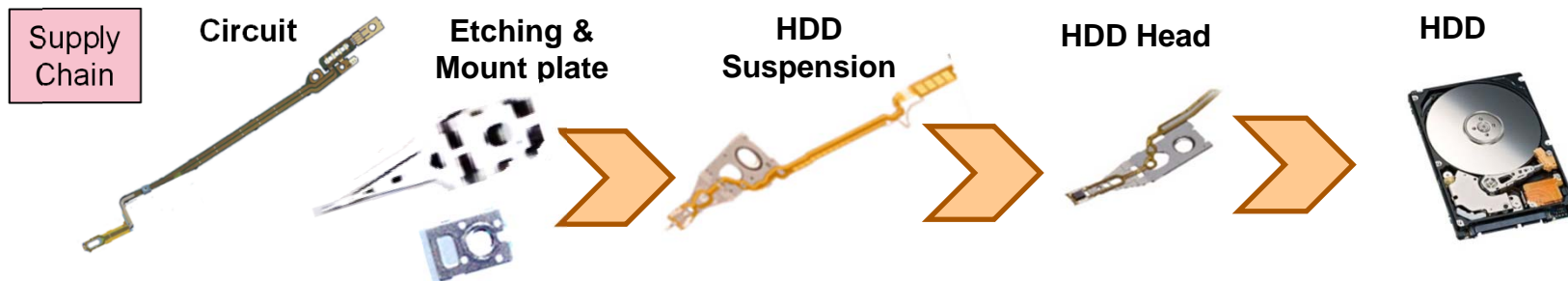
## ➤ Strategy for HDD Head

- Recent breakthroughs will enable TAMR products.
  - Precedence of micro DSA for narrow track technology
  - Efficiency up for supply chain in HDD industry and supporting backend process
- ➔ Advanced technology, High productivity & Low cost will contribute HDD industry.

## ➤ Strategy for Magnetic sensor

- Applying magnetic technology and process to Magnetic Sensor business.

## ◆ Background of acquiring HTI & Supply chain of HDD ~ Suspension



Technology Innovation

TAMR needs more narrow pitch for Circuit

DSA technology needs Innovation for TPI up

Technology break through for TAMR & Multi disks technology

Vertical Integration for Suspension

	Components (● Internal Components)			Suspension Assemble	HDD Head	HDD
	Circuit	Etching	Mount Plate			
TDK/MPT	From Outside	○	From Outside	TDK/MPT	TDK/SAE	Company D
HTI	○	○	○	HTI	Company B	Company B
Company A	From Outside	From Outside	○/Outside	Company A	Company C	Company C

Synergy for All TDK

- Making suspension components internally & efficiency up for SG&A,R&D.
- More automation for Suspension assemble
- Getting circuit technology for TAMR generation

Advanced technology & Low cost solution by Vertical integration in HDD suspension components will enable us to contribute to the HDD industry.

