SW Test Workshop
Semiconductor Wafer Test Workshop

A Study on Chuck with Automatic Tilt and Chuck Force Sense

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Presented by Shoun Yu

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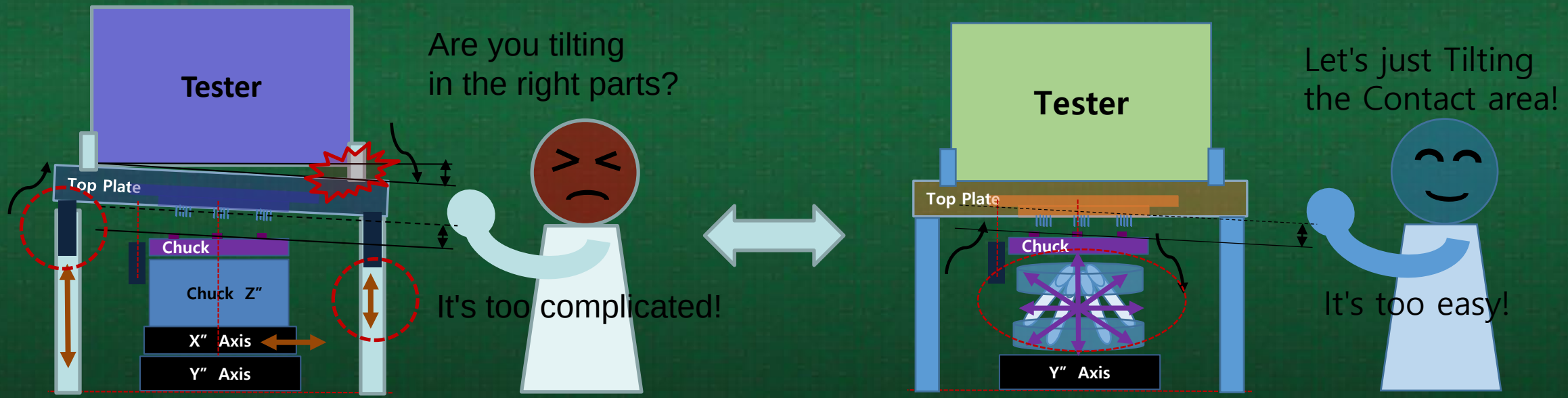
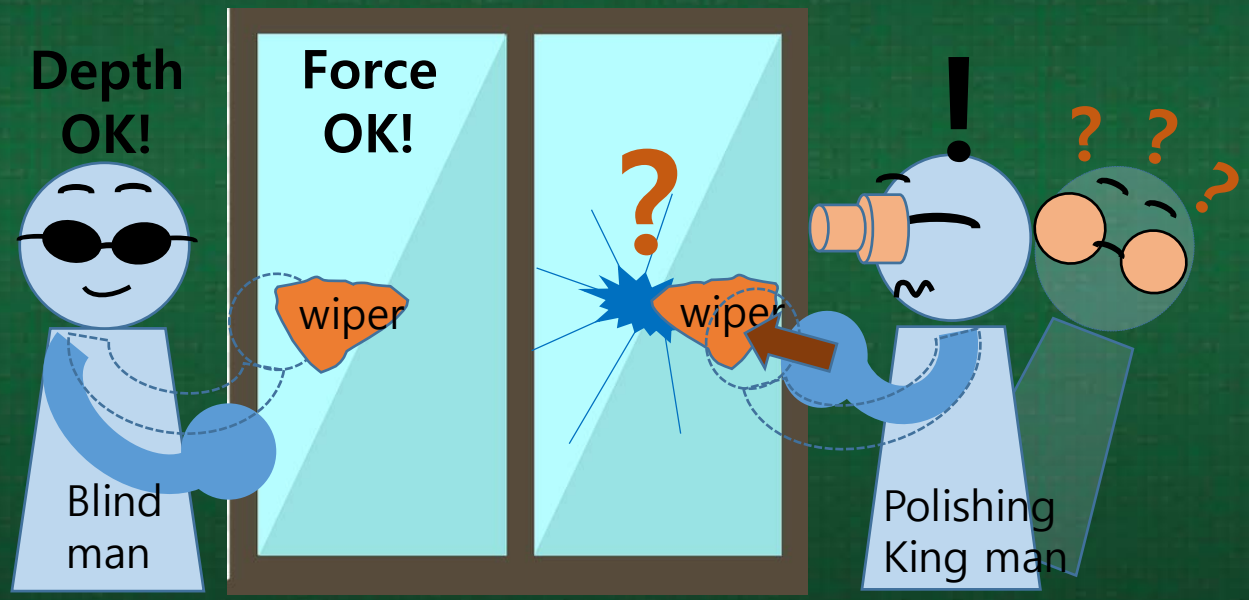
We believe chuck should tilt itself.

