# Prototype test of a new MOX powder transport packaging

PATRAM2010

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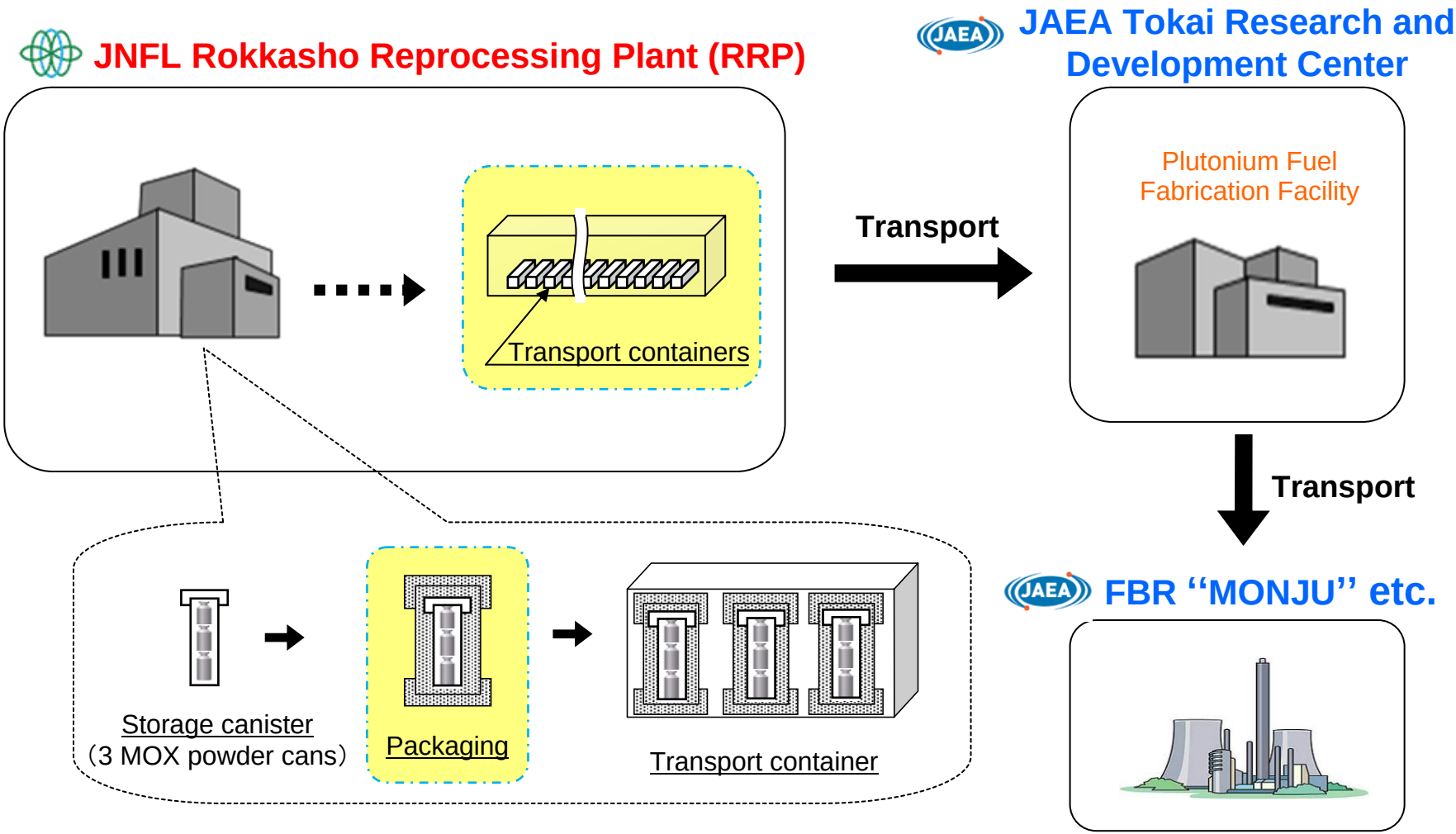
# Introduction