## □ As for "Magnetic sensor company" TDK becomes.

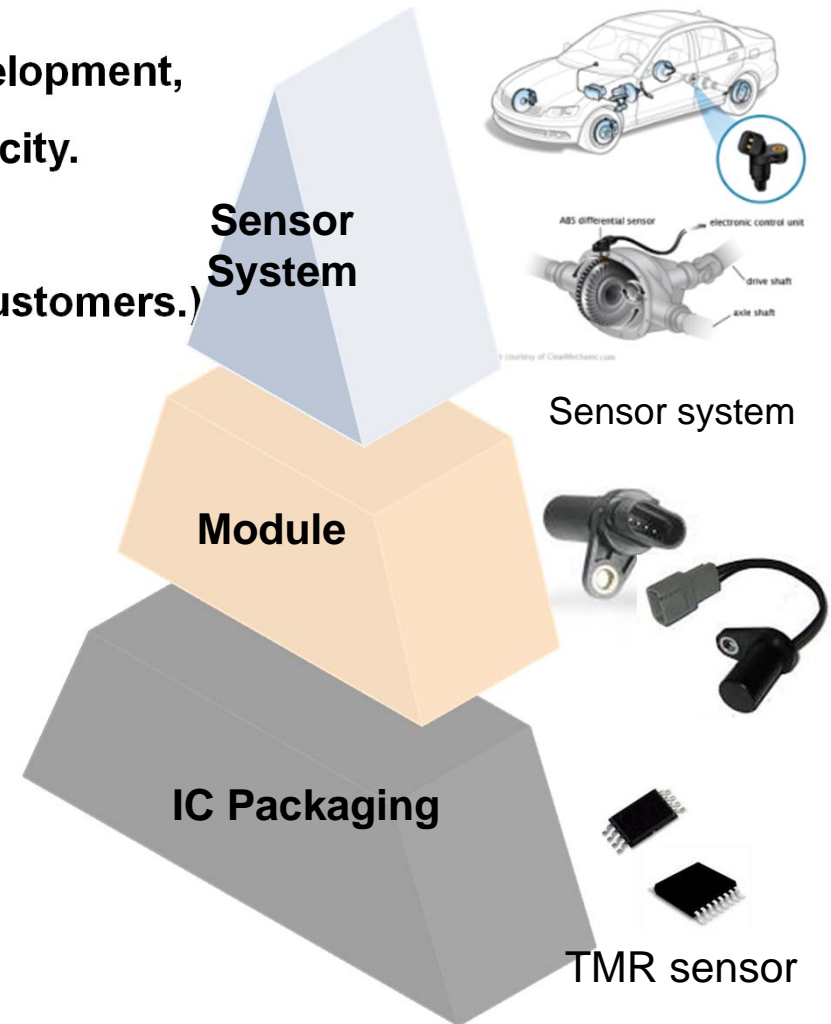
### 1) Establish business basis first.

- ✓ More capability for products design, development, ASIC design and getting production capacity.
- ✓ Expand products line up.
- ✓ Expand customer basis. (More than 40 Customers.)

### 2) Becoming general magnetic sensor company.

- ✓ Add many type of sensor on MR.
- ✓ More downstream, like module / system.
- ✓ Combination with other TDK products, like magnet and electric components.

→ Expansion for magnetic sensor for automobile / industrials / consumer market.



## Accelerating

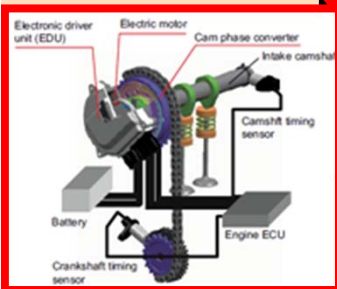
Electric throttle valve system



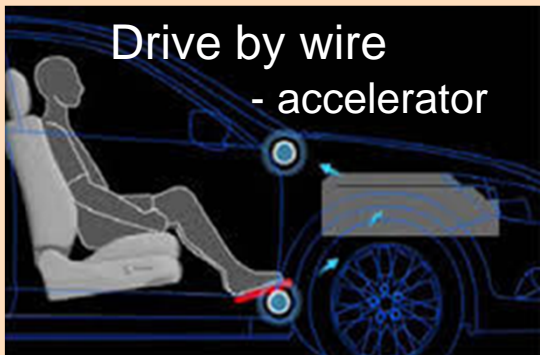
Engine Management:



-Cam timing  
-Crank timing



Drive by wire  
- accelerator

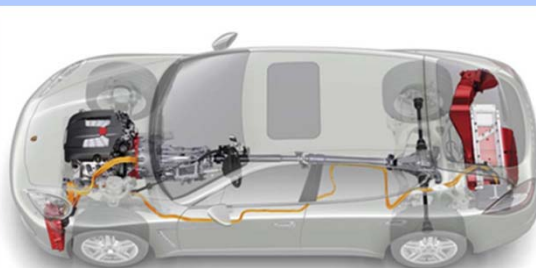
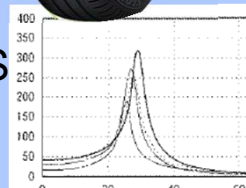


## Braking

Wheel Speed Measurement:  
-ABS



Indirect TPMS with ABS



Brake by wire



## Steering

Hydraulic



Electric(EPS)

- Torque sensor  
- Angle sensor



Steer by wire  
- EPS



- 1) TMR sensor and adding various types of sensor
- 2) Growing toward to overall magnetic sensor company
  - ➔ Applying High Accuracy & High Output for Liner scale in industrial market
  - ➔ Encoder for Single-lens reflex camera
  - ➔ Focusing for Smartphone application



**Magnetic sensor for industrial market**



**Magnetic sensor for consumer market**





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