

# DEVELOPMENT OF COMMERCIAL RFQ TOWARD CW APPLICATIONS

TIME has provided several RFQs and DTLs to national laboratories and industries.

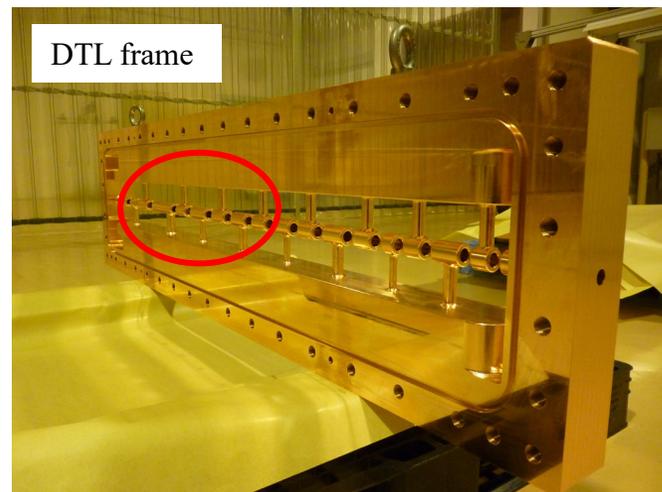
We are responding strong demands of high duty (CW) RFQs.



RIKEN RANS-II 200 MHz RFQ[1]  
Developed by RIKEN, Neutron Beam Technology Team



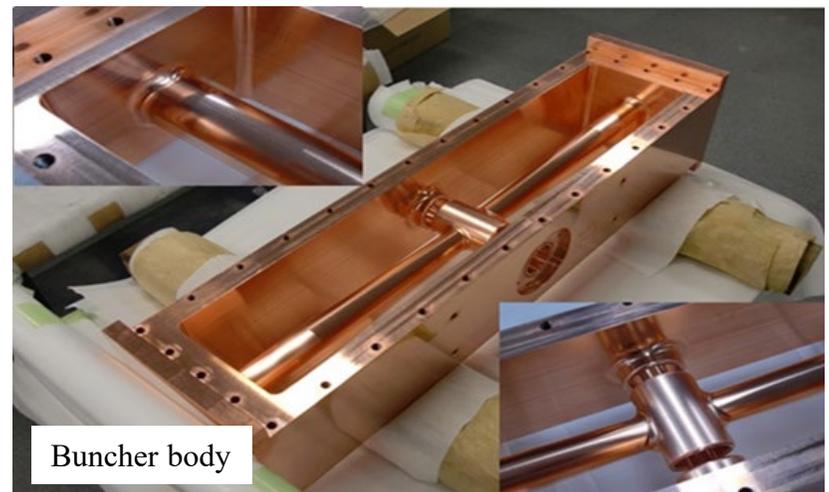
RIKEN RANS-III 500 MHz RFQ[2]  
Developed by RIKEN, Neutron Beam Technology Team



DTL frame



Drift tube : No welding

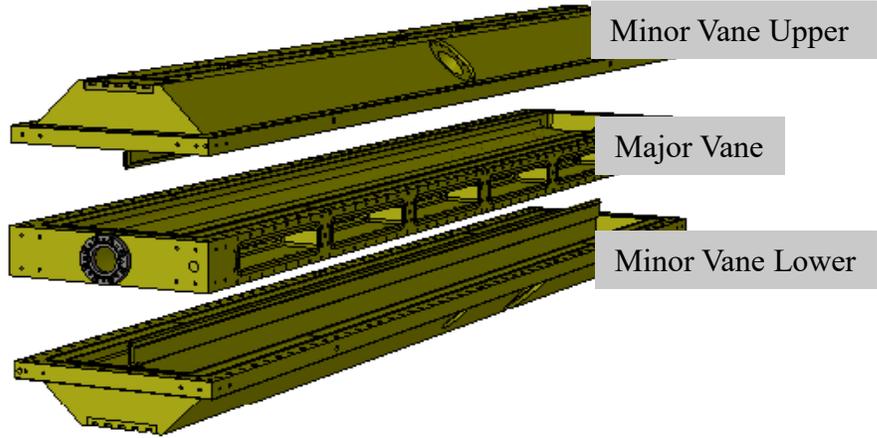


Buncher body

# Three-Layer structure

Super precise machining can be directly applied to any part of the cavity interior.

