

“R&D roadmap and technology uplifting”

C N KO

高松年

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Kam Yuen Corporate R&D Center

Kam Yuen (Group) International Limited, Hong Kong

14 March 2017



- **Product miniaturization precision**
- **High Speed data Communication**
- **Environmental Equipment**
- **Medical Equipment for old age**
- **Automation**

Our Businesses

We are helping our customers solve complex challenges and improve their processes.

Business Areas:

- a. Watch cases and bracelets
- b. New material applications (e.g. Zirconia parts..)
- c. Precision parts engineering (Sensor parts etc...)
- d. Automation processes and equipment
- e. Environmental equipment - Scrap chip recycler
- f. Medical and Healthcare Devices – XYZ liquid handler
- g. Industrial technologies - Systems in Data Centre

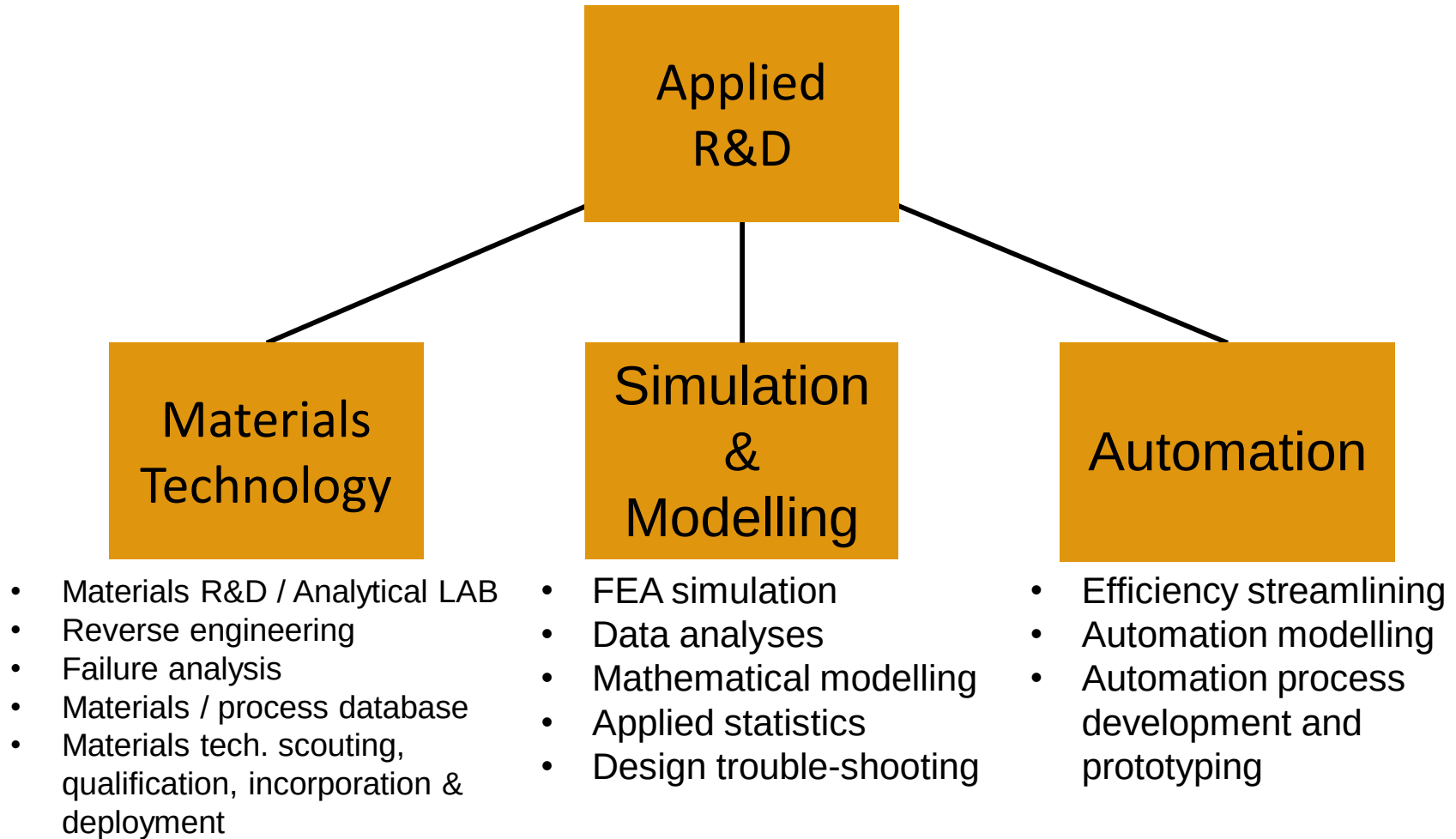
Mission

- To provide a one-stop customer focus and value creation services for companies aiming at upgrading their productivity, quality, technology, service and management to achieve or exceed world-class standards.

Vision

- The preferred service provider of consultancy services related to materials and chemical technologies as well as related manufacturing industries of Products or parts (watch, precision forging, healthcare, environmental, etc.), Automation, Machine Design and manufacturing leading to world-class manufacturing & technology excellence in Hong Kong & China region.

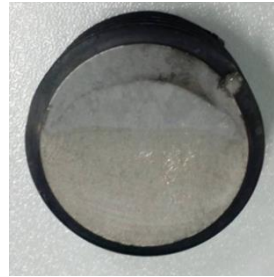
Lead : Dr. C.N. Ko



R&D cooperate with local and overseas research partners

Raw Material Assurance
Reverse Engineering
Failure Analysis

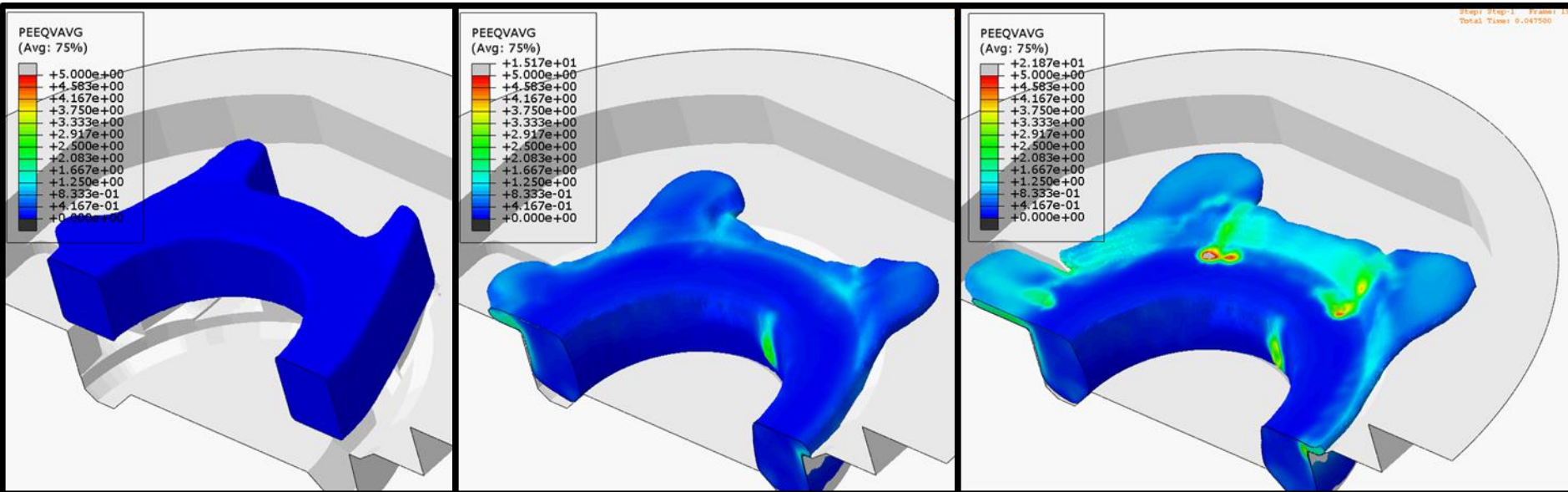
Failure Analysis of broken bolts



Sample	1 #	2 #	3 #	4 #
Hardness 1	342.2	379.1	390.5	395.9
Hardness 2	365.4	376.4	396.7	387.8
Hardness 3	388.9	386.9	378.9	386.7
Mean	365.5	380.8	388.7	390.1

