THE DOLLY & ADAPTOR PALLET CONCEPT
A concept supporting Lean production and Kanban

- Reduced handling costs
- Reduced turnaround time
- Optimization of space utilization
- Reduced stock
- Increased productivity

Getting the right things to the right place at the right time in the right quantity to achieve perfect work flow.
The material flow

The process at the supplier:

**Production**

At the production line the components will be packed directly into the plastic boxes (KLT’s*), which are placed on Dollies. The Dollies with KLT’s* are brought to the optimal ergonomic height by a "lifter".

* KLT= Klein LadungsTräger

**Milkrum**

The Dollies are coupled together in a train and transported back to an outbound shipping station by a "locomotive".

**Shipment - FIFO-Station**

The Dollies are parked in the outbound supermarket / FIFO-Station – sorted by types.
The material flow

The process at the supplier:

**Loading**

The Adapter Pallet is loaded with 4 Dollies.

**Transport**

.....and loaded on to the trailer with a fork lift truck.

The goods are transported to the customer.
The material flow

The process at the customer:

Shipments with truck

Unloading

The Adapter Pallets are delivered at the inbound warehouse of the customer.

The goods are unloaded and checked-in.
The material flow

The process at the customer:

"Ship-to-line" Supermarket  |  Milkrun  |  Assembly

The Dollies are unloaded from the Adapter Pallet and placed in the "Ship-to-line" Supermarket.

The Productionsline is feed by the Milkrun with Material / components on Dollies and KLT’s.

At the assembly line the material is taken directly out of the KLT for further manufacture. The Dollies with KLT’s are brought to the optimal ergonomic height by a "lifter".
The advantages of the concept

• **Improved work flow** - No need to reload the KLT’s

• **Ergonomic system**: No lifting – The dollies are rolled in and off the adaptor pallet

• The adaptor pallet is designed according to the EURO pallet standard size and **comply with automated conveyor systems**.

• **Better vehicle fill both ways** - Three loaded adaptor pallets can be stacked on the top of each other. 20 empty adapter pallets can be stacked on each other.

• **Easier internal handling and better truck utilization in return logistics**
  The dollies can easily and safely be stacked up to 18 units ≈ 2.3 m

• **Easy stacking** of the Dollies thanks to stacking ring system for the swiveling wheels

• **Strong construction** for long term handling

• **Versatile unit** - The Dolly can take both standard KLT’s (200x300, 300x400 and 400x600mm) and component trays

• **Secured load under transport**  The Dolly and Adaptor Pallet can be directly placed in the truck. The extra plastic lid secures the load.
The Dolly

- Ext. dimensions: 600 x 400 x 157 mm
- Net weight: ca. 6.5 kg
- Surf. treatment: Electroplated
- Payload: 200 / 250 kg
- Stackability: can be stacked to a height of 18 units ≈ 2.3 m
- Stability: Very good
- Adapted for handling in/with: "Supermarkets" and "Taxi trolleys"

- The Dolly can be equipped with the following types of wheels:
  - 100 mm nylon wheels
  - 100 mm black ESD rubber/hard plastic wheels
  - 100 mm grey rubber wheels

The K. Hartwall Standard Dolly is adjusted for the following standard boxes "VDA KLT’s*": 400 x 600, 400 x 300 und 300 x 200 mm + various types of component (Blister) trays.

The Dolly-construction is patented by K. Hartwall A/S.

* KLT=Klein LadungsTräger
The Dolly – Type I

External dimension: 600 x 400 mm
Wheels: 2 fixed and 2 swivel
Stackable: Yes – very safe and simple stacking
Working capacity: 250 kg with standard polyamid wheels
                 250 kg with antistatic wheels
                 200 kg with antistatic rubber wheels
Adapter pallet: Adjusted to K. Hartwall’s standard adapter pallet

- White polyamid wheel
- Black polyamid antistatic wheel
- Black antistatic rubber wheel
The Dolly – Type II

External dimension: 600 x 400 mm
Wheels: 4 swivel
Stackable: Yes – very safe and simple stacking
Working capacity:
- 250 kg with standard polyamid wheels
- 250 kg with antistatic wheels
- 200 kg with antistatic rubber wheels
Adapter pallet: Adjusted to K. Hartwall’s standard adapter pallet

- White polyamid wheel
- Black polyamid antistatic wheel
- Black antistatic rubber wheel
The Dolly – Type V