Using this patented technique, we developed a high duty RFQ.

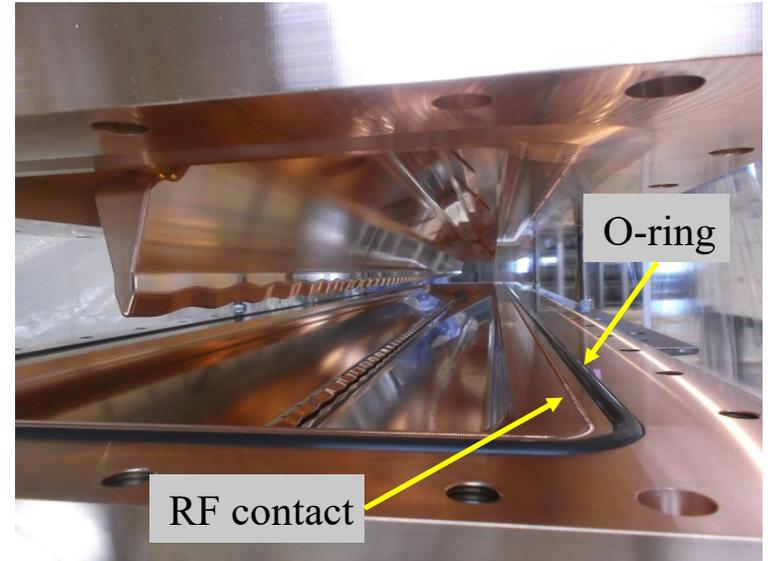


### Design parameter of RFQ

Frequency	200.3 MHz
Q Value	14600 (Simulated)
Design species	Proton
Beam Current	20 mA
Injection beam energy	35 keV
Extraction beam energy	2.5 MeV



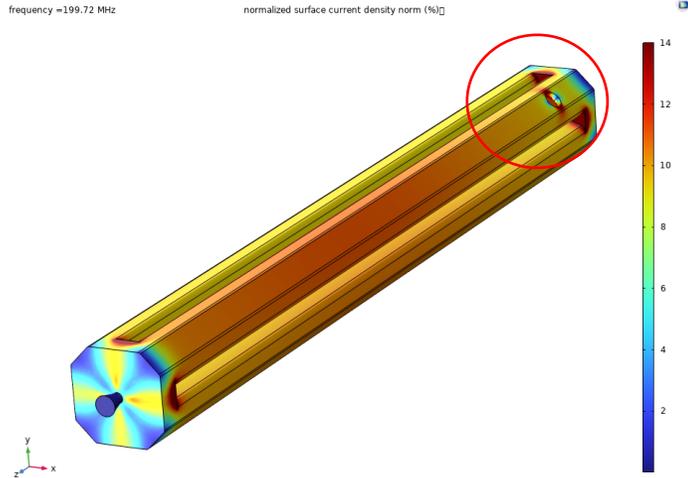
Assembled with a slide guide to avoid collision between vanes



