

Air-cushion based pre- and final assembly for buses

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The demands of the market are playing an important role for the decision pro or contra introducing the air-cushion technology. Devices with an air-cushion gear can be used for a great range of transport and assembly tasks and due to their great advantages in comparison to conventional solutions they can help to configure the production more flexible.

The world-wide trend, which affects all industrial fields is the change from mass production to job lot production and special productions. Today companies have to operate more flexible on the global market, to be able to satisfy the requirements of their clients as fast as possible. For this reason, a lot of companies are searching very busy for appropriate solutions and also to realise them as fast as possible.

One of the solutions is the change from chain production (taylorism) to a more flexible stationary assembly by introducing teamwork together with moveable assembly equipment. This important change makes a flexible, order determined and simplified production necessary.

Before the responsible managers of Mercedes-Benz decided to introduce the air-cushion based bus-assembly in Turkey, they inspected similar existing facilities in railcar and aeroplane industry. Decisive for introducing an air-cushion based bus-production was, beside other factors, the great experience of the system-supplier in realising flexible and team orientated production facilities.

Together with employees of Mercedes-Benz, a very flexible and air-cushion based final assembly was planned and realised. The classical linear assembly process was replaced by a nearly stationary assembly, that means a combination of local and linear workstations. The production layout divides in four assembly centres for all individual works and a short chain production for all similar works like engine and axle assembly.

At this plant, with a capacity of 2000 buses per year (final phase 4000 buses per year) there are no fix installations



1: Remote controlled air-cushion transporter for buses



2: Air-cushion transporters for underfloor works



3: Air-cushion-device for the assembly of engines

such as overhead conveyors, cranes, conveyor belts or floor rails for transport or assembly equipment. These inflexible installations have been replaced by transporters on air-cushions (equipped with different lifting systems and assembly aids), like:

- radio remote controlled pallet transporters with air-cushion gear for the transport of buses (fig.1)
- air-cushion transporters for the high-stations (underfloor works) (fig.2),
- air-cushion assembly aids for assembly of windows, engines, front axles (rigid construction or single-wheel construction), rear axle and wheels (fig.3),
- air cushion devices for pre-assembly of axles and drive-unit (engine and gearbox).

These air-cushion devices are used for moving the coaches from the paint shop to the final assembly, at final assembly for movements between assembly stations and inline stations as well as for various assembly tasks.

The results were more ergonomic work conditions, a higher flexibility of the production process and a minimisation of future investments in cases of layout changes. Moreover, the air-cushion technology enables an unconventional production layout with up to 60% less required area. Due to that the total investment (construction and machinery) for the new plant was enormous reduced. Furthermore a significant increased productivity and also a reduced processing time is expected.

In order to secure optimal material transport, the stock of materials was integrated into the respective production areas. The material is provided close to each assembly stations. Teamwork is the most important aspect of the organisation.

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