Found that wrong bolts (32-40 HRC) were used. Should be using 12.9 bolts 38-44 HRC and NOT 10.9 bolts 34-39 HRC

Precision Forging
Precision Machining



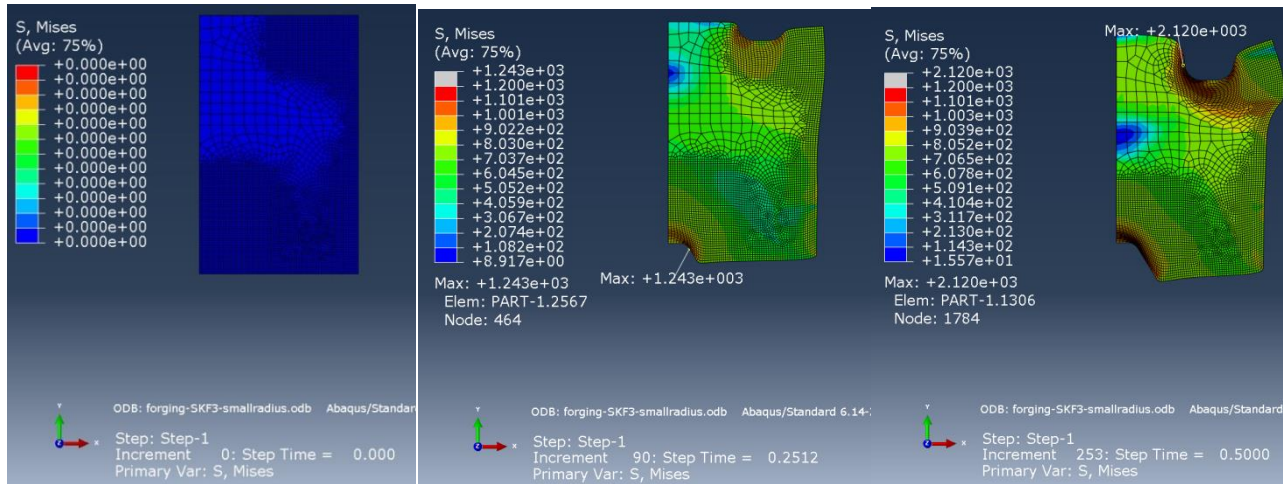
WITNESSING THE
DEVELOPMENT
OF MISES STRESS
FROM **DESIGN** TO
WATCH CASE



FROM **VIRTUAL**
REALITY TO
REALITY

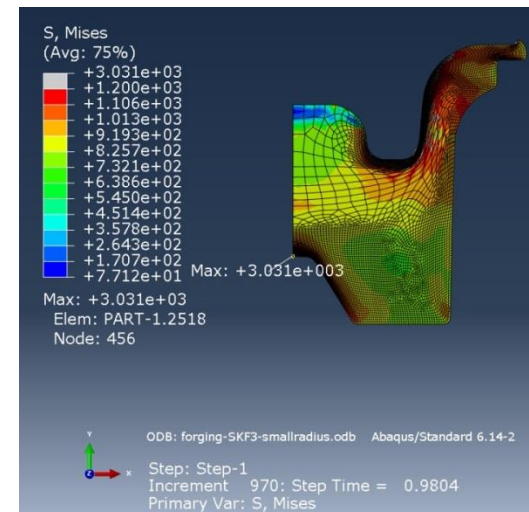
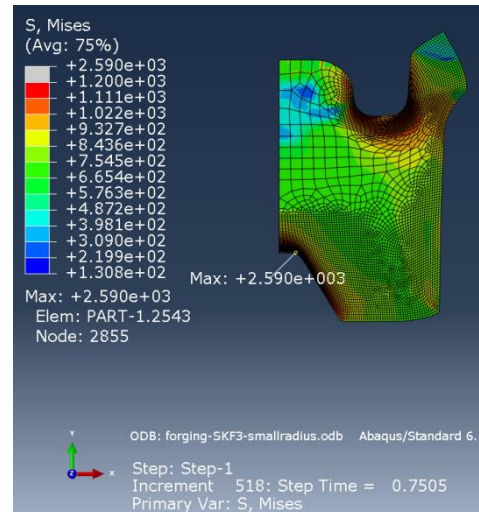
ABAQUS* is a multi-purpose software originally released in 1978 . It provides FEA solutions for predicting the strength and deformations in structures in the linear and nonlinear regime in many fields including Aerospace, Automotive, Structural, Medical, Metal Forming, Lubrication, etc.

Precision Forging



PEEQ.avi

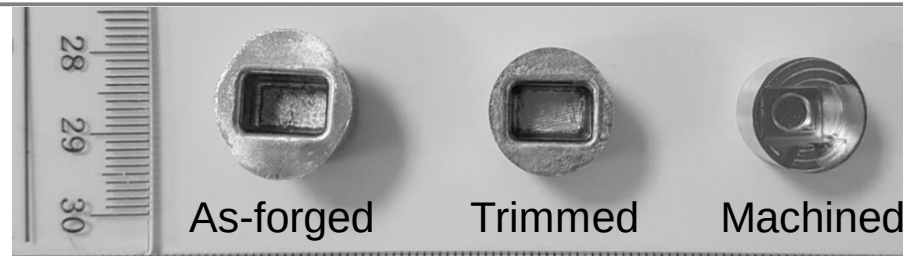
**FINITE ELEMENT
AXISYMMETRIC MODEL**



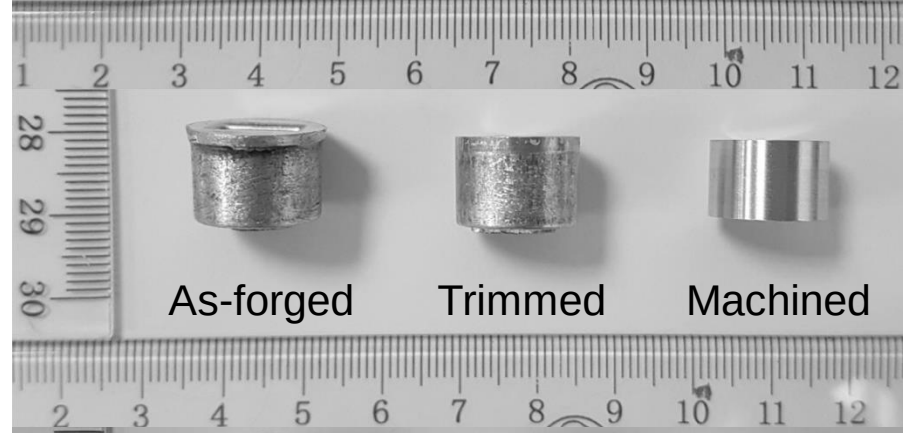
DEVELOPMENT OF MISES STRESS FROM BLANK TO HUB