1) We have been foolish to try **to move the fixed tester head.**



We believe force control is more fit in Z movement

2) We push the window **until it breaks.**

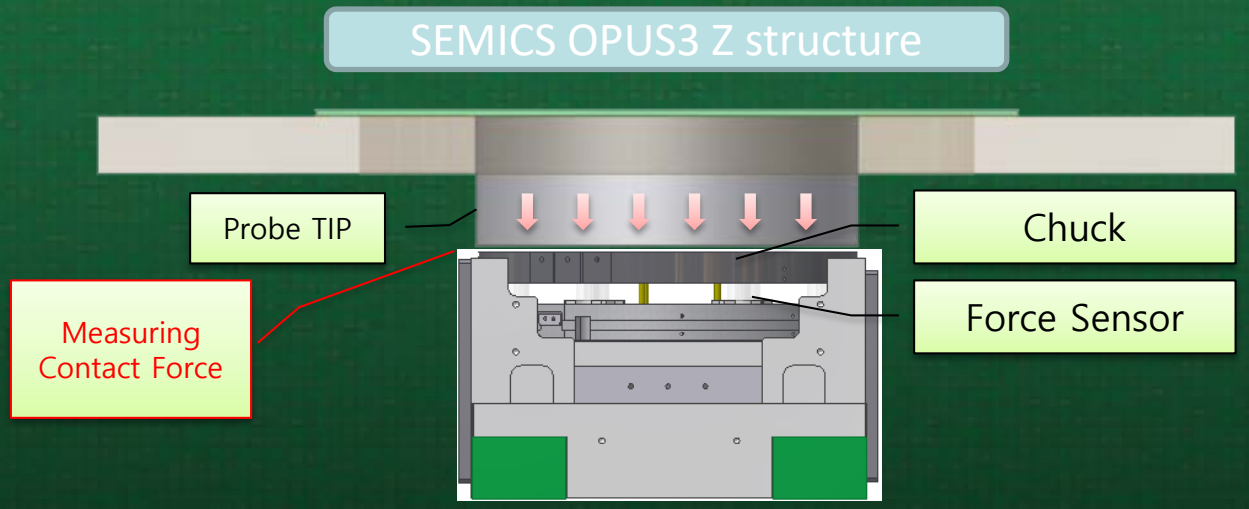


Blind = Position Control
with force sensitivity

Glass = Wafer

Why it is difficult.

- **We had already tried for our belief many times.**
  - Try strain gage sensor …
  - Piezo actuator …
  - Force control …



• RIO's suggestion

- We were also unsure of three things.
  - We believed that the constrained Z-axis is a way to increase precision.
  - Universal hexapods are not applicable because they are larger than payload.
  - It looks too expensive.

  Should we turn the two motor functions into six motor?

other hexapod

How did we solve it?

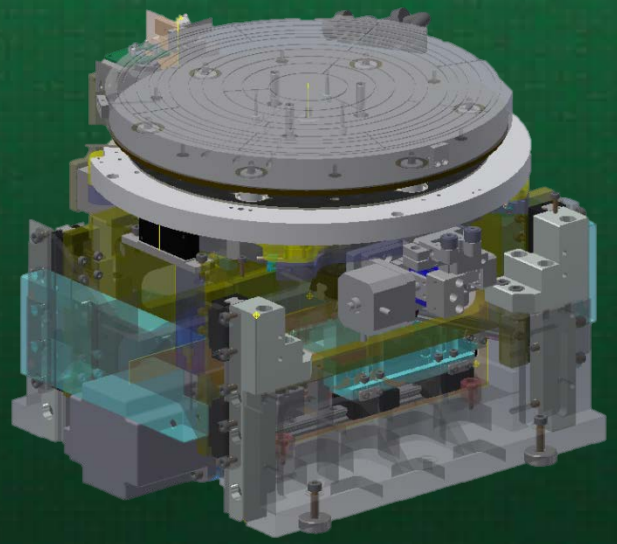
- **New Stage Design**

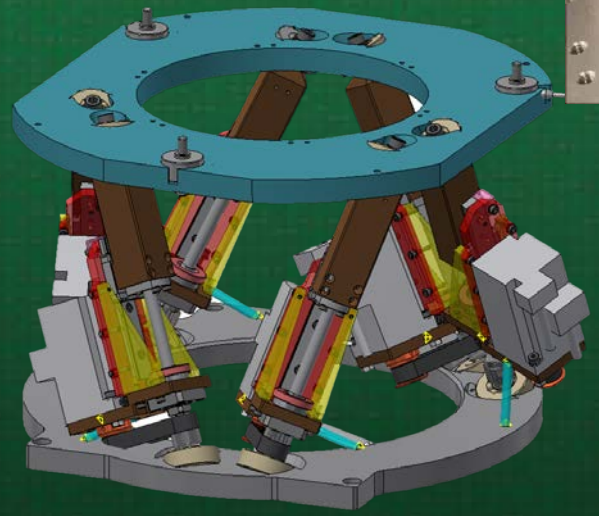
  => Force sensor + Hexapod stage

  – We have 6 degrees of freedom at chuck.

  – We give more power at small size with design.