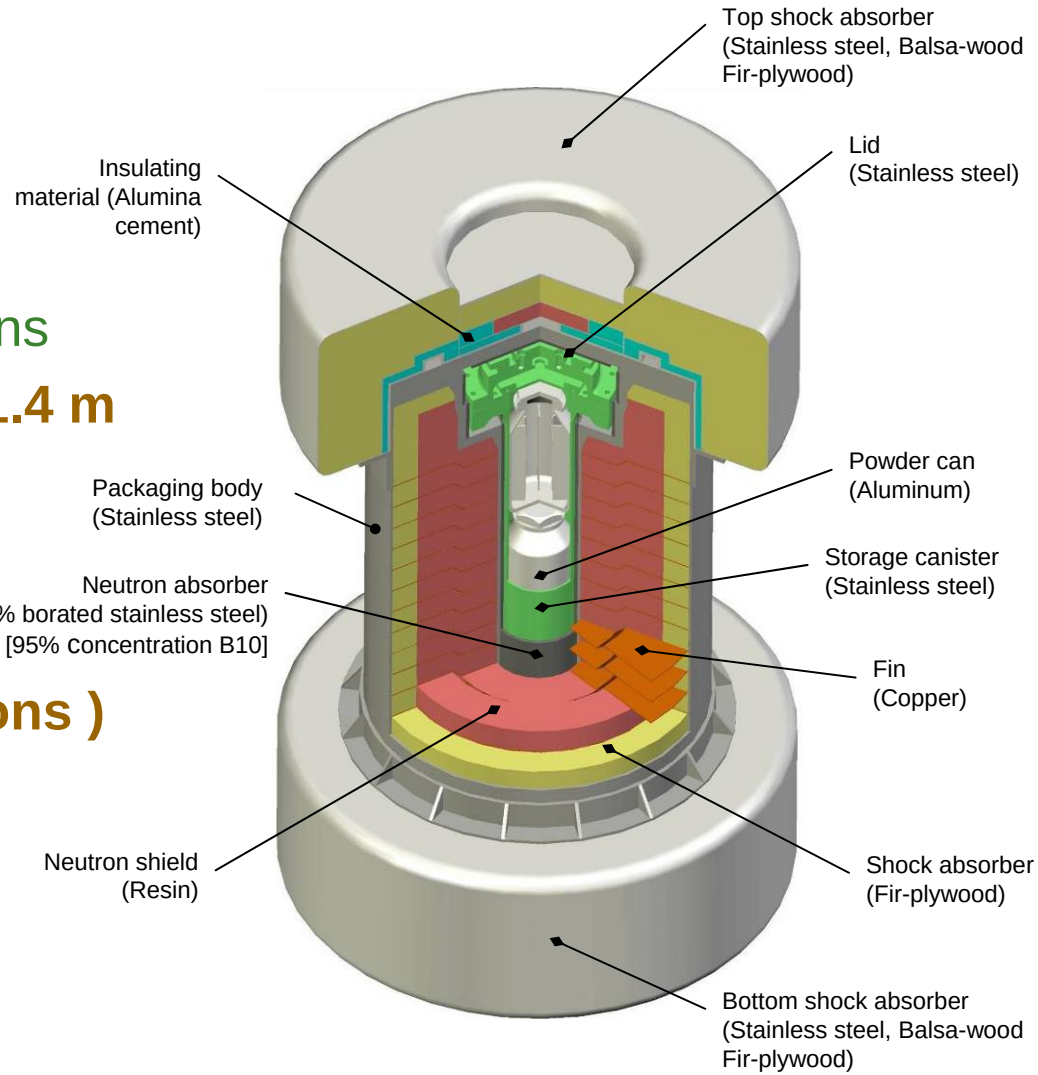
- The Japan Atomic Energy Agency [JAEA] is planning to transport uranium and plutonium mixed oxide [MOX] powder from the commercial Rokkasho Reprocessing Plant [RRP] operated by Japan Nuclear Fuels Limited [JNFL].
- The design and analyses for the new packaging for transporting the MOX from the RRP to the JAEA Plutonium Fuel Fabrication Facility [PFPF], started in 2002.
- The demonstration performance tests were conducted using a 1/1 full scale prototype packaging.