# Development of tuner less RFQ

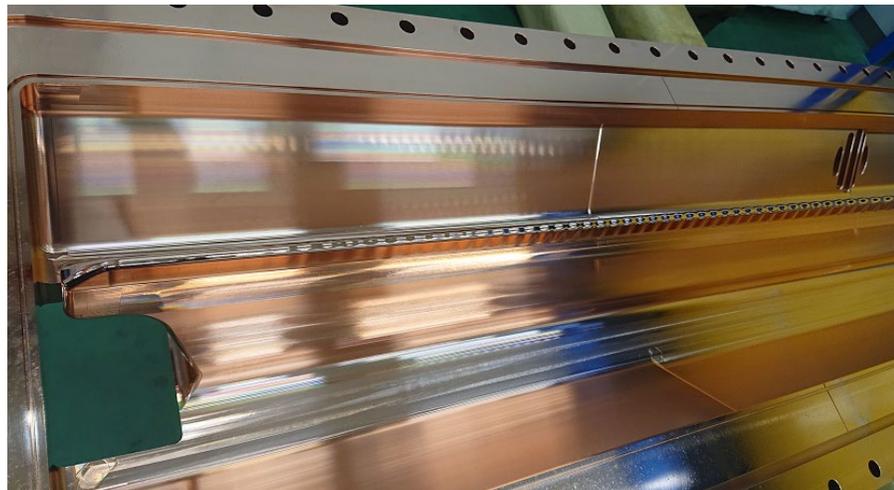


The tuner insert locally concentrates the current distribution and also raises the temperature causing discharges

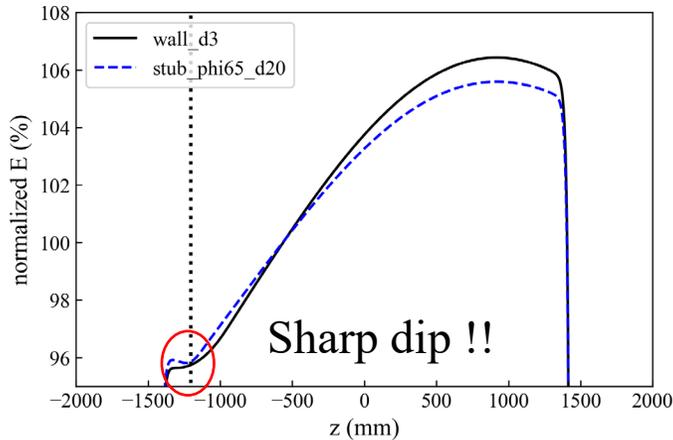


RFQ reversal work  
To perform accurate electric field measurements, the RFQ was inverted many times for each measurement quadrant.

We repeated the electric field measurement and cutting of the inner wall of the RFQ cavity.

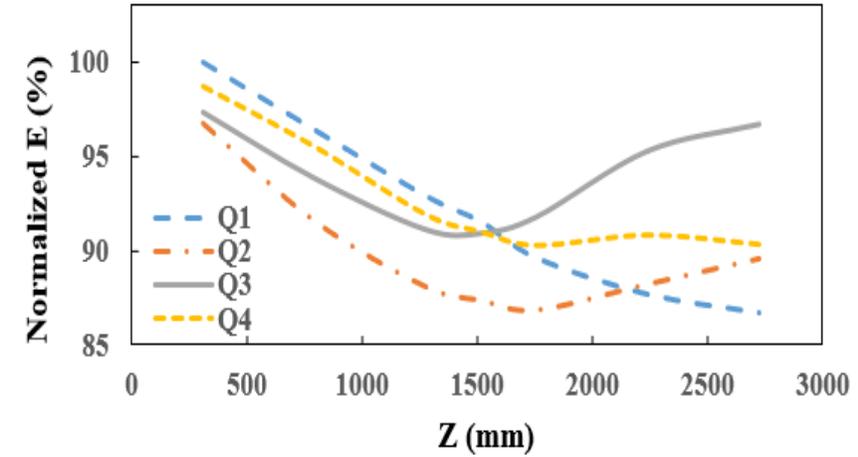


The electric field changes locally only at the tuner insertion portion.