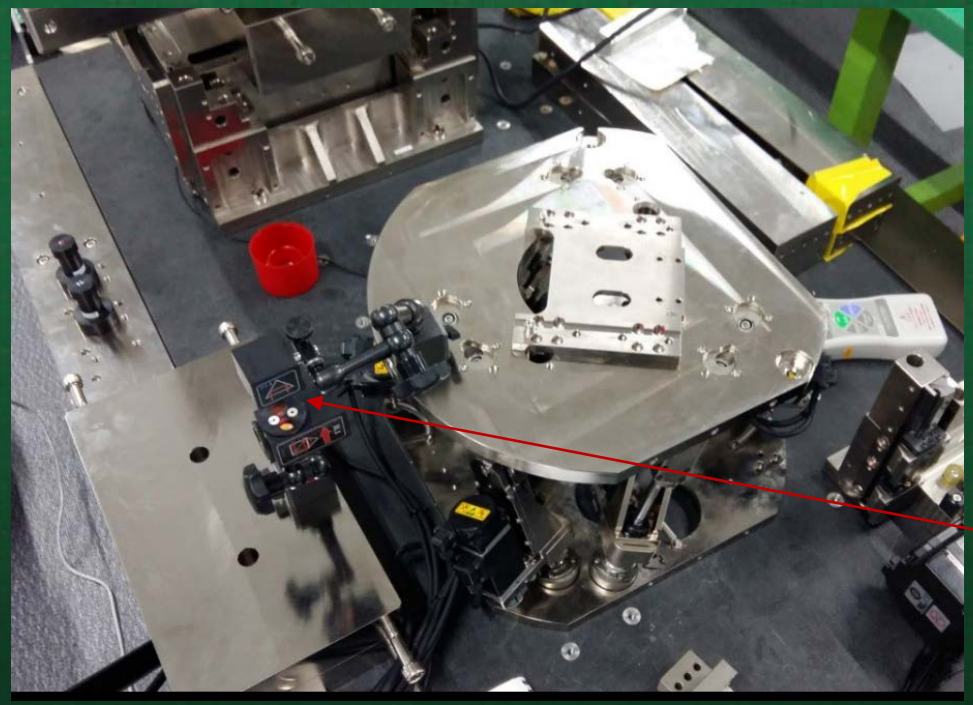
  – It is less cost than top plate tilting.

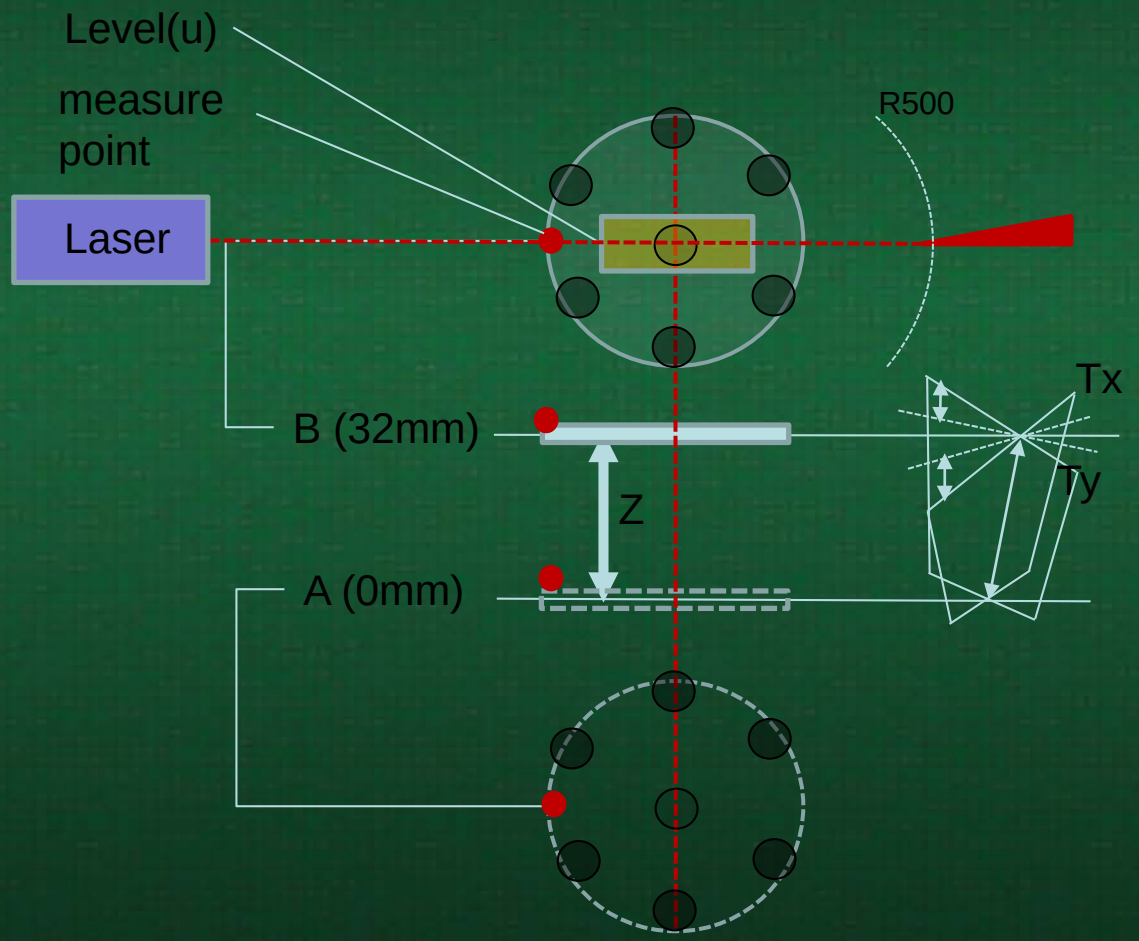




It was very accuracy.

