

Using containers reduces radiation strain

## Hazardous waste on air-cushion

Exact positioning saves graveyard

**VDI-N, Nürnberg, 14.4.89, MK**  
 - In the intermediate storage Gorleben of the society for storage of fuel-elements (BLG), they changed from vessels to containers. As this, dealing with atomic waste becomes easier and more economical. Furthermore at the same time the radiation strain of the employees working in this area is minimized. The air-cushion transport system specifically developed for that purpose can transport two of the biggest containers each up to 20t weight one on top of the other at the same time.

The vessel-deposit of the intermediate storage Gorleben of the society for storage of fuel elements (BLG) was equipped with a special air-cushion transport system for dealing with atomic waste also in new packages like containers and cast-vessels. Whereas up to now the vessels inclusively concrete shield were permitted 5t of weight at the most, the biggest of the six container types with a maximum of 28 vessels of the size of 200t, can have up to 20t weight.

There are six types of containers, which are hence stored intermediately one on the top of the other to save graveyard in Gorleben, with a maximum size of 3.20m length, 2.00m width and 1.70m height. They are made of concrete, steel-plates or casting. In order to deal with these loads and to transport them, the DELU GmbH in Nürnberg developed the new transport system. In this way, two of the heaviest containers (40t) can be transported one on top of the other to the storage place via „aircraft“.

By means of the mobility and the possibility of exact positioning of this transport system, graveyard is saved, as for example containers can be directly placed next to the other. The containers are positioned on I- or T-girders, so the air-cushion transporter is able to pick them up anytime.

The transporter is designed in such a way, that it glides unloaded on four small air-cushions and with imposed load up to 40t it glides on six big air-cushions.

The vehicle can cope gradients of up to 2.5% and can be driven remote controlled in all directions via a portable control panel. The vehicle is equipped with a hose reel with a pneumatic drive. The vehicle is connected to the 80m long compressed-air supply loop, by means of a 35m long hose which is wound on the hose reel.

Thereby the air-cushion vehicle can cover an area of 9,000m<sup>2</sup>. The unloaded transporter drives at 26m/min and with full load 20m/min. The speed can be infinitely controlled from zero by the portable control panel.

At the transporter there is an equipment for automatic lifting and positioning as well as for transport without or with the load of the load supports (I- or T-gridders). The transporter is automatically centered below the load. A proportional pneumatic control unit automatically controls each air-cushion element functional to the load and surface quality of the floor. When the automatic speed reduction applies under the condition load, driving curves or crosswise, it contributes to additional safety.

In addition to that, there is a programming equipment for wheel pressures, speeds and retardation of acceleration time of the vehicle, as well as an equipment for diagnosis of the pneumatic control unit.

The anti-collision warning-system, which works optical and acoustical, gives warnings in time when the transporter comes in the near of a deposited container. For example at a distance of 1.8m to the disturbing object, the optical alarm-system changes to green, at a distance of 1.0m to yellow and at 0.6m to red.

The additional automatic anti-collision unit designed as an emergency-stop, reacts against walls of the storage hall or other marked objects or areas.

The air-cushion transporter is driven and controlled by the mean of two friction drives which are 90° synchronized turnable. Two kinds of driving are possible. First the tank driving (joystick principle), with the drives parallel to the longitudinal axis of the vehicle. This makes driving forward, backward, curves and a turning radius of zero possible. Second, crosswise driving, left or right, with 90° turned friction drives. Pushing the emergency stop button on the portable control panel causes a stop of the vehicle. The braking distance at full load and maximum speed is about 0.25m. The vehicle is stopped through turning of the air-supply of the air-cushions, so the vehicle lowers down on the supports.

The air-supply consists of a full-automatic single-stage compressor with a power of 10m<sup>3</sup>/min, an air-tank with a volume of 10,000l, an air distribution-net made of acrylnitril-butandien-styrol (ABS-) tubes and of a 3x80m long air-supply-loop (air-track) type „Entra 50 DL“.