Part Shape Evolution

Top View



Side View



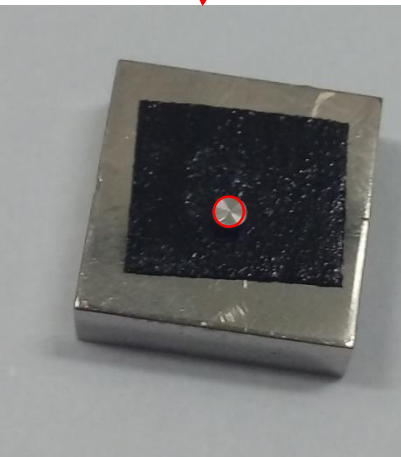
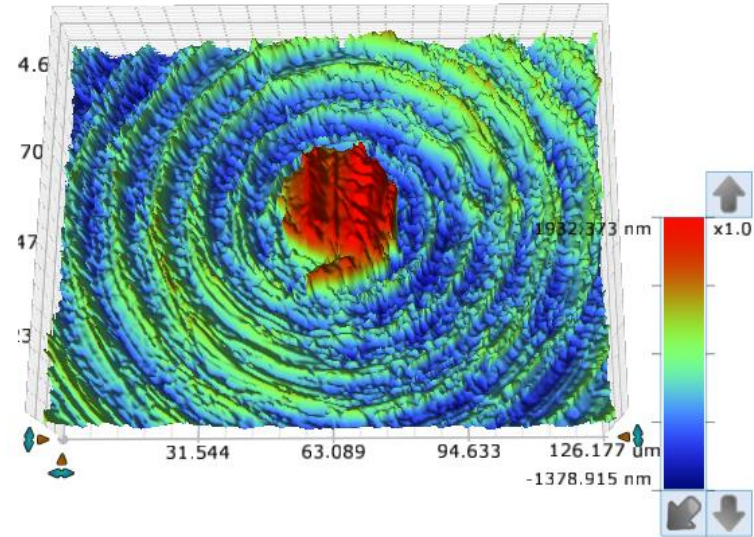
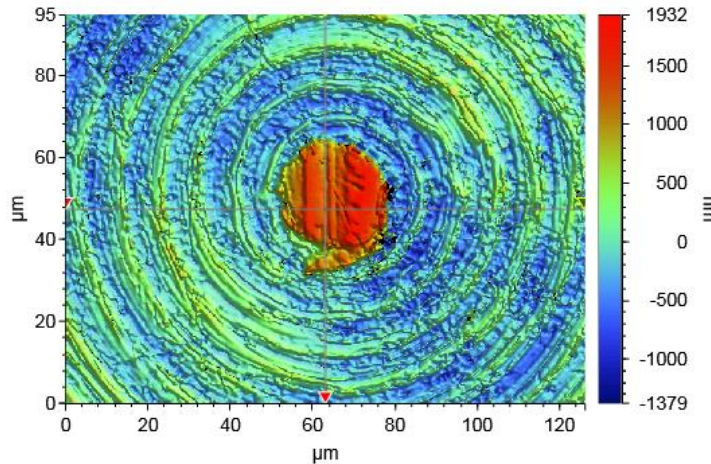
Bottom View



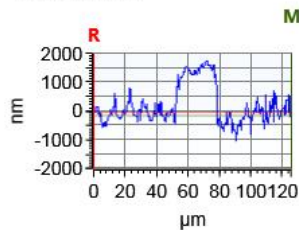
Figure 12. Top, side and bottom view images of the KYO-forged, KYO-trimmed and post-machining parts arranged in the order of part shape evolution.



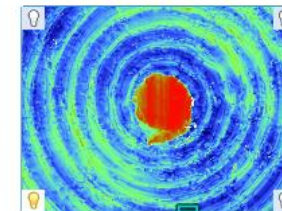
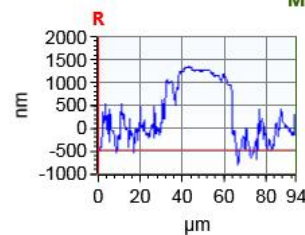
CFAC_D2_M2_J1_PEEQ_Mirrored.avi