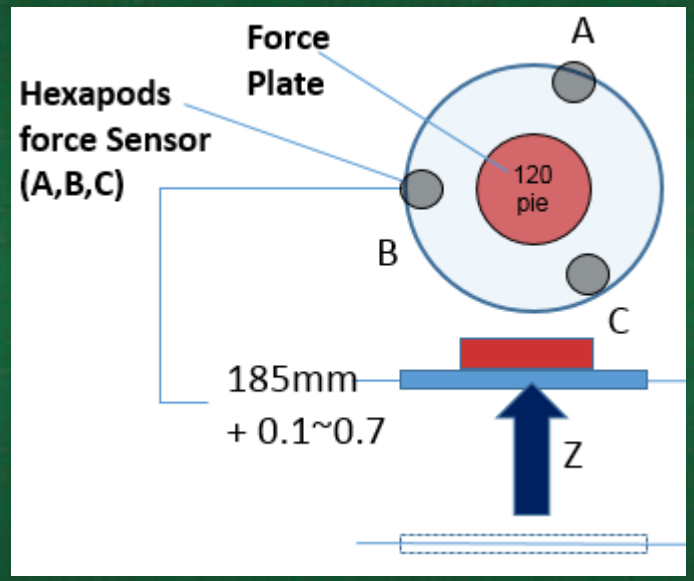
- **Accuracy**
  - A -> B position (updown) repeatability : 32mm ± 1um



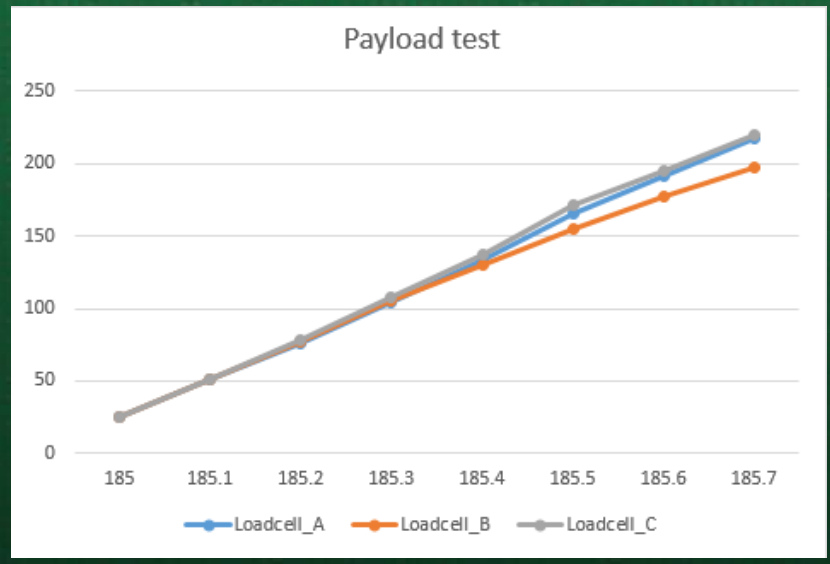


It was strong.

- **Payload : more than 560 kgf (Z Up Test)**



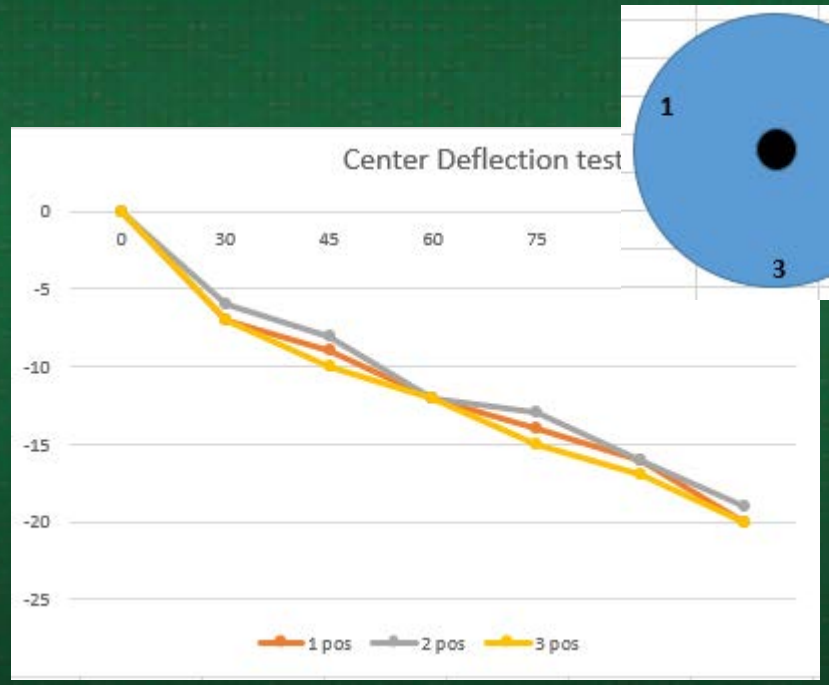
Z Height	Loadcell_A	Loadcell_B	Loadcell_C	Payload
185	25	25	25	75
185.1	51	51	51	153
185.2	76	77	78	231
185.3	104	105	108	317
185.4	134	130	137	401
185.5	166	155	171	492
185.6	191	177	195	563



