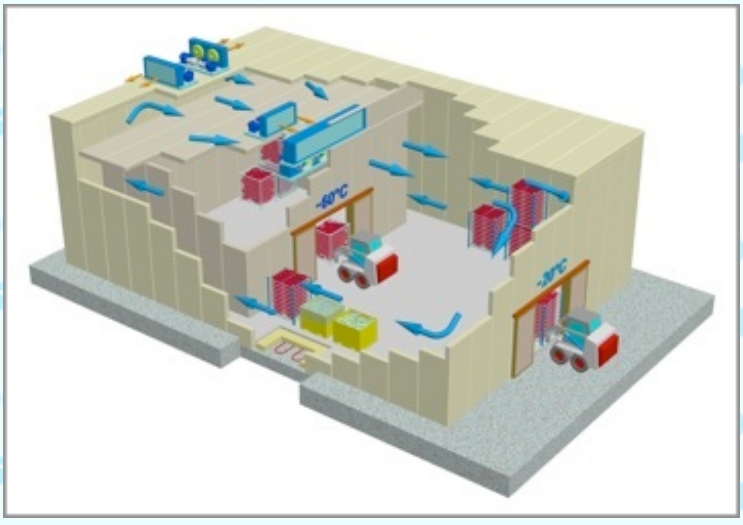
Room-in-Room
diy - facility to freeze and store tuna - diy

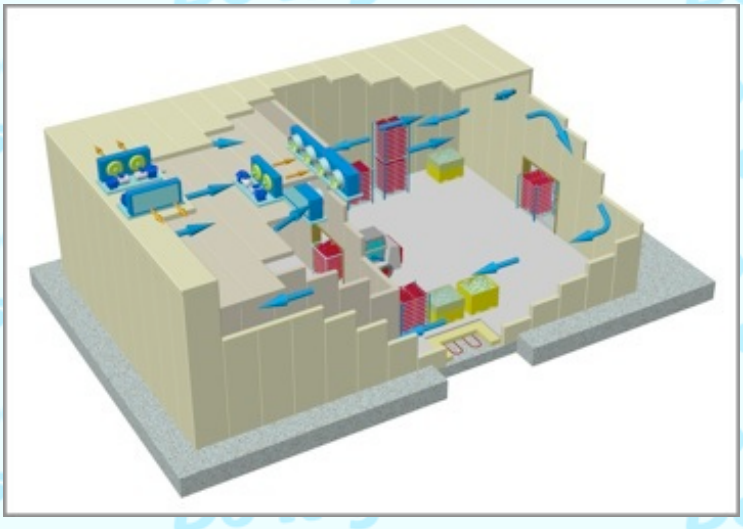
***Acrobat A4 Document**: two pages*
for Viewing (188 k, with background) and Printout (180 k, without background)

*Japanese cuisine looks back on centuries of traditional cooking. Sashimi-bars in Japan serve raw tuna as a delicacy—at high prices. The exotic taste is secured through sophisticated handling; fresh harvests of yellowfin and bluefin tuna are **frozen to -60°C and and kept at that temperature** until served. The facilities are complex—cascaded refrigerating systems using two different refrigerants—and expensive. Know-how and skill are required to install, operate and maintain these plants. Handling is costly, resulting in expensive products. Below is an economy concept for a facility that will do the job and be affordable in developing areas.*



***Picture 1 - Bird's Eye Cut-away View; seen from the entrance end** (hit the picture for enlargement)*

*A simplified **Room-in-Room Do-it-yourself Concept** for a facility to freeze and store tuna 'the Japanese way' is shown in two BECVs (bird's eye cut-away views, Pictures 1 & 2). Assuming an ambient temperature of +20°C, the temperature drop across the walls—from the ambient to the outer compartment (-20°C) and from there to the inner chamber (-60°C)—is in both cases 40°K. Hence, the same type and thickness of insulated wall panels and identical sliding doors can be applied for both enclosures. Sections removed from the wearing slab and floor insulation expose two return bends in the floor heating (red).*