X Profile: $\Delta X = 125.9803 \mu\text{m}$; $\Delta Z = -105.5221 \text{ nm}$



Y Profile: $\Delta X = 94.4359 \mu\text{m}$; $\Delta Z = - \text{ nm}$



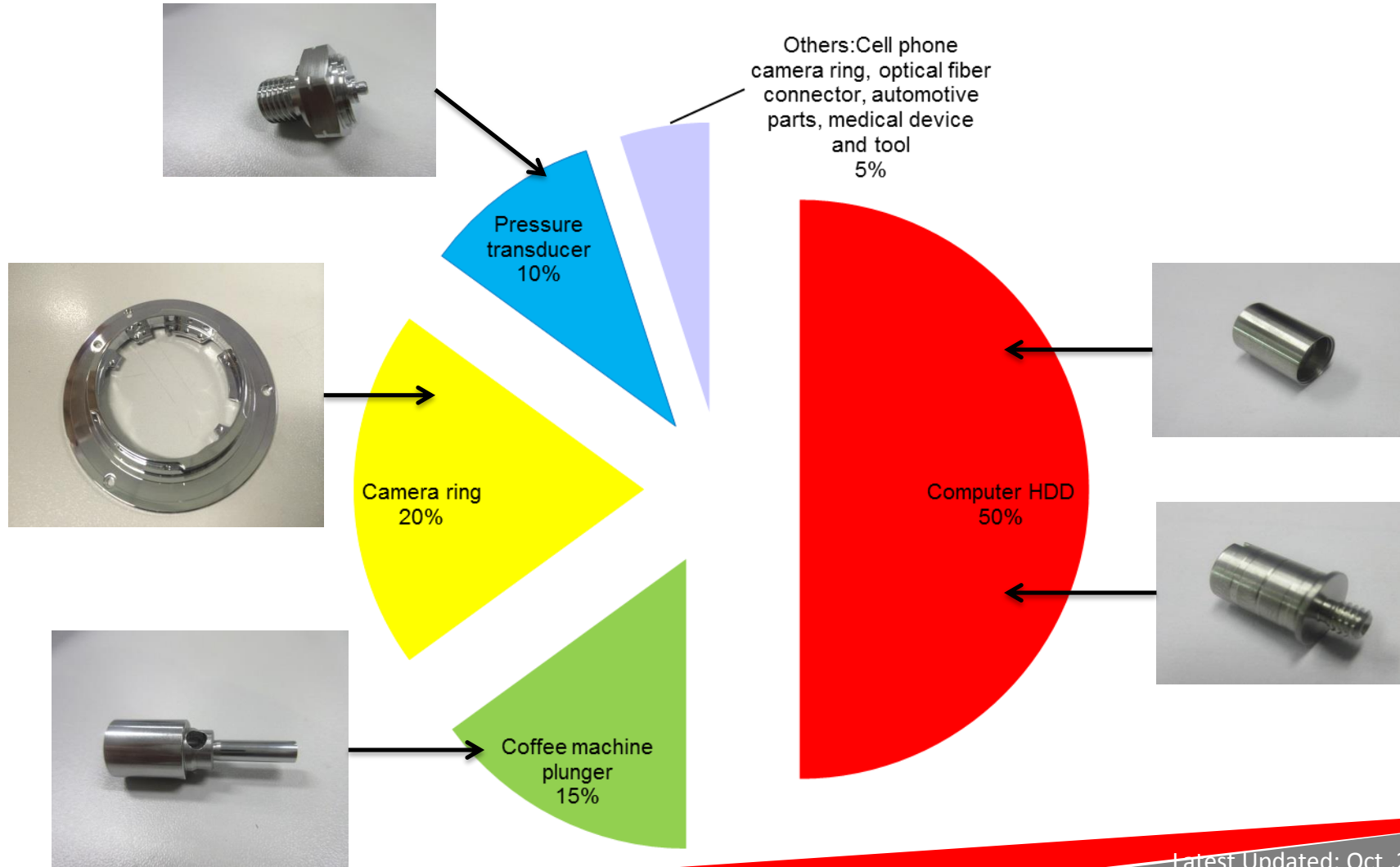
Trace Only

Contour+Trace

Item	Value
Ra / nm	299.44
Rq / nm	426.59

○ Test Area

Miniature parts Business segments

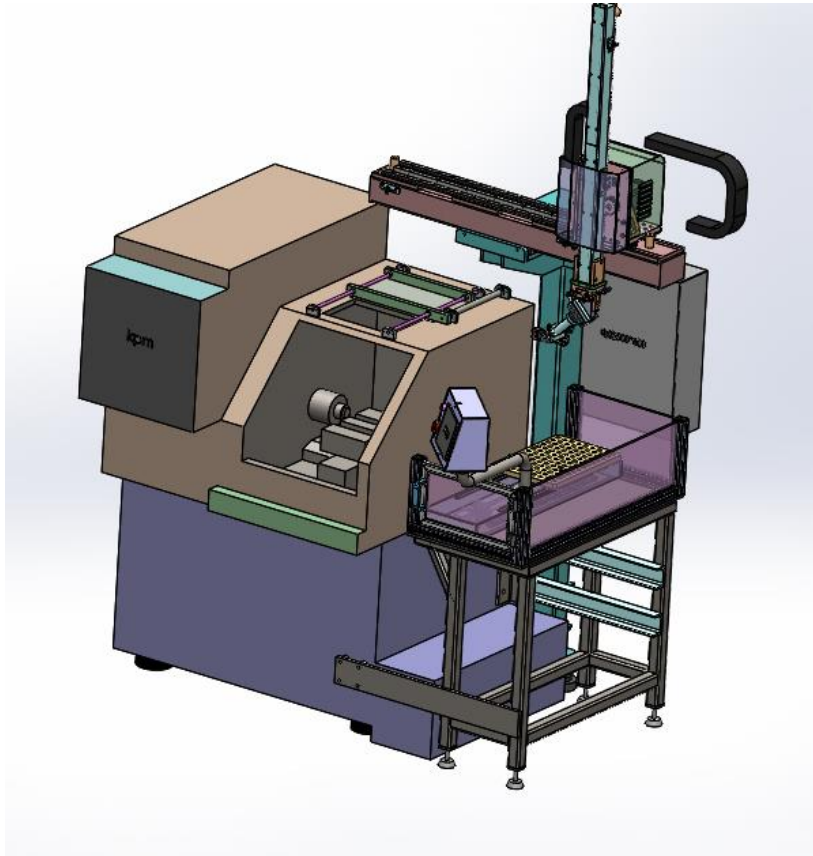


**SOME AUTOMATION
CASES
TO SHARE**

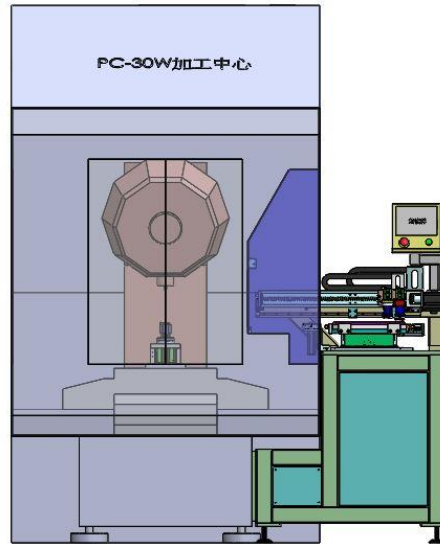
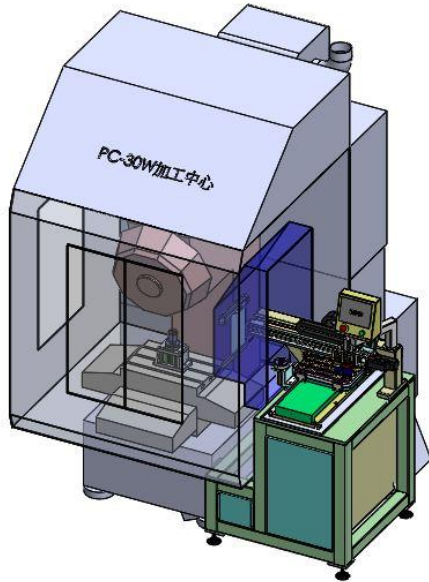
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Pick and Place Automation Equipment for NUMERICAL CONTROL machine

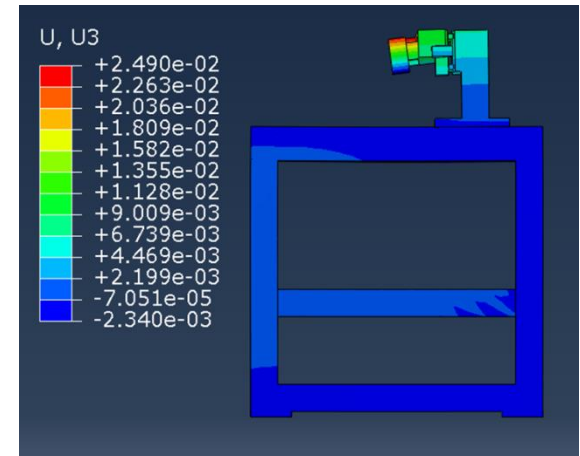
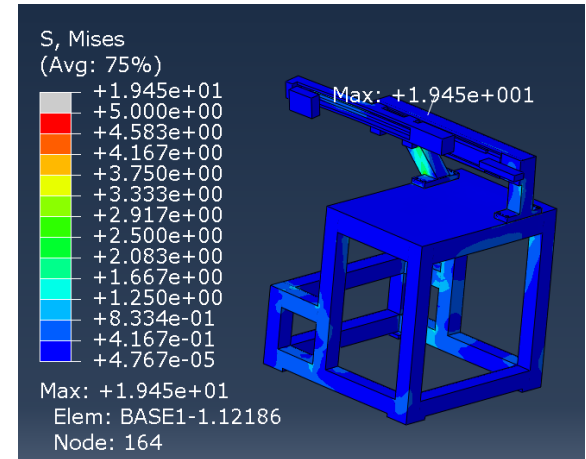
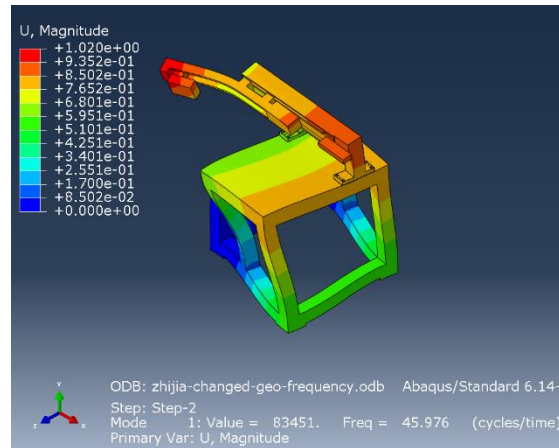


VID_20160525_100443.mp4



(1). The maximum deformation of the whole structure are only about 0.085mm, and U_z will be only 0.025mm.