It has high stiffness.

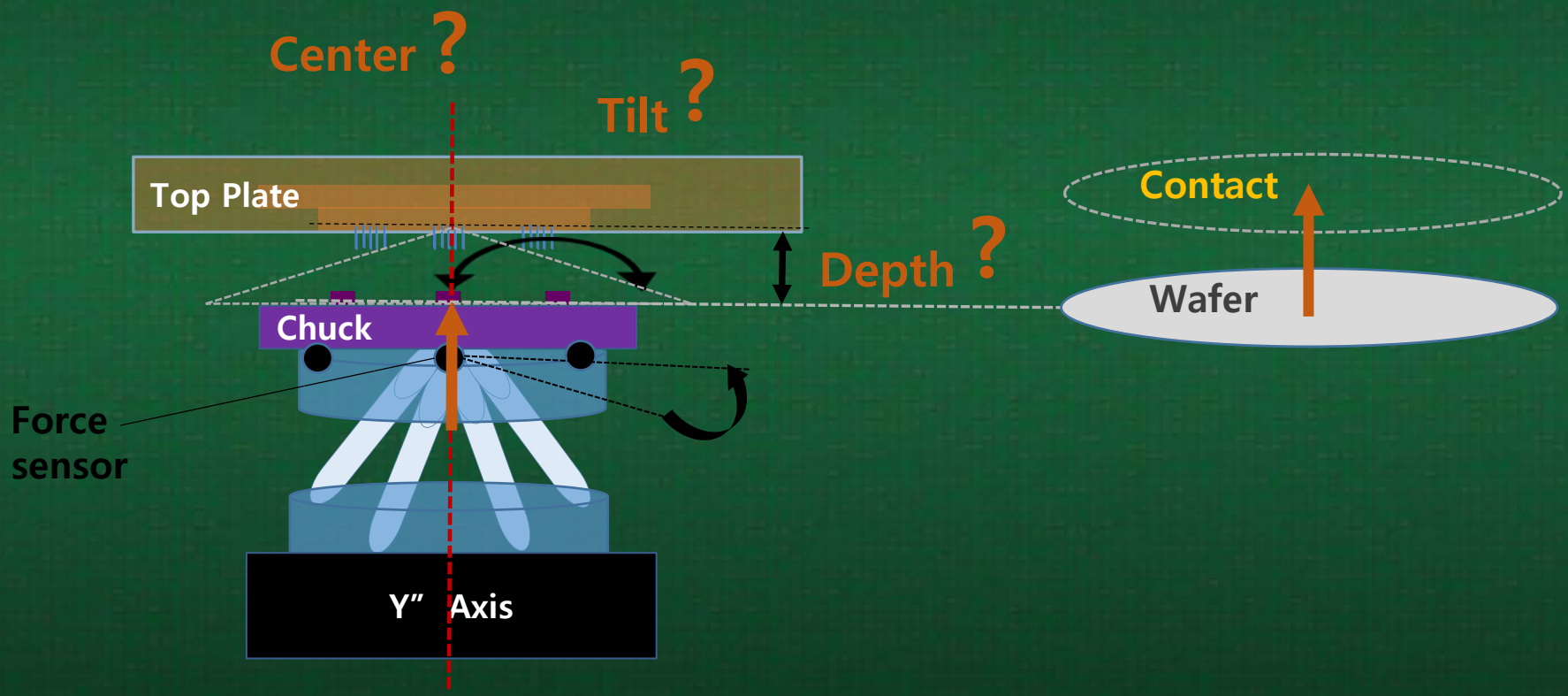
- **Less deflection (payload at center) : about 14um deflection for 75 kgf**

Deflection (um)			
Load (kgf)	1 pos	2 pos	3 pos
0	0	0	0
30	-7	-6	-7
45	-9	-8	-10
60	-12	-12	-12
75	-14	-13	-15
90	-16	-16	-17
105	-20	-19	-20