# Outline of transport



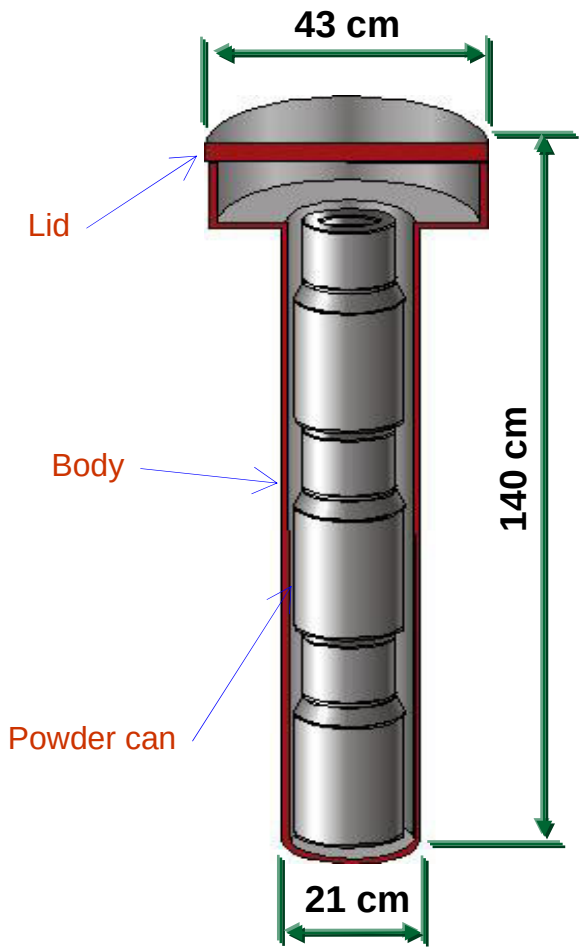
# Specifications of package

- Package type
  **Type B(U)F**
- Outer packaging dimensions
  **Outer diameter: about 1.4 m**
  **Height: about 2.2 m**
- Package weight
  **About 4.0 tons**
  **(Packaging: about 3.8tons )**