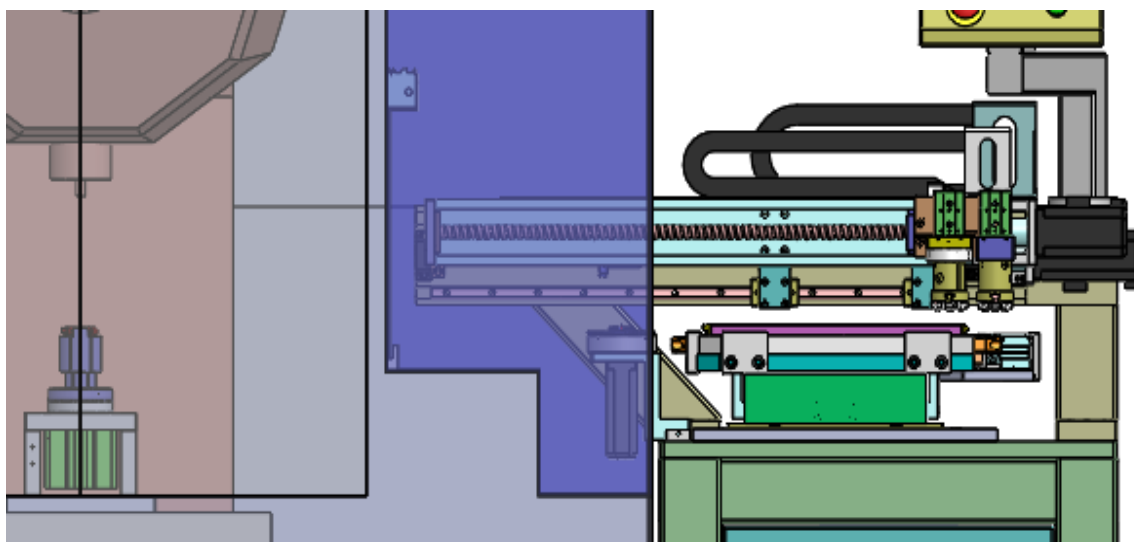
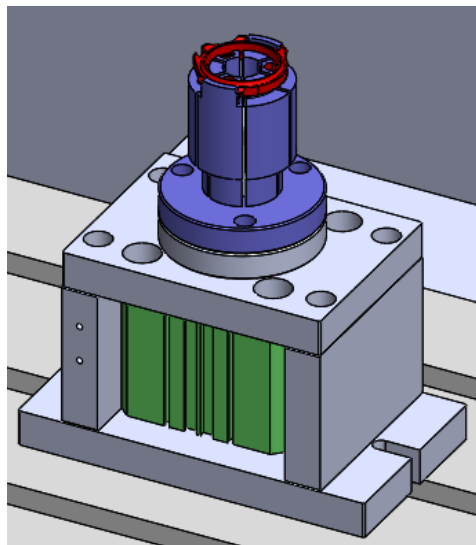
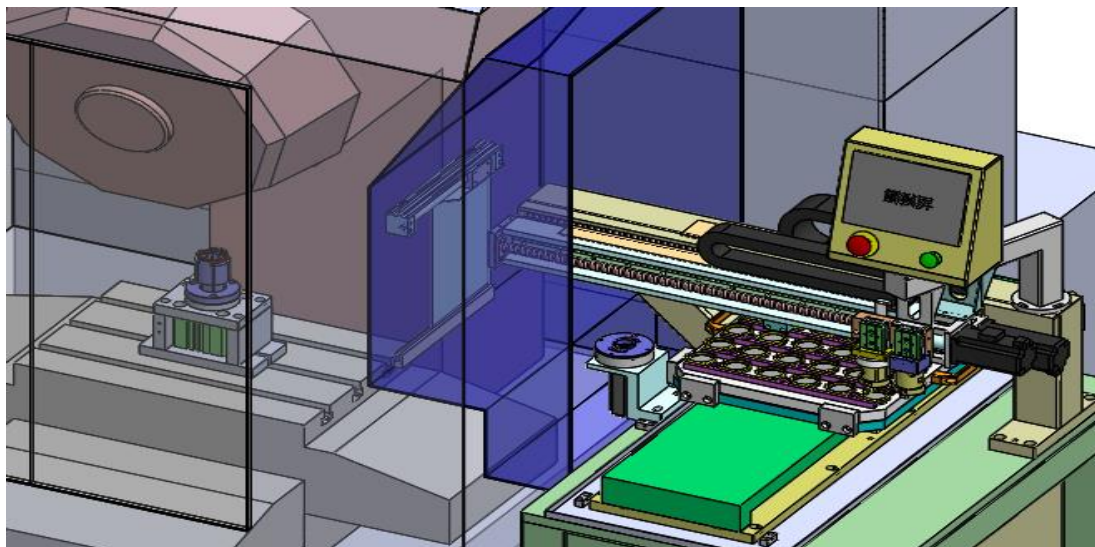
(2) The maximum Mises stress on the structure is only 19.45MPa. The structure was considered safe.



初始狀態(透明顯示部分板金外殼)