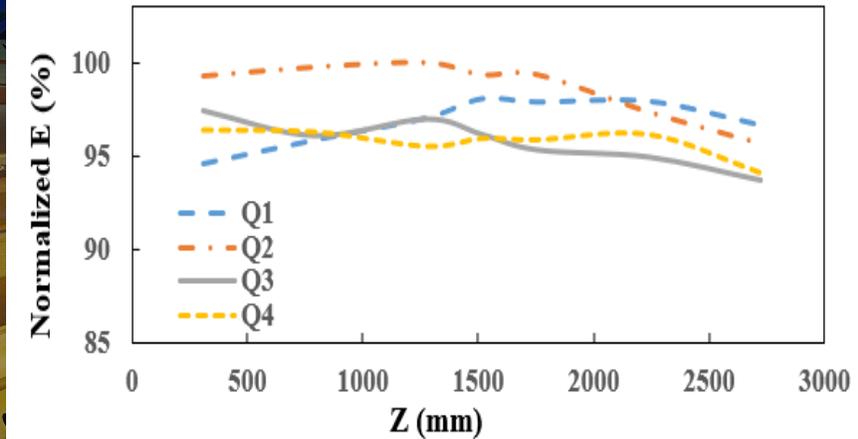
Before adjustment Electric field

Resonance frequency : 202.905 MHz



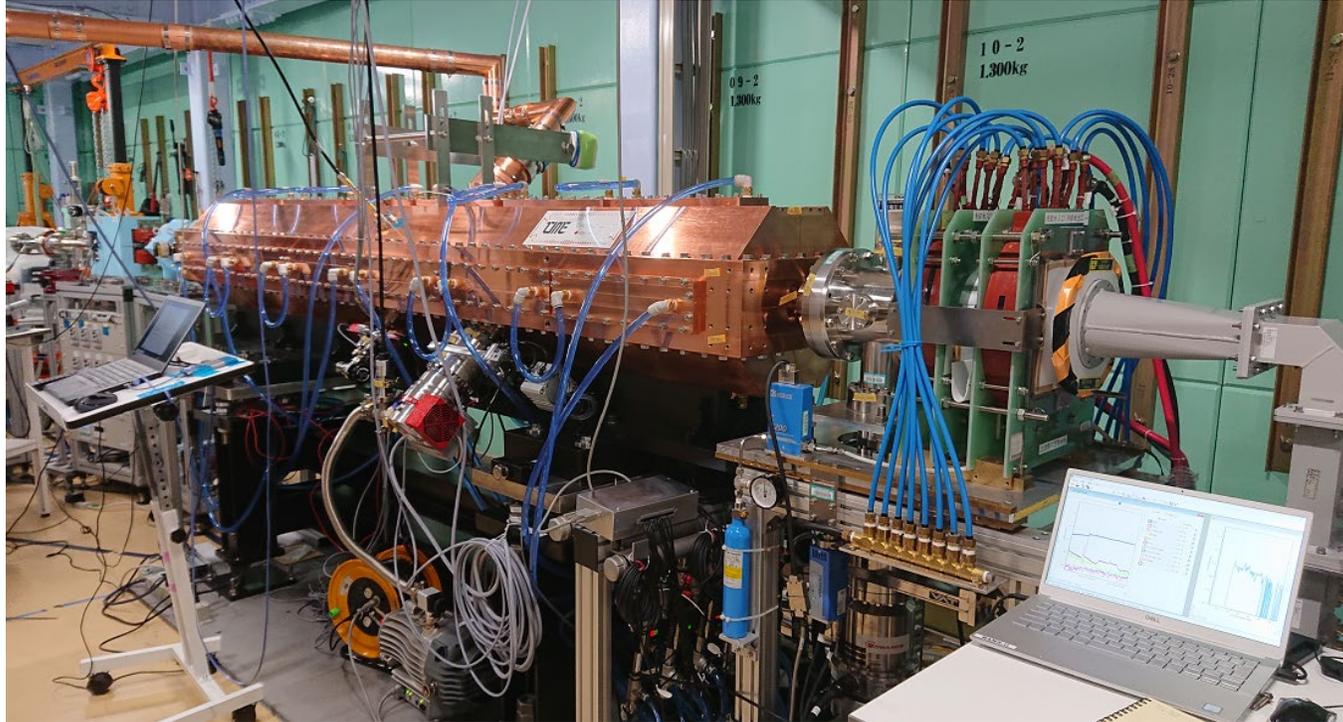
After adjustment Electric field

Resonance frequency : 200.276 MHz





## Beam test at RIKEN

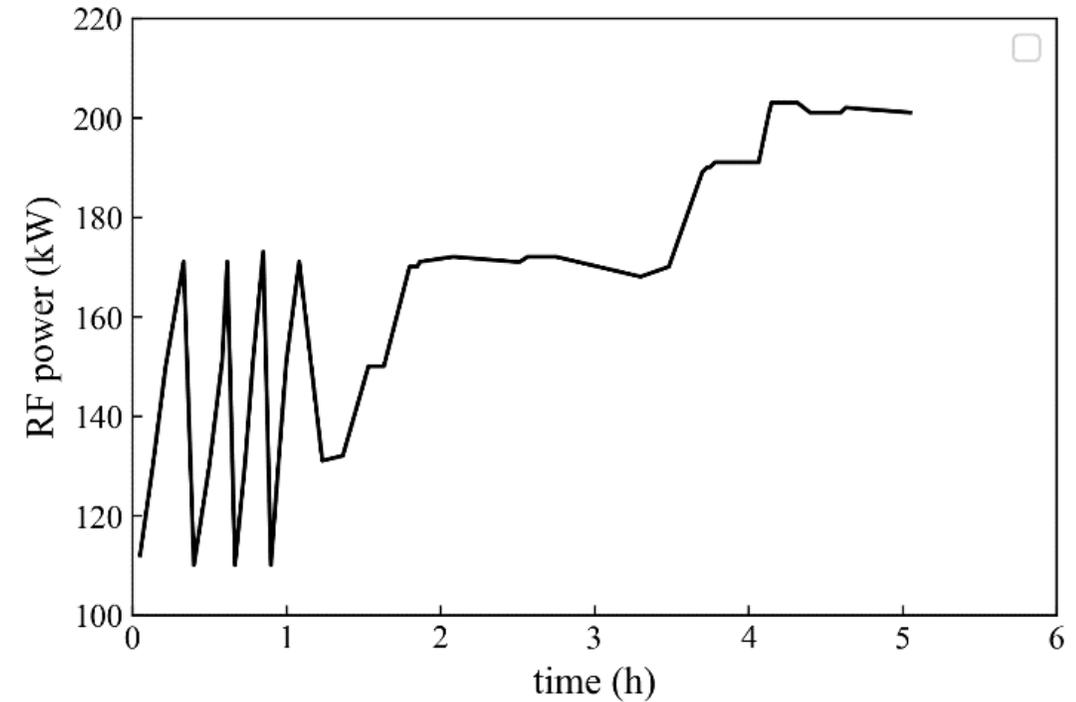


Frequency            200.344 MHz  
Q Value                13400 (Measured)

If you need a high performance robust RFQ, we can help you.



## High power delivery test at MTA (Hungary)



High power commissioning completed in 5 hours.

RF-Power: 200 kW

Pulse length: 1.25 ms

Duty factor: 5 %

Vacuum: 5.02E-5 Pa



# Thank you for your attention!

And please visit our poster MOPORA12.

## **ACKNOWLEDGMENTS**

This RFQ was evolved based on RANS2 which was developed by RIKEN neutron group and TITech.

## **REFERENCES**

- [1] T. Kobayashi, S. Ikeda, Y. Otake, Y. Ikeda, N. Hayashizaki, “Completion of a new accelerator-driven compact neutron source prototype RANS-II for on-site use”, NIM A, 994 (2021) 165091
- [2] S. Ikeda, Y. Otake, T. Kobayashi, N. Hayashizaki, “Design of 500 MHz RFQ linear accelerator for a compact neutron source,