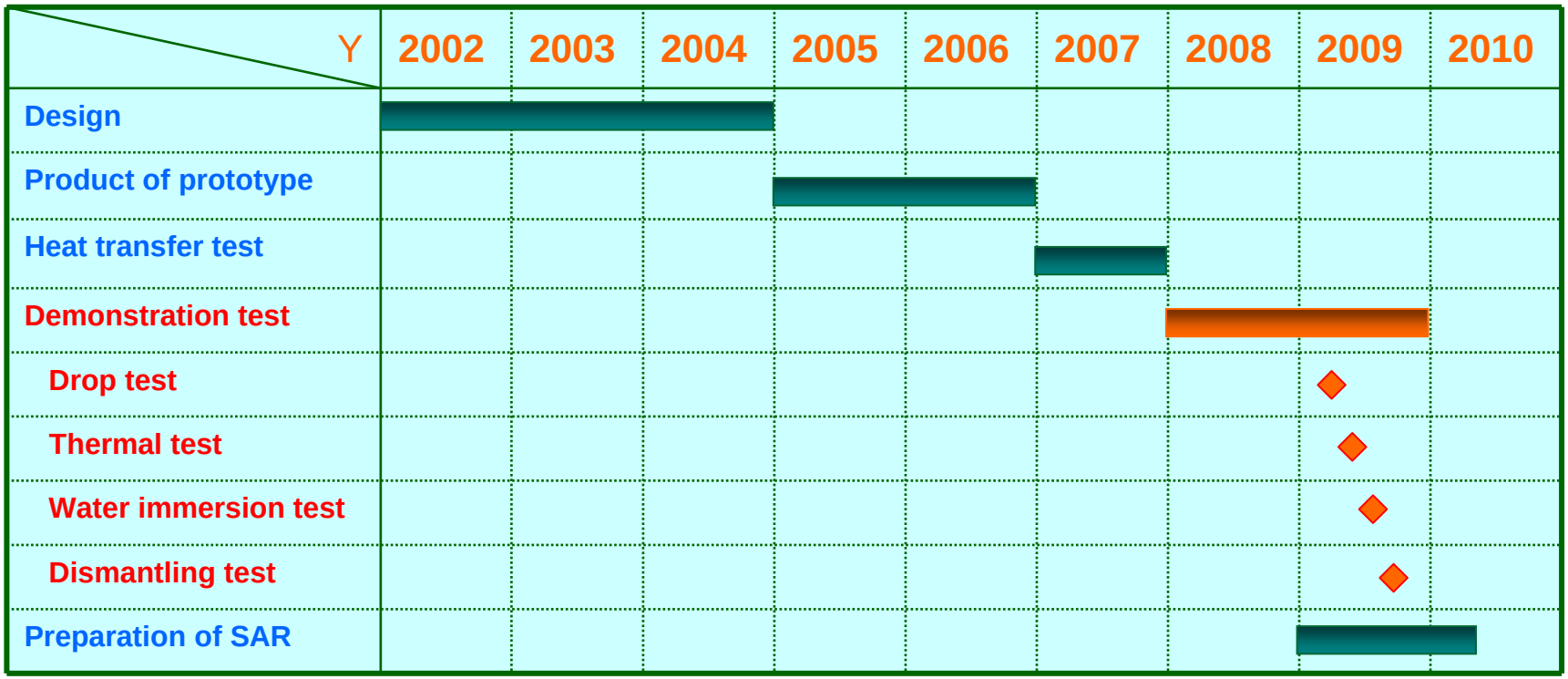
# Specifications of contents

| | |
|---|---|
| Type | Uranium and plutonium mixed oxide |
| Chemical form | $UO_2 \cdot PuO_2$ |
| Property | Powder |
| Weight of $UO_2 \cdot PuO_2$ | 45kg or less / 3cans |