CNC機平台配備氣動夾具與索咀

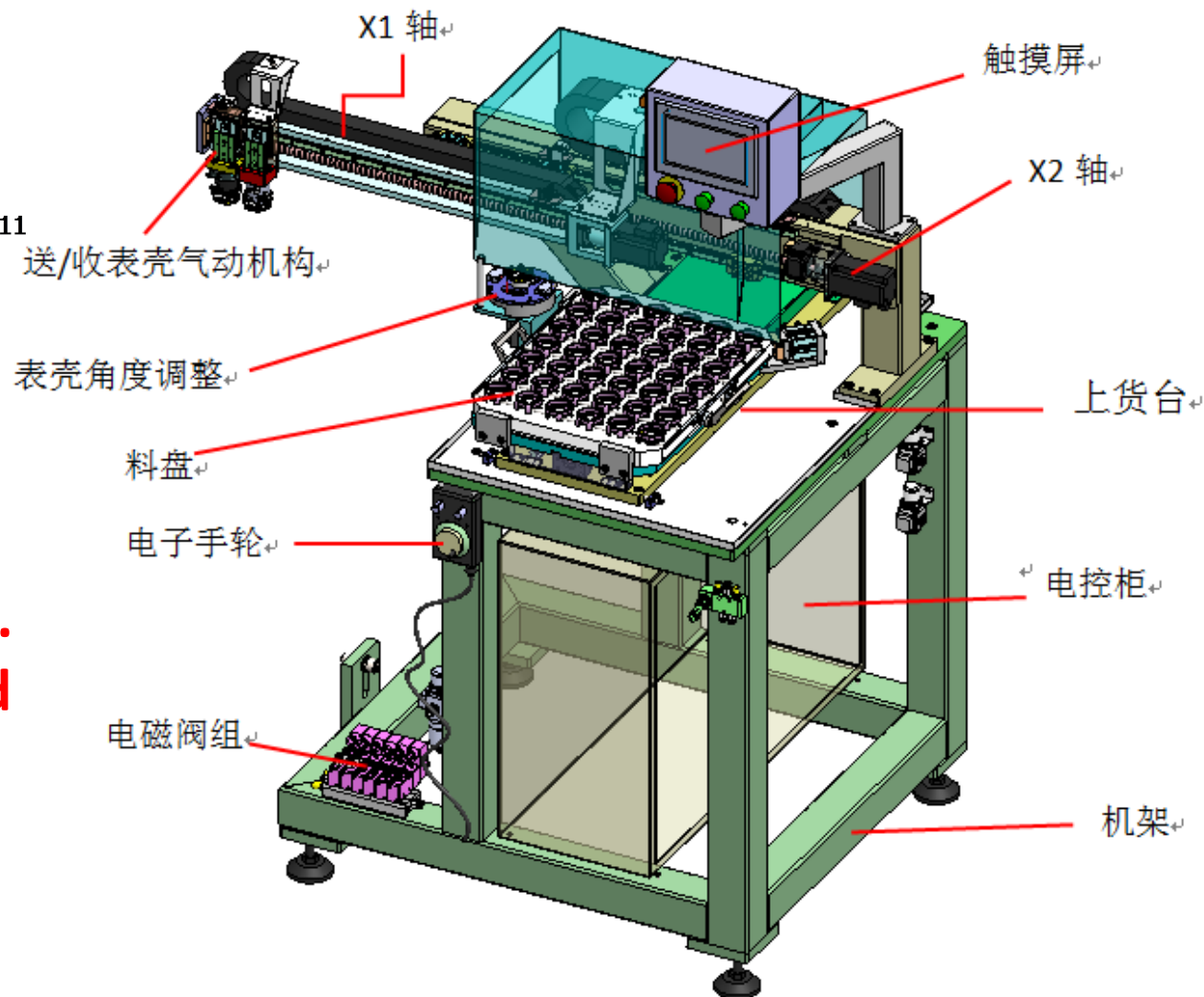
下圖為局部放大圖



設備構架

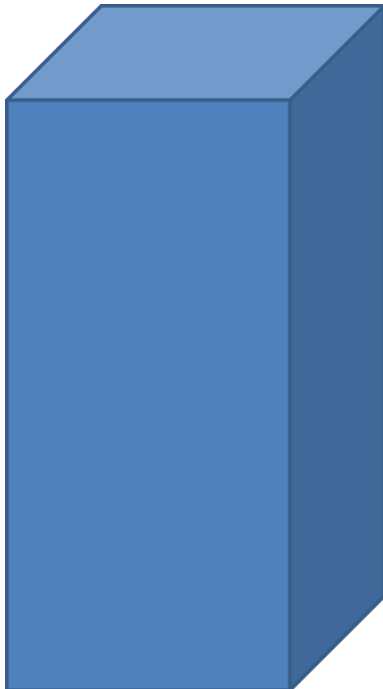


CNC送料機?机??20161111



**Assembly
testing done.
Being moved
over to
production
for beta
testing**

Some Industrial Case Studies



- 0.000147m^3
- 0.5kg
- Density= 3401 kg/m^3

Around 20 times
space saving.