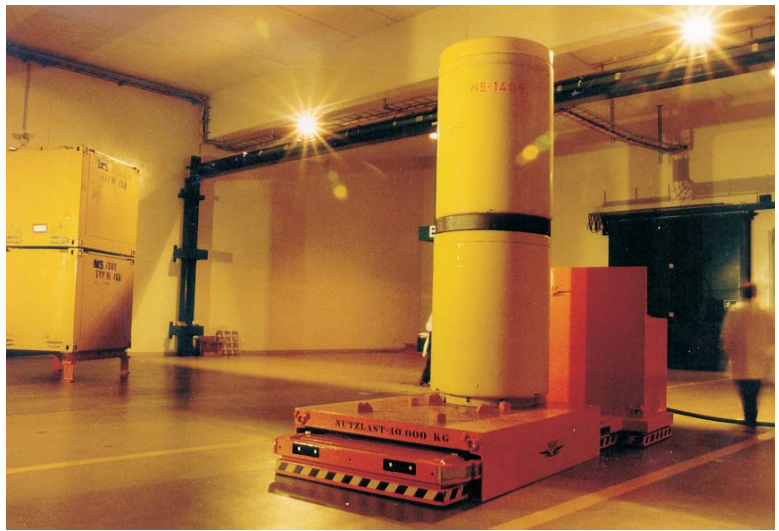
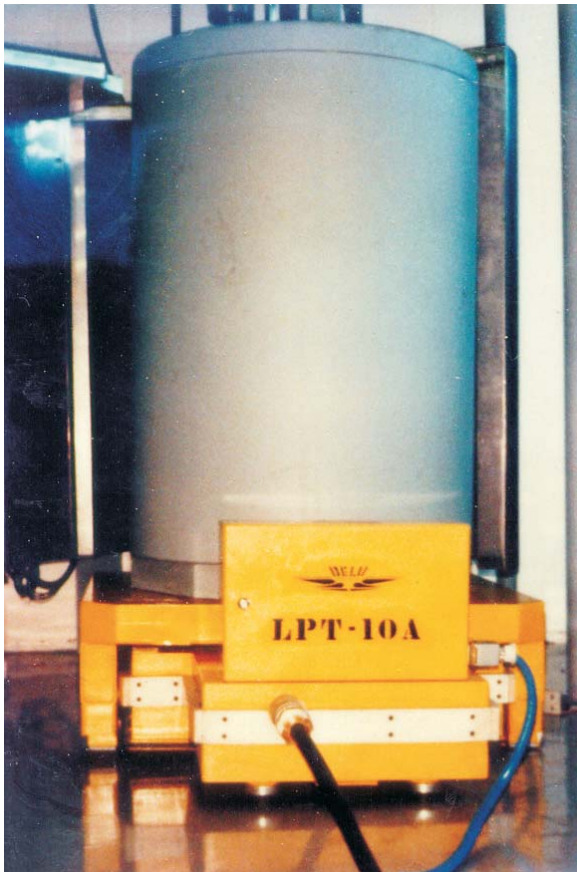
Top and bottom: Up to 40t moves this remote-controlled air-cushion transporter, which is special designed for the use in nuclear plants (BLG-Gorleben).



At the right picture you see the fixture for automatic centering below the load.



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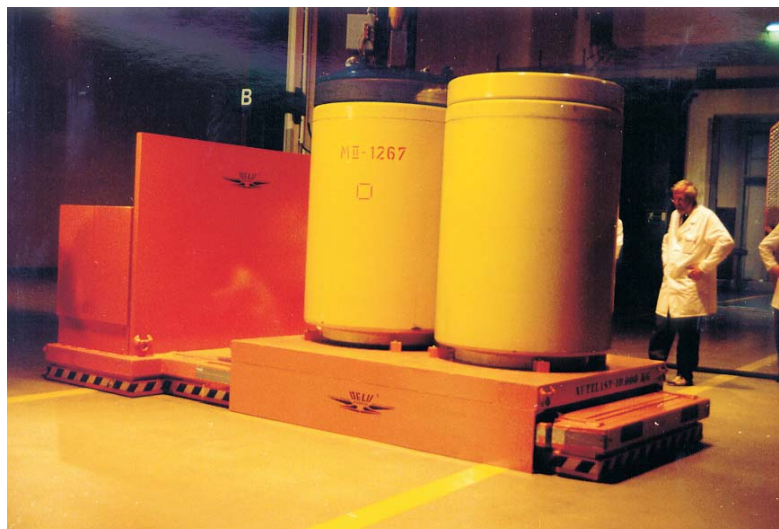


### Reference list of delivered transporters:

- BLG - society for storage of fuel-elements Gorleben
- nuclear power station Unterweser
- nuclear power station Neckarwestheim
- nuclear research centre Karlsruhe
- nuclear research centre Jülich
- Hahn Meitner Institut Berlin
- DESY Hamburg
- EWN - northern energy plants, Greifswald

### Feasability studies, evaluations and plannings:

- BLG - society for storage of fuel-elements Gorleben (fuel-elements-vessels, weight 1000kN)
- Preussen Elektra AG Hannover (container and cast-vessels, weight max. 400kN)
- DBE - german society for building and running of waste disposal sites.



The logo for DELU NÜRNBERG, featuring the company name in a stylized font with wings extending from the sides.

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