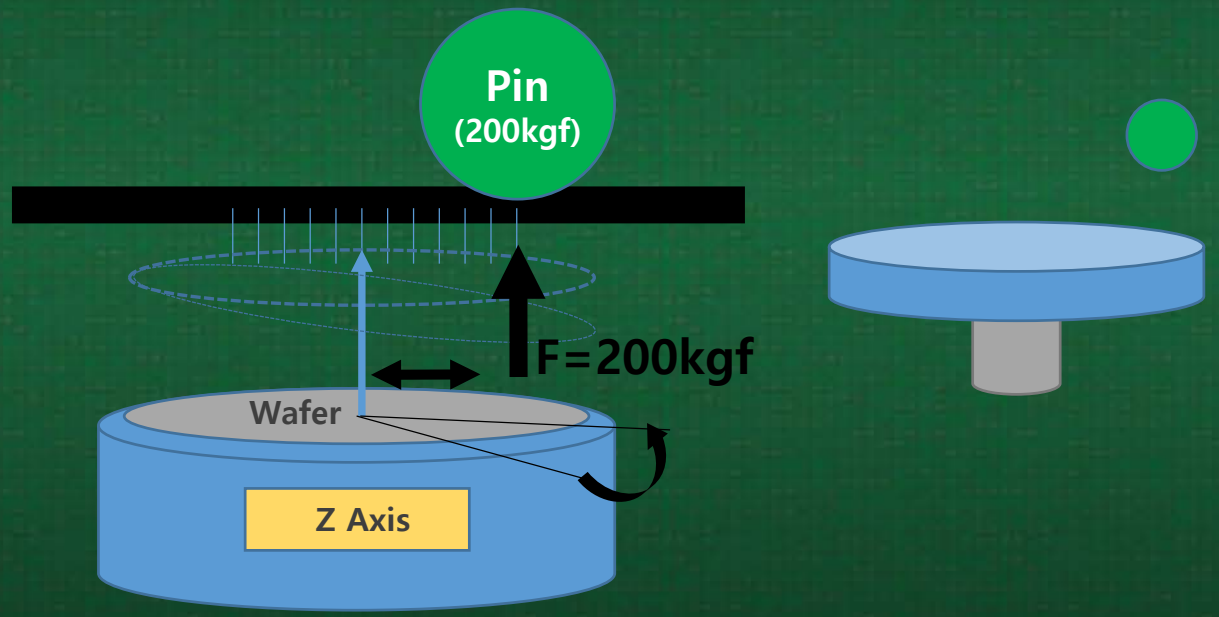


- **How can we use it?**

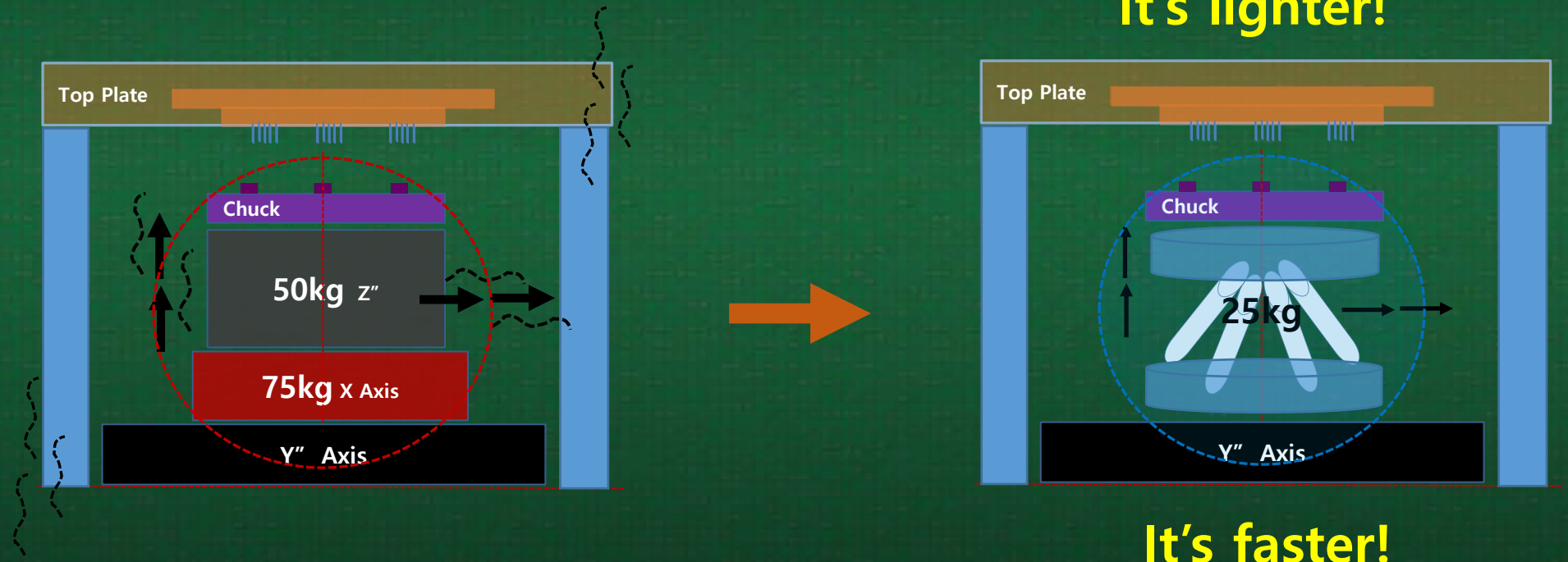
Project I : Handling uncertainty of probe card position



