

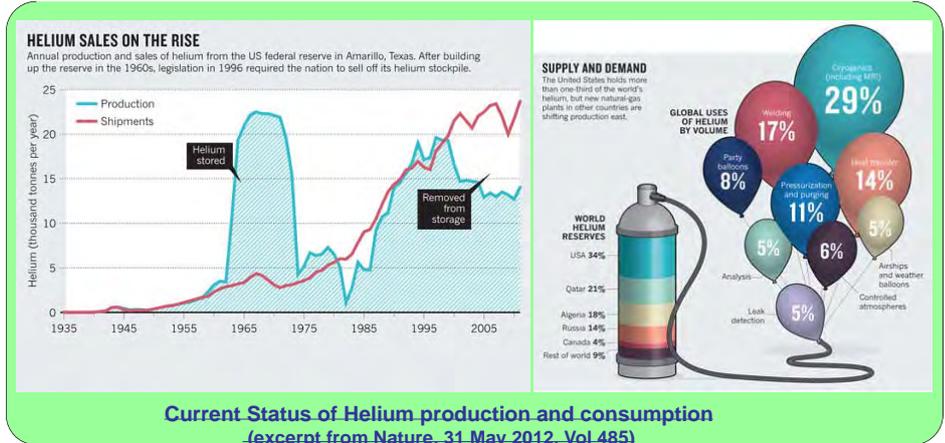
1. Helium Problems and MEG (Magnetoencephalography)

MEG problems

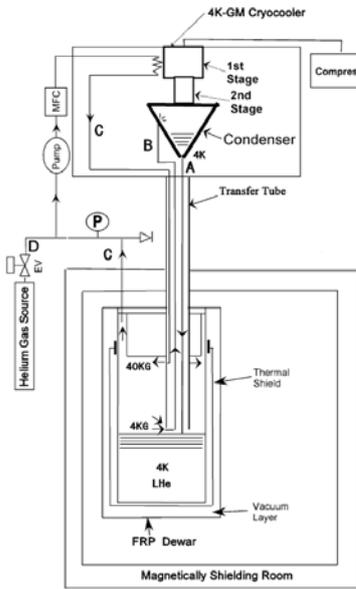
- Large amount of expensive He required (8 - 10l/day)
- Frequent liquid He refilling required (2 times/week)

Required specifications for the HCS for the MEG

- Liquid He circulation: 10l/day
- Continuous Operation: 1 year or more
- No blocking by contaminants (H_2O , N_2 , O_2)
- No incremental noise (acoustic/ magnetic) added by HCS

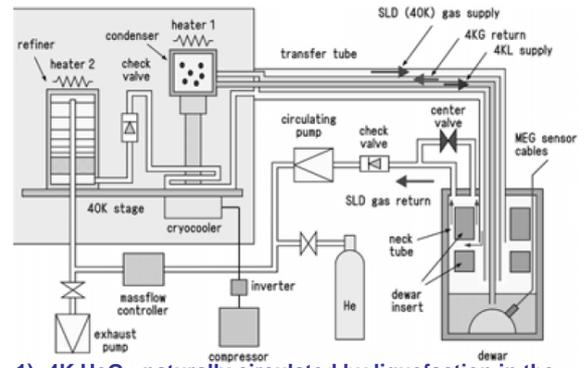


2. Newly developed Helium Circulation System



Basic idea of the new HCS

- A: pipe to lead LHe (to cool SQUIDS) from condenser to dewar by gravity
- B: pipe to lead lower temperature (4K) HeG from dewar to condenser
- C: pipe to circulate higher temperature (40K) HeG (to cool the dewar)
- D: pipe to add pure HeG
- EV: electric valve
- MFC: mass flow controller
- Line B \Rightarrow A
The condenser absorbs low temperature gas and liquefies it without raising it up to the room temperature (300K).
- Line D \Rightarrow C
40K HeG is flowed into the neck tube of the dewar to cool it.



- 4K HeG : naturally circulated by liquefaction in the condenser
 - 40K HeG (to cool dewar) : circulated by a pump
- Refiner with heater is introduced to prevent blocking by contaminants (H_2O , N_2 , O_2).
- Trapped contaminants are automatically exhausted after evaporated by the heater.
- Transfer tube : a newly developed seven concentric TT to reduce the amount of heat flowing into the system
- Block diagram of the gas flow**

3. HCS and MEG in Operation



Multi-pipe TT of the HCS installed on the commercialized MEG

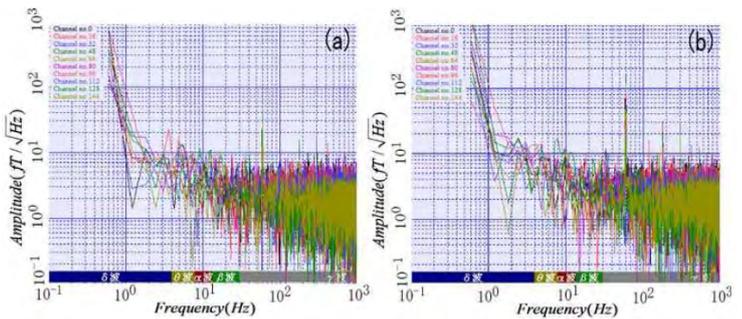
4. Applications in other fields

- MRI
- Low temperature science

Patent Licensing Available

Patent No.: WO2000/039513, WO2004/070296, WO2004/110269

JST/ IP Management & Licensing Group Phone: +81-3-5214-8486, E-mail: license@jst.go.jp



BEFORE HCS installation (b)AFTER HCS installation
Noise amplitude spectra of selected 10 channels of the system

Advantages:

- Helium consumption: reduced to 1/200 of conventional systems.
- Operation cost: less than 1/10 of conventional systems.
- Incremental noise: no noticeable noise added by HCS

This system is already commercialized by Frontier Technology Institute Inc. (JAPAN)