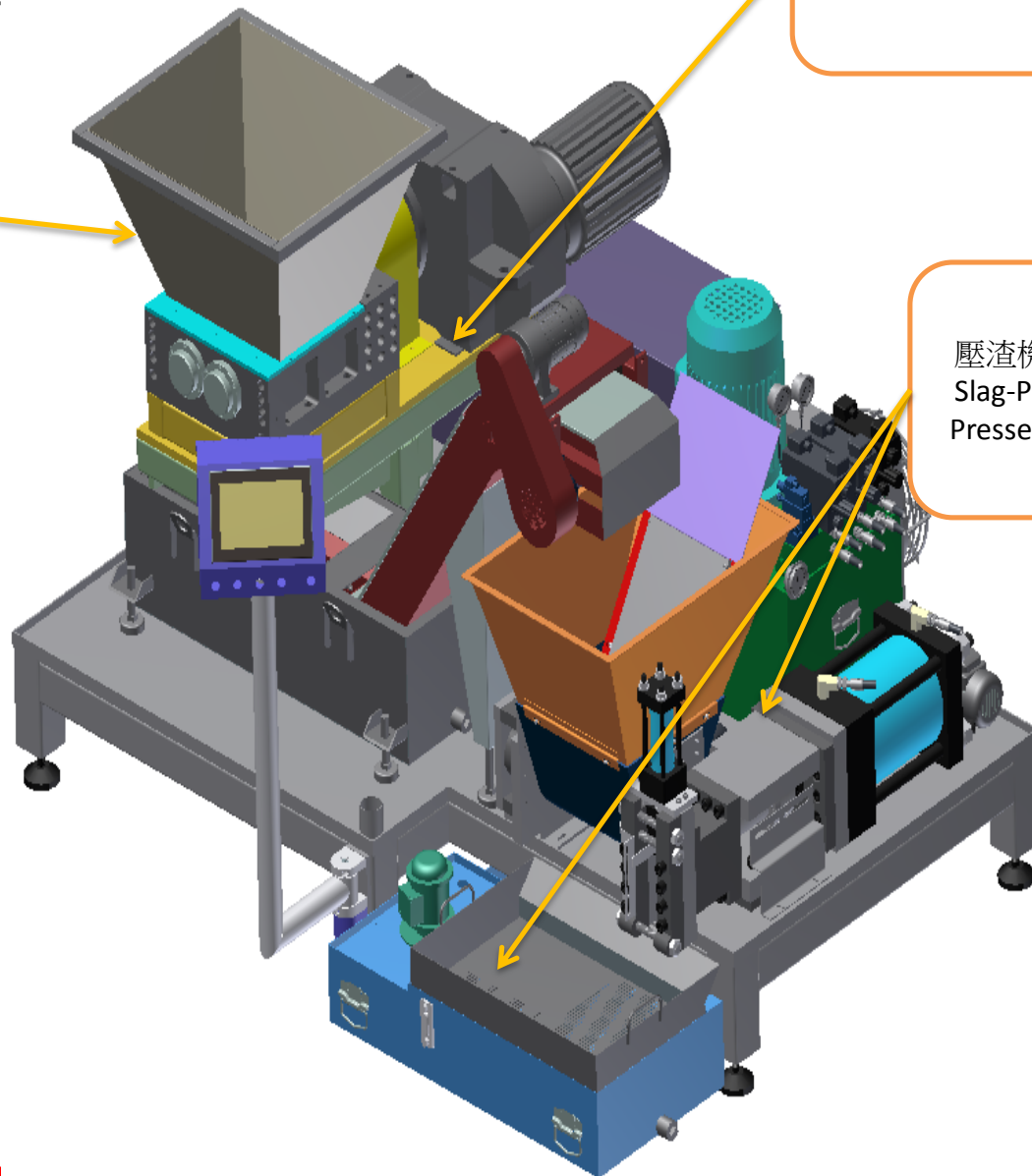
KAM YUEN

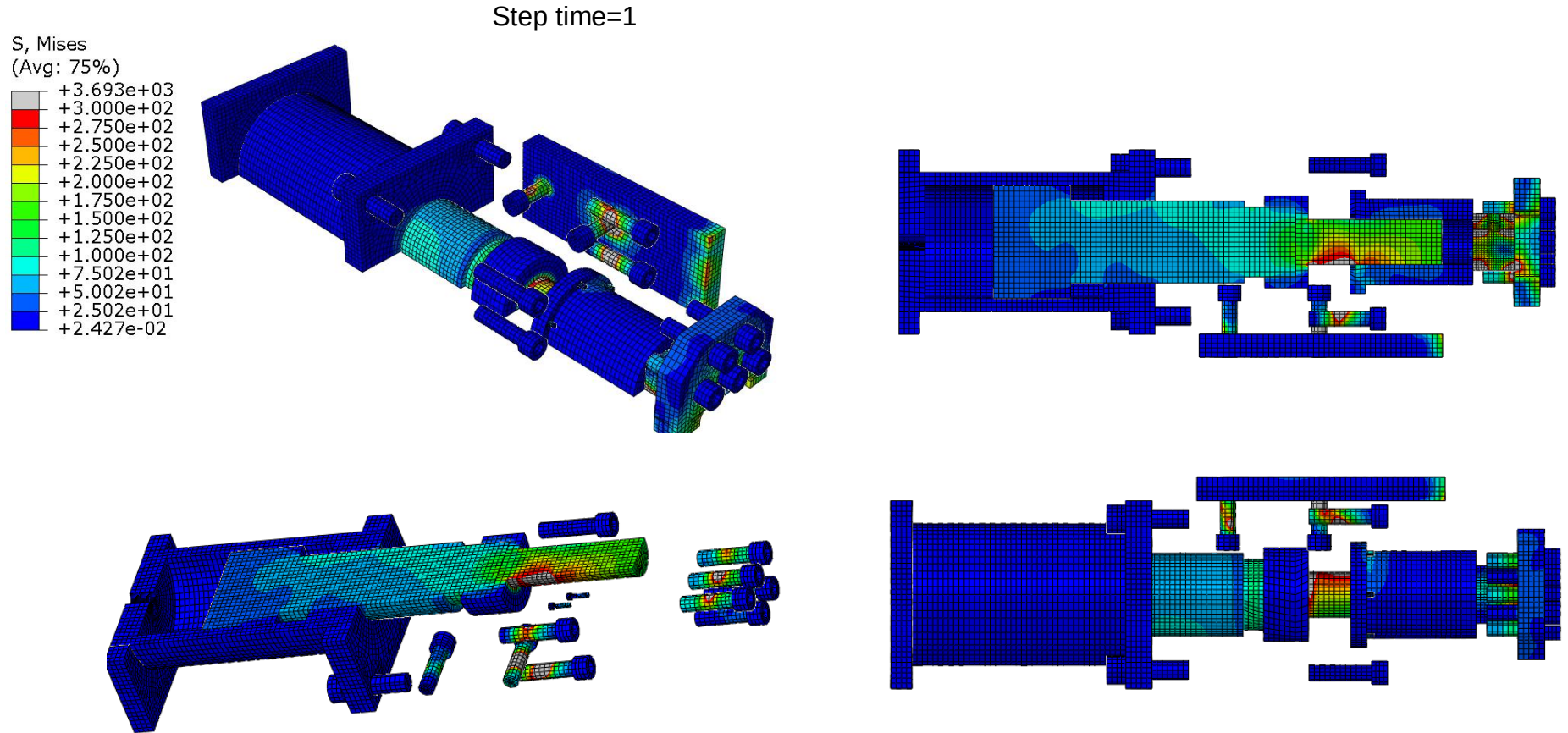
Corporate R&D Center

破碎機組
Crushing System

送料系統
Conveyor System

壓渣機組及壓餅收集
Slag-Press System and
Pressed-Cake Collector





Most of the high stress areas are the bolt areas. The predicted stress at the bolt areas may enlarged because of the tie boundary conditions between them and the machine.

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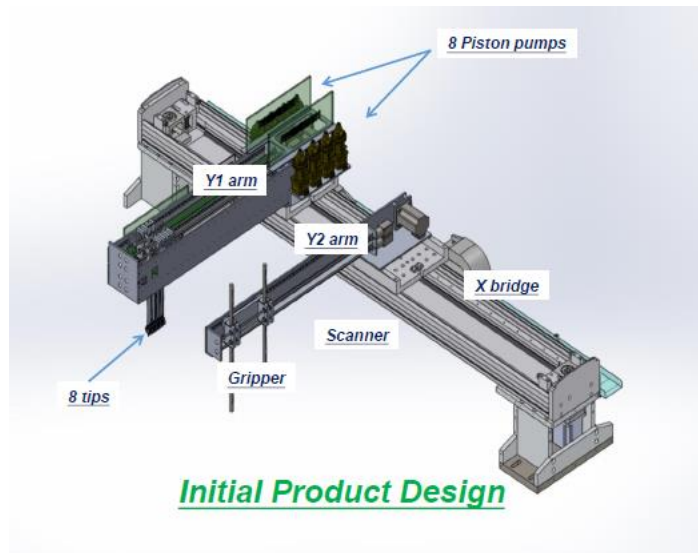
XYZ Liquid Handler



LAB automation solutions for life science research, clinical diagnostics and analytical chemistry.

Customized Automated Liquid Handler for IVD instrument. Liquid handling pumps for OEMs business

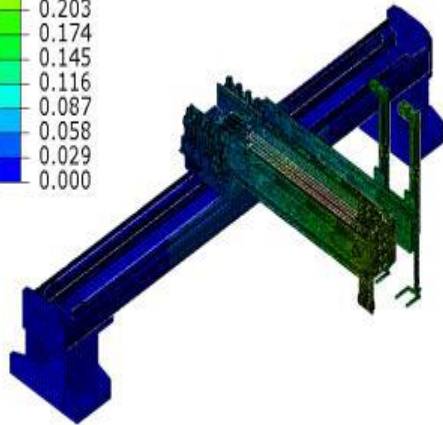
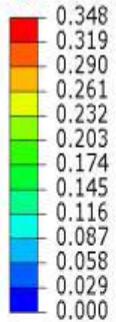
- **Double the throughput**
- Increase **4 channels to 8 channels** with **independent Y spacing movements**.
- Increase **range** and **speed**
- Improve **position accuracy & repeatability**
- **Shorten** pumps' and tips' distances



Customer existing IVD instrument

FEM Analysis prepared by R&D Team

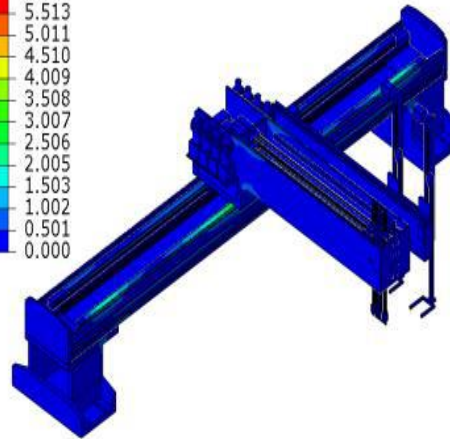
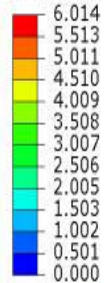
U, Magnitude



ODB: 818-total-changed.odb Abaqus/Standard 6.14-2 Mi

Step: Step-1
Increment 15: Step Time = 1.000
Primary Var: U, Magnitude
Deformed Var: U Deformation Scale Factor: +1.000e+00

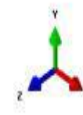
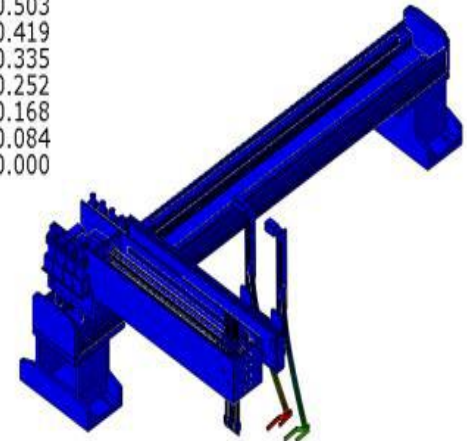
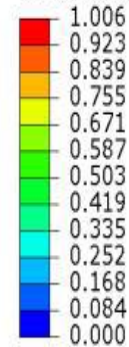
S, Mises
(Avg: 75%)