Project II : Active Stiffness control



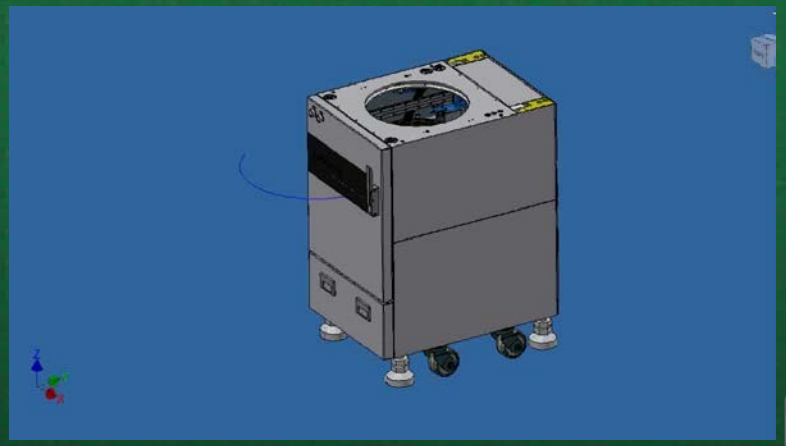
Project III : Very fast Index time

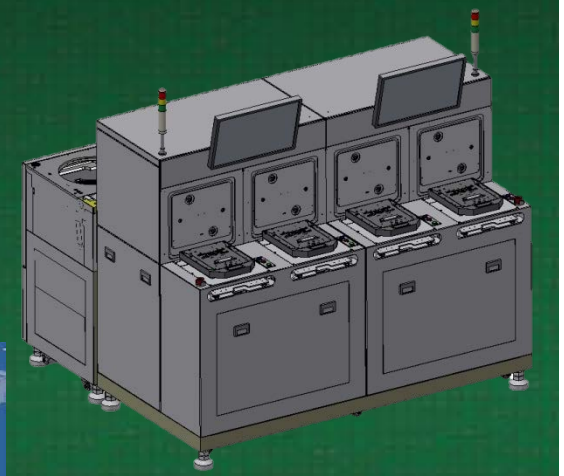


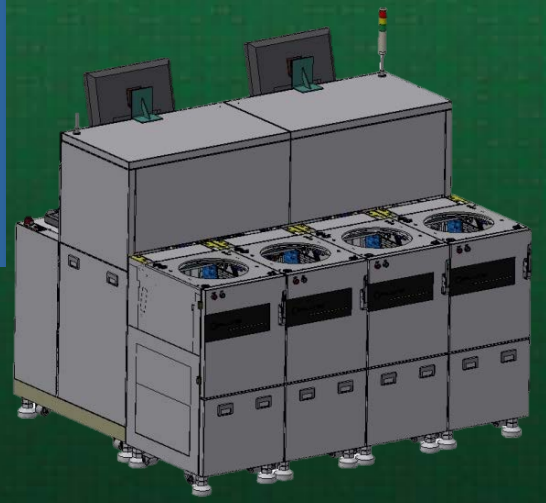
- **Super Contact Prober**
  - Force control & minimize overdrive
  - Active stiffness control
  - Fastest index time (low mass of Z)

