

# The principle of MSE evaluation method

## (Academic-industry partnership with Fukui University)

### A Evaluation technique :

Slurry (water and solid particle mixture) were mixed with compress air in the nozzle and eventually injected on material surface at high velocity. Injected slurry on material surface resulted, a wear progression (wear rate) proportionately to the erosion (a strain/ scar occurred at the surface by particle collusion) strength of the material. It is a new type of solid particle impact test (slurry jet) to swiftly evaluate wear properties of various material especially hard coated thin films.

### B Basic element

#### 1 Solid particle

Wear generating element. 1 $\mu$ m in diameter and hold 10-50 nm of wear depth per particle.

#### 2 Slurry

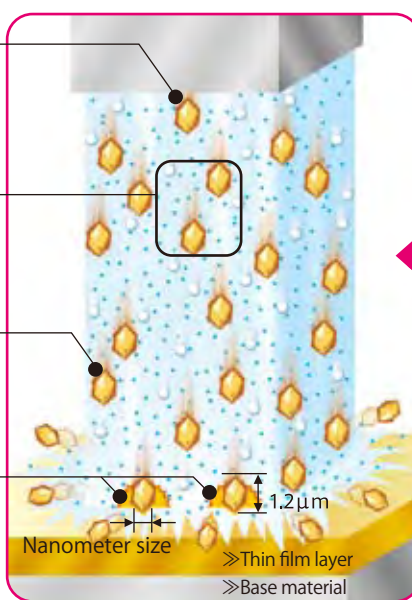
Water and solid particle (powder) mixture. Accurate control of slurry injected pressure and flow rate.

#### 3 High velocity projection

Wear progression by solid particles collusion with up to 100 m/s in velocity using air pressure.

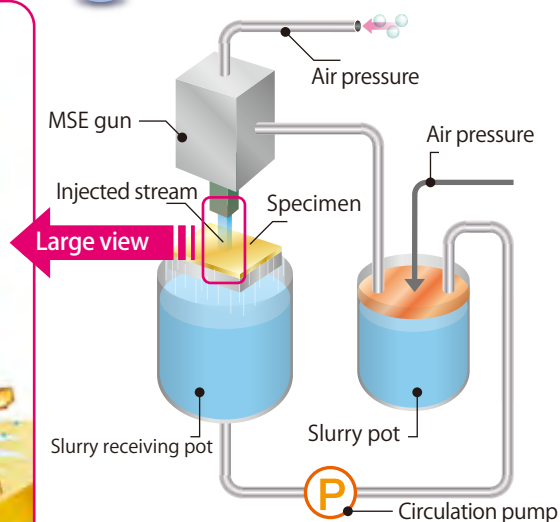
#### 4 Large amount of solid particle impact

High velocity wears progression by some hundred million of solid particle impact per second.



Injected stream

### C System structures



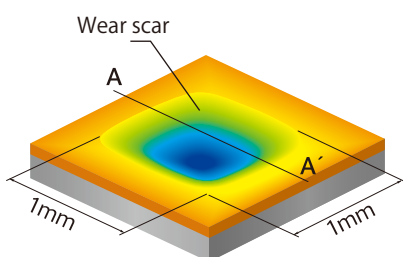
By control the projection force at constant, particle projection amount can be set variably.

### D Measurement steps

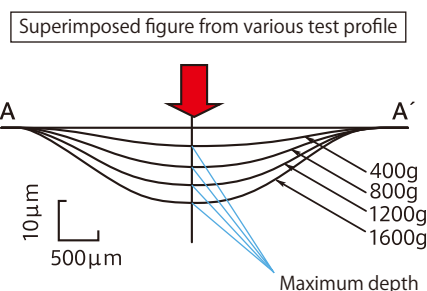
#### 1 Slurry projection on predefine specimen surface.

(Slurry projection amount is selected base on the pass data)

Continuous operation comply with the need

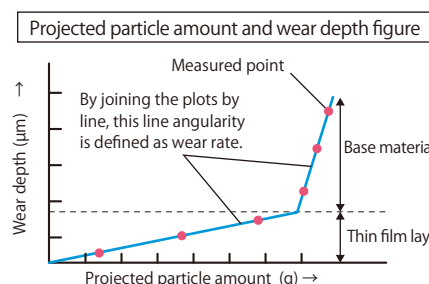


#### 2 Profile measurement of wear scar



Shape measurement was conducted along the centre of wear scar of A-A' line shown in left figure. (The basis surface is the maiden surface of wear scar)

#### 3 Data processing (Thin film case) [TiN]



Wear rate of thin film layer	0.05 $\mu$ m/g
Wear rate of base material	0.99 $\mu$ m/g



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