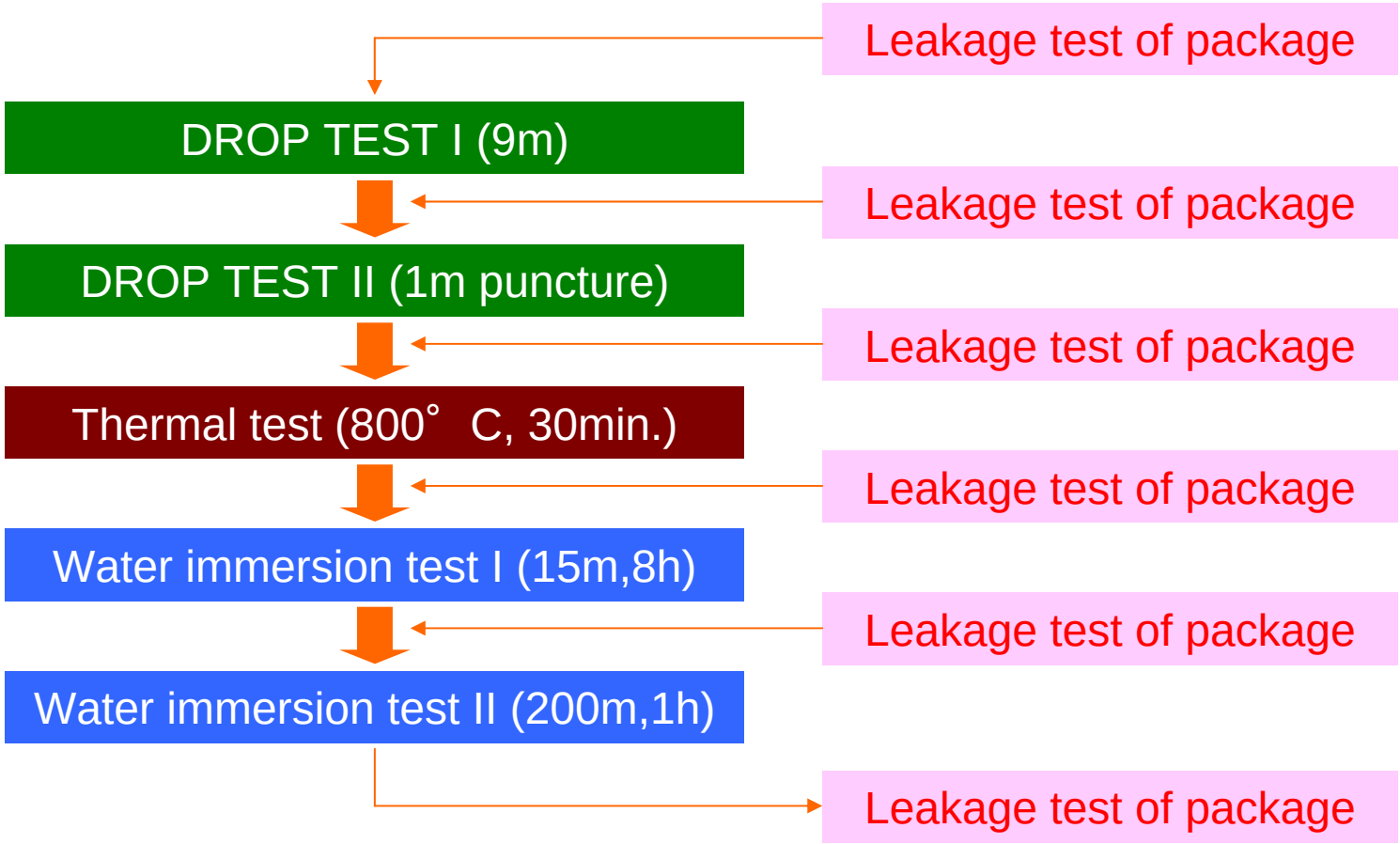



**Storage canister**

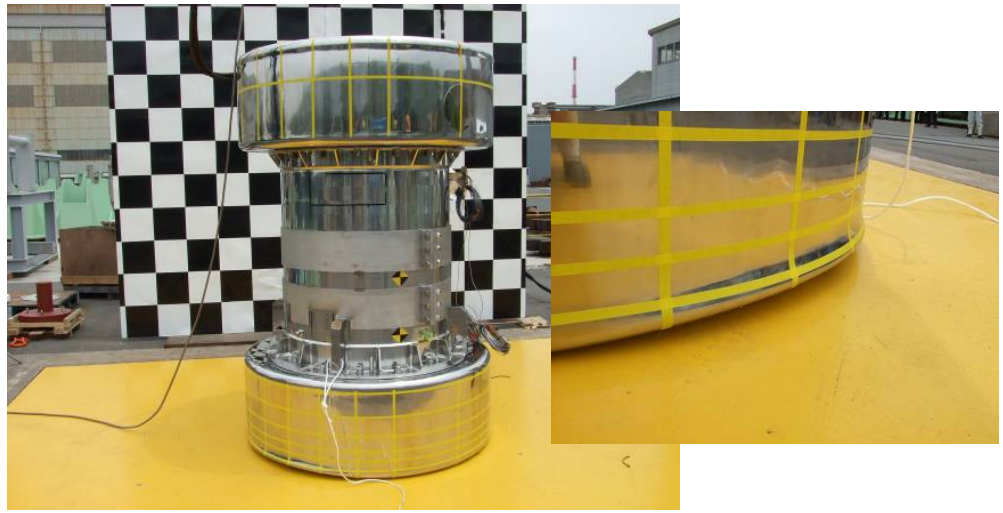
# Development Schedule



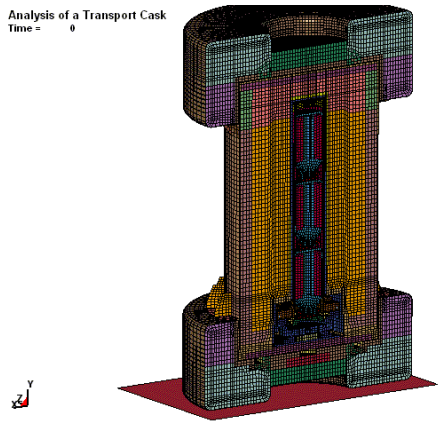
# Test Flow



# Test results-Drop test I



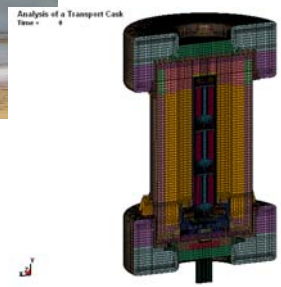
| Deformation of shock absorber (mm) | | Acceleration (G) | | Stress of Lid ($N/mm^2$) | |
|---|---|---|---|---|---|
| Test result | Analysis result | Test result | Analysis result | Test result | Analysis result |
| 41 | 41 | 349 | 345 | 95 | 122 |

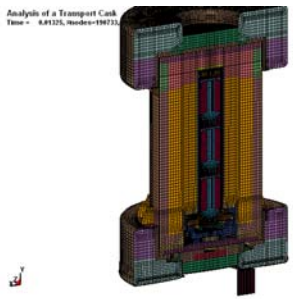



Free drop from 9m

The integrity of containment was not impaired.