- External dimension: 604 x 404 mm
- Wheels: 4 swivel
- Stackable: Yes – very safe and simple stacking
- Working capacity: 250 kg with standard polyamid wheels
  250 kg with antistatic wheels
  200 kg with antistatic rubber wheels
- Adapter pallet: Adjusted to K. Hartwall’s standard adapter pallet

- White polyamid wheel
- Black polyamid antistatic wheel
- Black antistatic rubber wheel
The Dolly – Type VII

External dimension: 604 x 404 mm
Wheels: 2 fixed and 2 swivel
Stackable: Yes – very safe and simple stacking
Working capacity: 250 kg with standard polyamid wheels
  250 kg with antistatic wheels
  200 kg with antistatic rubber wheels
Adapter pallet: Adjusted to K. Hartwall’s standard adapter pallet
Special: With towing device for the coupling of more dollies in train

White polyamid wheel
Black polyamid antistatic wheel
Black antistatic rubber wheel
The Dolly – Type 800 x 600

<table>
<thead>
<tr>
<th>Specification</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>External dimension:</td>
<td>800 x 600 mm</td>
</tr>
<tr>
<td>Wheels:</td>
<td>2 fixed and 2 or 3 swivelling</td>
</tr>
<tr>
<td>Stackable:</td>
<td>Yes – very safe and simple stacking</td>
</tr>
<tr>
<td>Working capacity:</td>
<td>500 kg with standard polyamid wheels</td>
</tr>
<tr>
<td></td>
<td>500 kg with antistatic wheels</td>
</tr>
<tr>
<td></td>
<td>250 kg with antistatic rubber wheels</td>
</tr>
<tr>
<td>Adapter pallet:</td>
<td>Adjusted to K. Hartwall’s standard adapter pallet</td>
</tr>
<tr>
<td>Special:</td>
<td>With towing device for the coupling of more dollies in train</td>
</tr>
<tr>
<td></td>
<td>White polyamid wheel</td>
</tr>
<tr>
<td></td>
<td>Black polyamid antistatic wheel</td>
</tr>
<tr>
<td></td>
<td>Black antistatic rubber wheel</td>
</tr>
</tbody>
</table>
The Adaptor Pallet with brake system

- External dimensions: 1200 x 800 x 120 mm
- Net weight: 51 kg
- Payload: 1,000 kg
- Surface treatment: Electroplated
- Long side handling: Fork-lift
- Short side handling: Fork-lift, pallet truck/stacker and hand pallet truck
- Integrated brake system

The construction of the Adaptor Pallet is patented by K. Hartwall and covered by EU design protection.
The material flow

The alternative build-up of the Milkrun-train:

The build-up of the train supports the internal demand for the transport of both dollys as well as pallets and glitterbox units. It offers flexibility as it becomes possible to combine the transport of both wheeled and palletized units.
The material flow

The alternative build-up of the Milkrun-train:

The Shelf-Wagon:

This type of wagon is used for the transport of single box kanban units plus C-parts or "low runners" in KLT's.
The material flow

The alternative build-up of the Milkrun-train:

The Shelf-Wagon:

- Shelf-Wagon for KLT’s, standard boxes, and trays.
- Outside dimensions: 1000 x 725 x 1600 mm
- Castor combinations: 2 fixed and 2 swivelling
- Castor size: 125 or 160 mm
- Castor type: Polyamide, polyurethane or rubber.
- Payload: - 400 kg per unit
  - Max. 4 units in a train
- Accessories: - Handel
  - Towing device
  - Brake on the castors
The material flow

The alternative build-up of the Milkrun-train:

The ”Pallet/Gitterbox” Wagon:

This type of wagon is used for the transport of gitterboxes or pallets. Disadvantage: Handling equipment is still needed at the work station or decoupling is necessary.
The material flow

The alternative build-up of the Milkrun-train:

The "Pallet/Gitterbox" Wagon:

Wagon for pallets, gitterboxes, etc.

Outside dimensions: 1220 x 820 mm

Castor combinations:
- 2 fixed and 2 swivelling
- 2 fixed and 4 swivelling

Castor size: 125 or 160 mm

Castor type: Polyamide, polyurethane or rubber.

Payload:
- 1,000 kg per unit
- Max. 4 x 1,000 kg in a train

Accessories:
- Handel
- Towing device
- Brake on the castors
Customer references

Bosch (Diesel & Gasoline Systems + Automotive Electronics)
Blaupunkt (Car Audio Systems)
ZF Lenksysteme (Steering Racks)

The system is applicable to all other industries having large serial production and lean manufacturing for the assembly of their products like house hold appliances, electronic devices, etc.