ODB: 818-total-changed.odb Abaqus/Standard 6.14-2 Mon

Step: Step-1
Increment 15: Step Time = 1.000
Primary Var: S, Mises
Deformed Var: U Deformation Scale Factor: +1.000e+00

U, Magnitude



ODB: 818-total-changed-dynamic-end.odb Abaqus/Standard 6.14-2

Step: Step-2
Mode 3: Value = 8457.3 Freq = 14.636 (cycles/time)
Primary Var: U, Magnitude
Deformed Var: U Deformation Scale Factor: +1.870e+02

Shape deformation analysis

Stress
Analysis

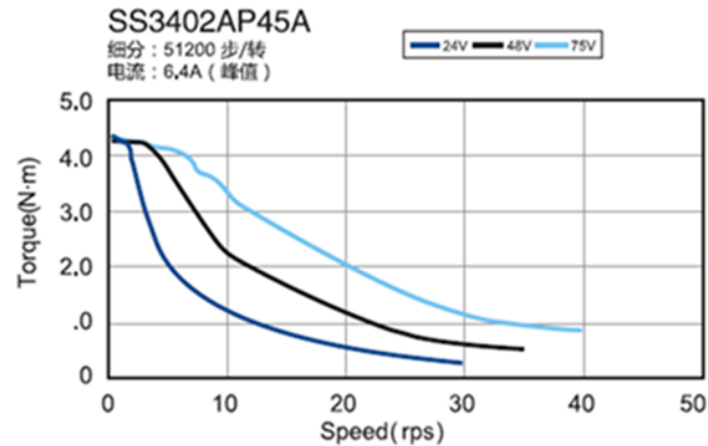
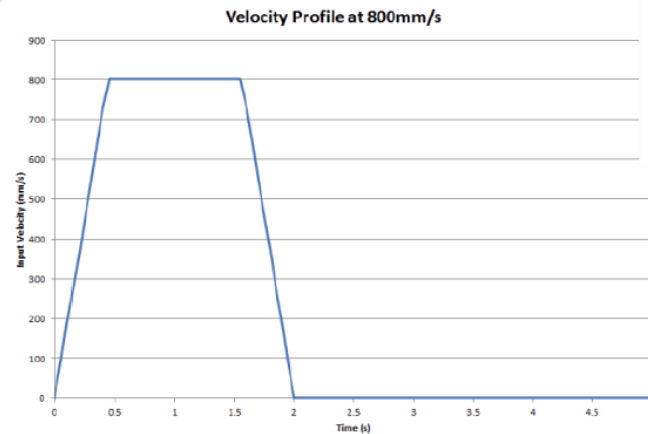
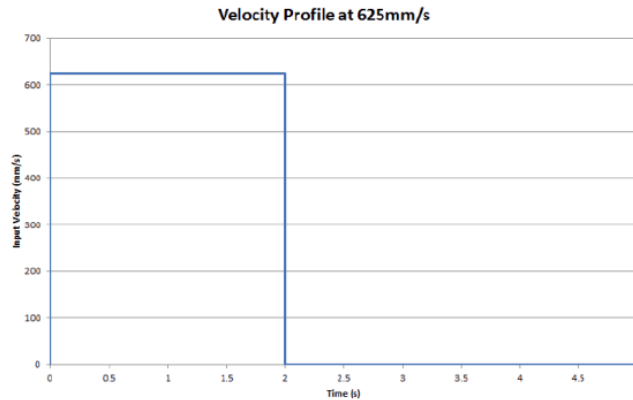
Frequency
analysis



Resonance_Peak625_SideView_70Frames_RealTime.avi



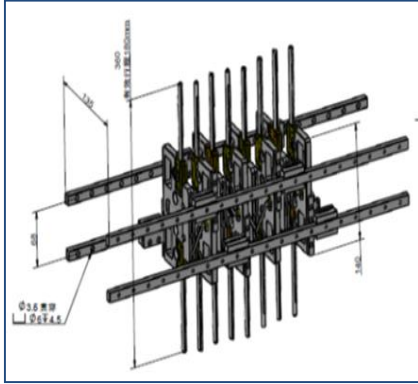
Resonance_Peak625_IsoView_70Frames_RealTime.avi



Peak800_SideView_20Frames_RealTime.avi

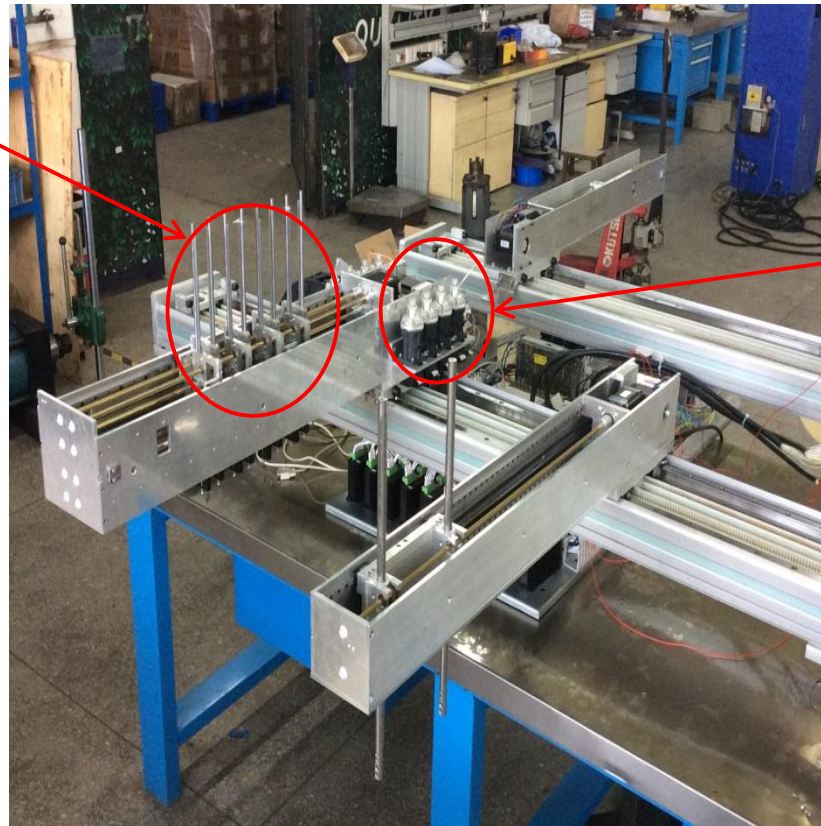


Peak800_IsoView_20Frames_RealTime.avi



Special designed
8 channels module

First version of a Automated
Liquid Handler are developed.



8 of our high
precision piston
pump

- The Cap Gold Process is one of our 14 Patents Achieved (3 on Invention and 11 on Application.)
- In-house developed technology and obtained the patent at 2006.
- Perfectly comply to salt fog test since we eliminate the soldering paste.



Kam Yuen has demonstrated how *Innovations* can
make a BIG difference to our commercialization of our
DREAMS

THANK YOU from the Kam Yuen team
Q&A

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2017