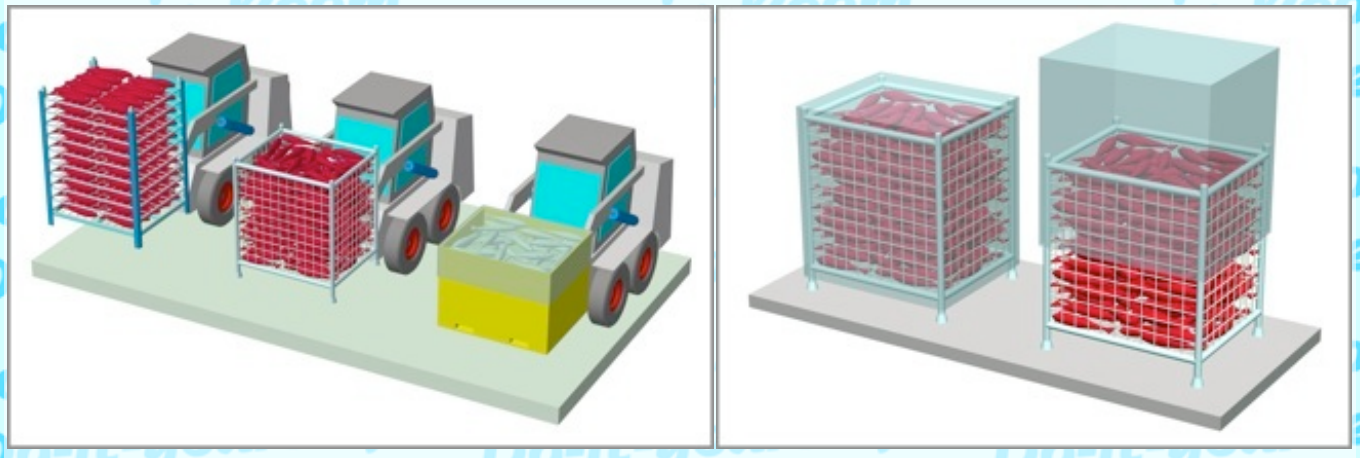
***Picture 2 - Bird's Eye Cut-away View; seen from the rear end** (hit the picture for enlargement)*

Blue arrows in the pictures indicate the air flow in the outer compartment; air leaving the air cooler is reflected from the front wall and returns through the goods. On its way back to the air cooler, the air is guided along the sides and back of the inner chamber, up to the ceiling. Air flow in the inner chamber is conventional.

Much like in the enclosures, selection of components for the two refrigerating systems—for the -20°C and -60°C areas—can be uniform to a great extent. The plants can employ identical compressors and operate with the same refrigerant. Auxiliary items, such as controls and safety devices, can be identical in both systems. However, two types of fans are required; one for the air coolers, the other for the air cooled condensers. The uniformity reduces the number of spares and simplifies service and maintenance.

The air cooler in the outer compartment is refrigerated with two air cooled condensing units, located on top of the outer enclosure. The air cooler in the inner chamber is refrigerated with one air cooled condensing unit located in the air returning to the air cooler for the outer compartment. Heat rejected from the inner chamber is brought onwards to the ambient through the refrigerating system for the outer compartment.

Tuna to be frozen is loaded on shelved racks, permitting all-around access for the cold air. The objective of the exercise is fast pre-cooling of incoming tuna, followed by immediate pulling of the latent heat. Frozen solid to the core, the tuna is stowed in baskets to reduce the storage volume and brought to the inner chamber for sub-cooling to -60°C and storage (Picture 3, left).



***Picture 3 - The Handling Equipment** (left) and **Protection against Dehydration** (right)*
(hit the pictures for enlargements)

The outer compartment can have a volume three to four times that of the inner chamber and serve as a general frozen storage to freeze and keep other goods. Two-speed fans on the air coolers and capacity controls on the compressors cater for 'freezing' and 'holding'. However, having reached desired core temperatures, unpacked goods—whether general products in the outer compartment or tuna in the inner chamber—tend to rime and dehydrate, with associated weight loss, when exposed to the intensive cooling effect during 'freezing'. To prevent this, air tight plastic bags, tailored to the size of the baskets, can be slipped over them (Picture 3, right).

*The **Room-in-Room Do-it-yourself Concept** above is an all-purpose plant for freezing and storing tuna and other marine harvests. It is simplified for easy and fast applications in developing areas. The facility can be built and operated with technical means, know-how and skills available locally in all developing communities along the sea shores, throughout the World. Drawings and specifications are provided on request.*