

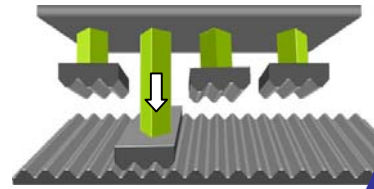
The novel stepper motor using micro patterns

Background

The demands to the linear motor for the low cost precision positioning.

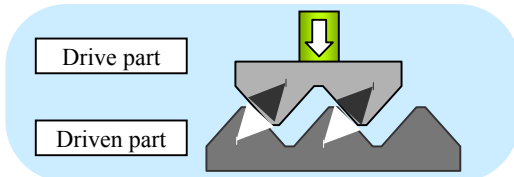
- It is the principle structure in which minimized step is possible to be μm and nm order.
- For mass productions and low cost
- It should be the stepper motor that open loop control is feasible.
- There is no vibration during system-halt, and gripping force is large.

The new principle stepper motor that may satisfy the demands



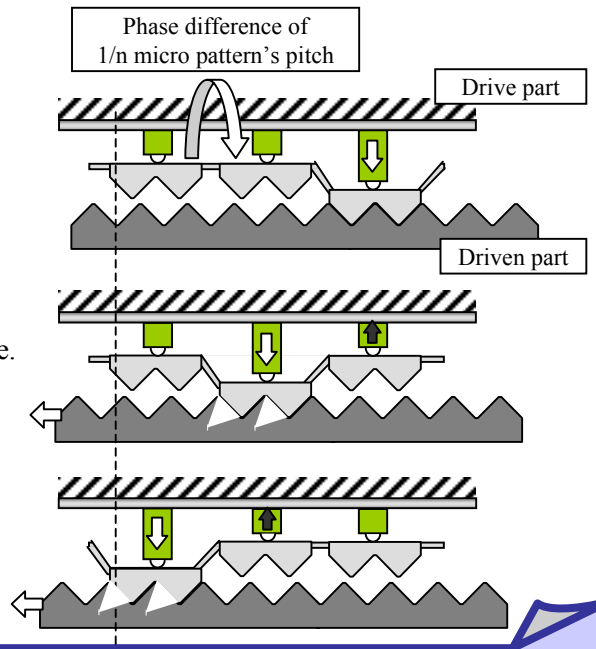
Principle

Step movement is realized by using of two surfaces with 3-dimensional micro patterns joggling perfectly.



N drive parts with micro patterns

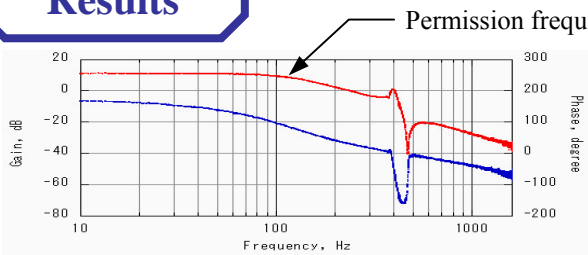
- It shifts and arranges $1/N$ pitch of phases at one time.
- A time phase is shifted and it pushes out in order.



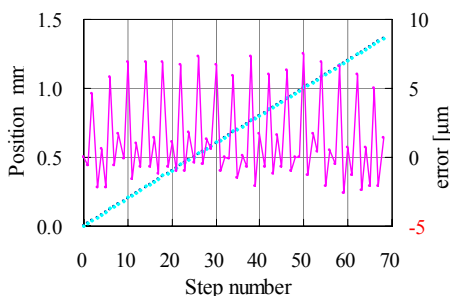
Feature

- A step width: $1/N$ pattern pitch
- Open loop control
- No backlash
- No vibration during system-halt
- large gripping force

Results



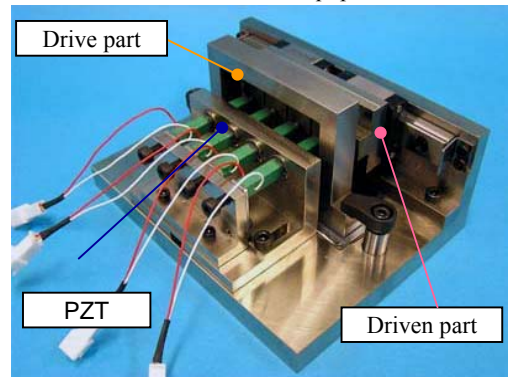
The expected maximum move speed
 $0.02\text{mm} \times 4(\text{PZT}) \times 100\text{Hz} = 8 \text{ mm/sec}$



Impelling force and gripping force
350gf or more

Positioning accuracy
 ($20\mu\text{m} / 1 \text{ step}$)
 $-3\mu\text{m} \sim +8\mu\text{m}$

<The examination equipment>



<The micro patterns ($80\mu\text{m}$ pitch)>