# Test results-Drop test II



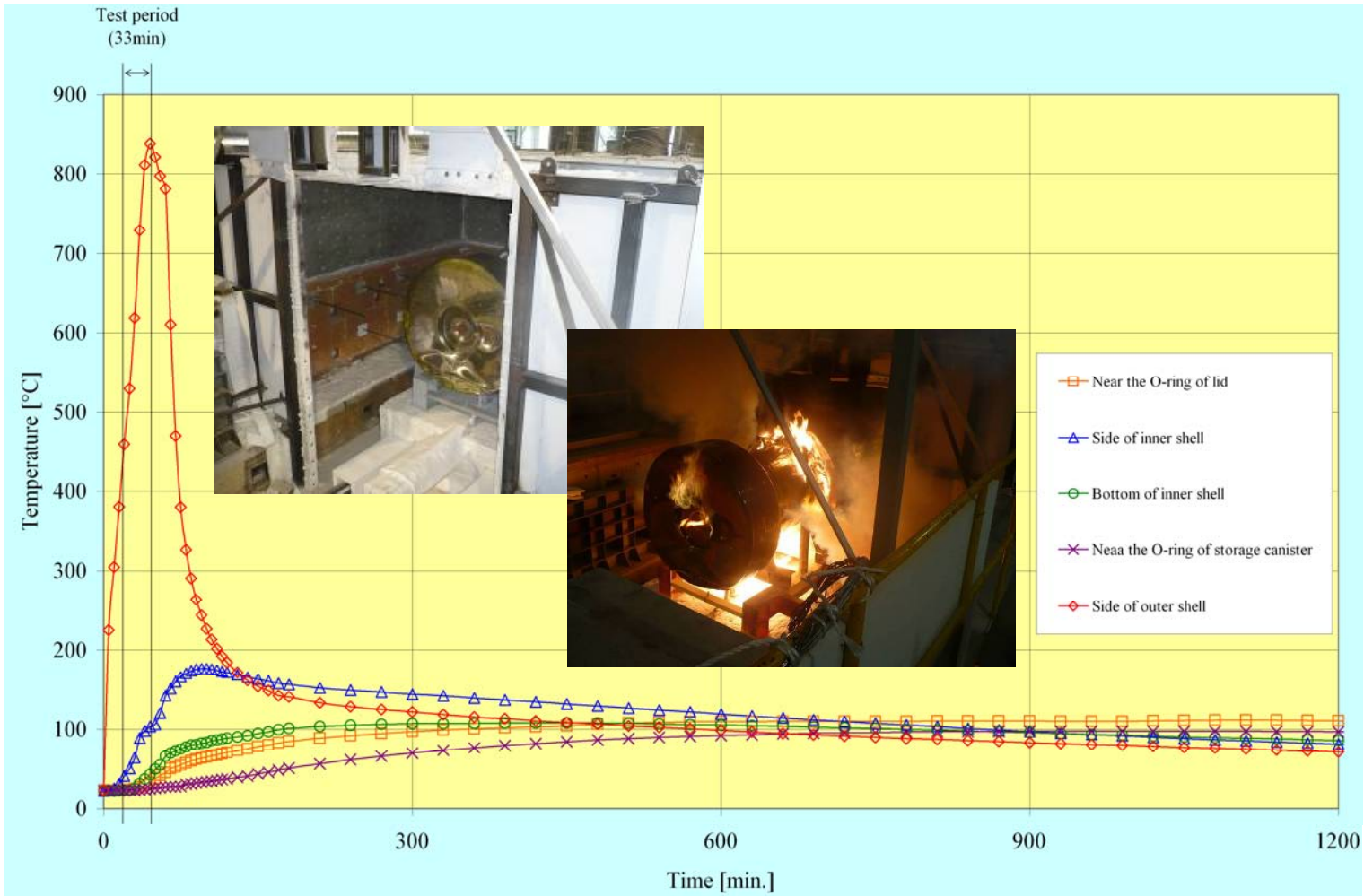


| | Deformation of shock absorber (mm) | | Acceleration (G) | | Stress of Lid ($N/mm^2$) | |
|---|---|---|---|---|---|---|
| | Test result | Analysis result | Test result | Analysis result | Test result | Analysis result |
| Center | 19 | 20 | 94 | 84 | 143 | 216 |
| Eccentric | 47 | 51 | 33 | 39 | - | - |

1m puncture

The integrity of containment was not impaired.

# Test results-Thermal test (1)




800° C, 30min.

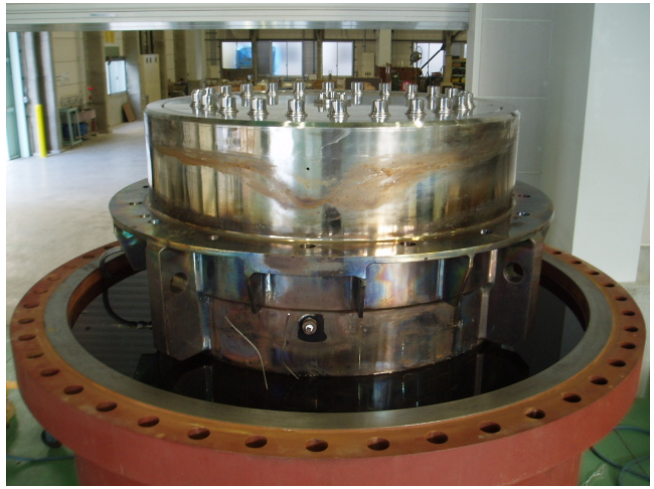
The integrity of containment was not impaired.

# Test results-Thermal test (2)

Test results of thermal test

| Center | Test results (°C) | Analysis result (°C) |
|---|---|---|
| Near the O-ring | 112 | 177 |
| Side of inner shell | 177 | 218 |
| Bottom of inner shell | 108 | 111 |
| Near the O-ring of storage canister | 98 | 100 |

# Test results-Water immersion test



15m/8h, 200m/1h

The integrity of containment was not impaired.

# Test results-Dismantling test (1)



- Containment system, neutron absorber and storage canister did not deform.
- Shock absorber for packaging body was carbonized.
- Neutron shield did not change in quality and discoloration was not seen.

# Test results-Dismantling test (2)

Analysis of neutron shield

Sampling, Analysis

Analysis results of neutron shield

| Center | Density ($g/cm^3$) | C (%) | H (%) | N (%) |
|---|---|---|---|---|
| At Production | 1.05 | 70.1 | 11.1 | 1.6 |
| At dismantling test | 1.05 | 70.4 | 11.0 | 1.8 |

Performance of neutron shield was maintained.

# Conclusions

- The demonstration  performance tests of a new MOX powder transport packaging were conducted.
- It was confirmed to meet the technical standard.
- The validity for the logic of safety analysis method was confirmed by test results.

E N D