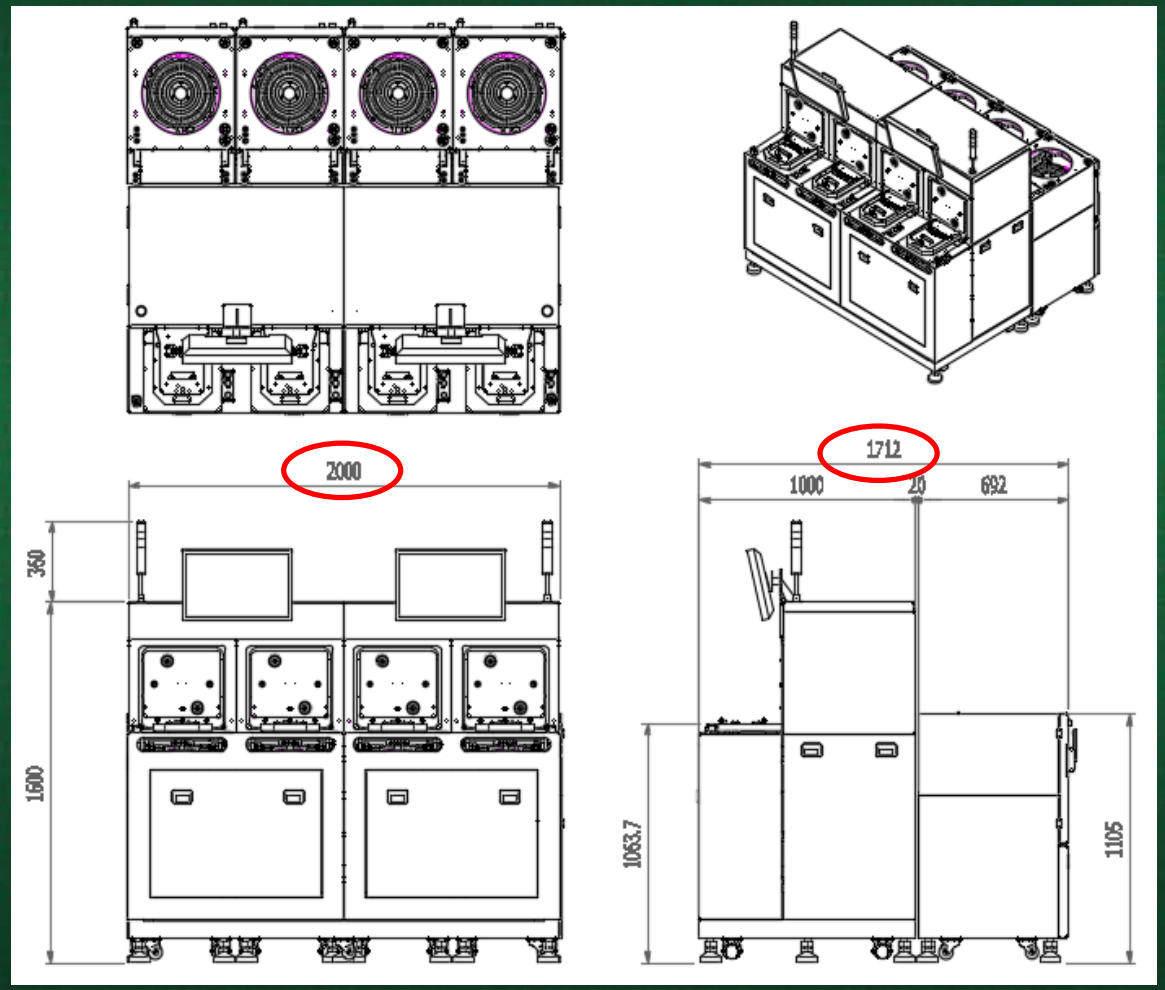
Project IV : Group testing prober

- **Group Prober (4 x 1 type)**
  - Compact Z
  - No need X-Y stage



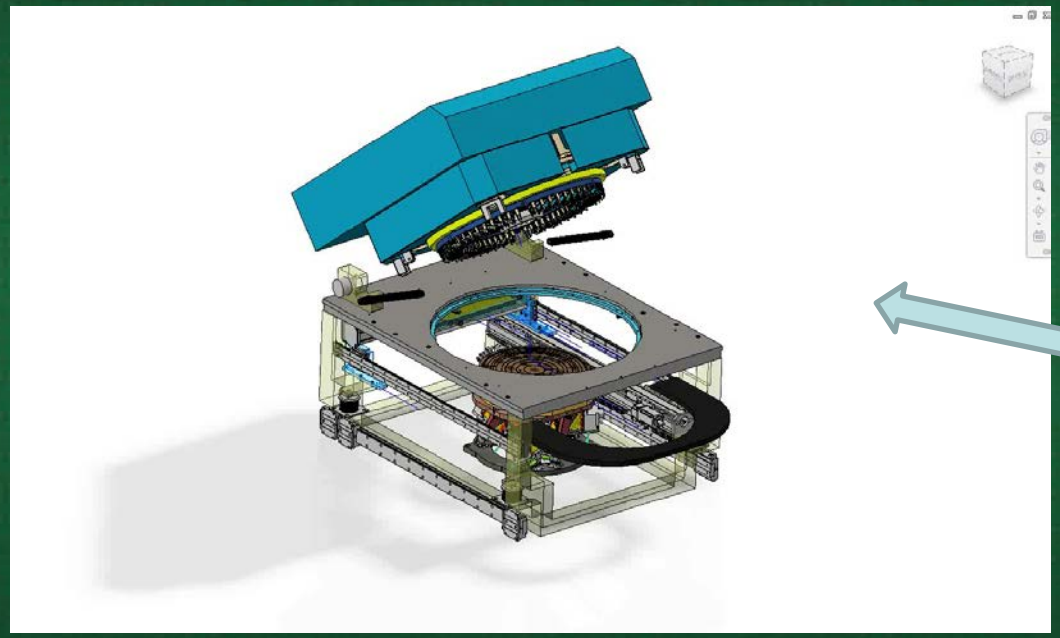






Project IV : Group testing prober

- **Group Prober (4 x 3 type)**



Vision of Semics

- **Semics's Core Value**
  - Value Individuality
  - Pursue Simple Perfection
  - Innovative & Persistent, Trustworthy & Friendly, Smart & Brave
- **Semics's Purpose**
  - **We provide differentiated products that increase yield and convenience in the world.**
  - Become the smartest company you want to work with most.
  - Become the company where employees are the happiest.

- **Why semiconductor testing people are great. (Youtube)**
  - https://www.youtube.com/watch?v=RBWn-6FdQ3Y&feature=youtu.be

Thanks for listening

- **Contact us with any questions …**

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