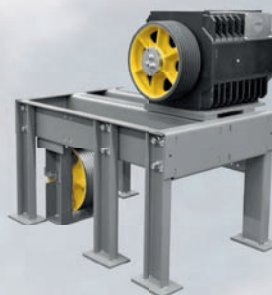


Internationale Fachzeitschrift für die Technologie  
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International Trade Magazine for the technology  
of Elevators and Escalators

● ● ● ● lift  
*report*



**LiftEquip**<sup>®</sup>  
ELEVATOR COMPONENTS

The elevator markets in Germany and many parts of Europe have a high number of existing installations, some of which are more than 25 years old. Due to the considerable age of these installations and safety-related considerations, as well as the need for necessary repairs and conversions, many of these installations have to be fundamentally renovated. It may also be necessary to modernize existing elevators as part of building renovation programmes and changes of use. In such cases, the installation is often completely replaced.

The market potential in terms of modernization is therefore significantly greater than for new installations which are either in planning or have already been fitted.

The majority of these installations still have a machine room, which it would then be advisable to keep in service, even in the case of modernization.

Modernizations which, without a compelling reason, forgo the continued use of an existing machine room, should therefore be carefully examined in order to check that measures in place for rescuing elevator passengers, maintenance and installation inspection are not encumbered as a result. Complete replacement with an MRL system is frequently proposed as a modernization solution when suppliers are not able to offer project-related and customized solutions.

Whenever a modernization is planned, it is therefore necessary to check the current situation regarding the installation in terms of up-to-dateness, by using the available drawings and technical documents (register), and to document the actual status with photographs.

Modernization concepts, the selection of components and schedules must always be coordinated in detail.

When installations are modernized, experience shows that noise behaviour in the building can change perceptibly in connection with changes made to the elevator.

It is therefore recommended that noise and passenger comfort should be measured before the conversion, in order for these measurements to then be used as comparison measurements after the modernization is completed.

Because the total amount of time and resources required for modernization is not limited only to the elevator components, the surrounding area should also be included in the examination during the planning stage.

The following general conditions should also be considered:

- ▶ Changes that affect structural aspects (ceiling loads, wall fastenings and pit stresses)
- ▶ Further usage of existing ceiling and wall openings

- ▶ Bracket fastenings (masonry situation)
- ▶ Shaft openings (position and size)
- ▶ Existing concrete foundations in machine room and pit (retain or remove)
- ▶ Dust-free conversion
- ▶ Access to the building during the conversion
- ▶ Transport paths in the building for the conversion
- ▶ ...

This means that, in the area surrounding the modernization, it must be possible to adapt the solutions and packages flexibly to the particular application conditions of the installation.

Some requirements that should be taken into consideration are detailed below. Some requirements may also arise in combination:

- ▶ Optimization of the elevator car size

With an elevator car that can be flexibly configured with integrated car sling for gauge reduction, the internal car area can be optimized, given the available shaft cross section. When doors with corresponding pad

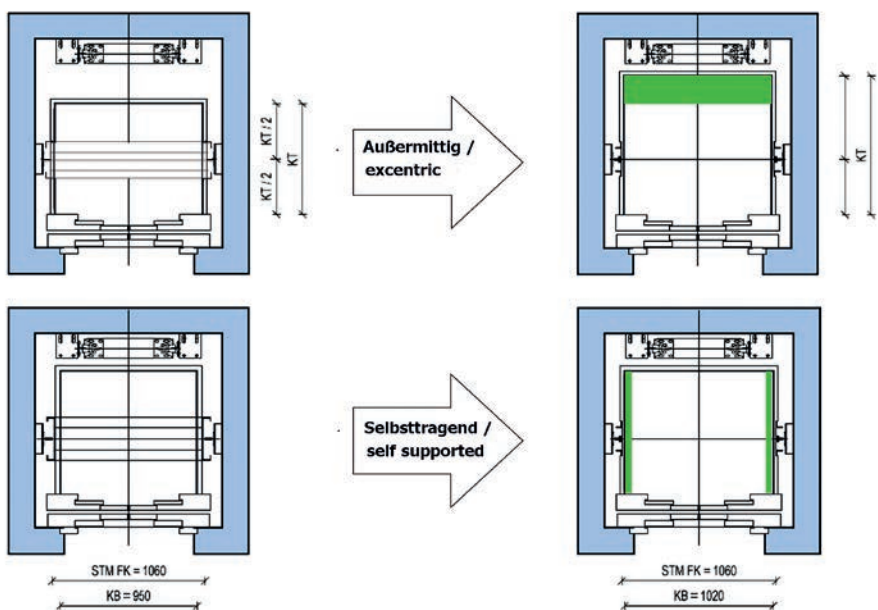


Figure 1: Shaft utilisation



Figure 2: Elevator car with integrated car sling and flexible dimensions

thicknesses and installation dimensions are also used, in many cases this optimization makes it possible to use a door with a width of 900 mm and a floor area which fulfil the requirements for a type of elevator that can be used by the disabled.

► Door openings

When the existing door openings on the floors can continue to be used as a result of appropriate planning, this means a considerable reduction in the additional measures taken by the customer. Old hinged-door frames can be retained and the sliding doors placed behind them. By paneling the frames, the closure to the masonry on the floor can then be made dust-free.



Figure 3: Panelled hinged-door frame with telescopic door

► Operating and indicator elements

On the landing, LOP, LIOP, LIP panels with integrated electrics for simple cabling to the control system can be fitted as desired on the door frame or the masonry as flat attachment elements with different button designs. The requirements of EN 81-70 are then also met.

► Gearless or geared

For the drive, a check must be made to see whether an existing gear with large traction sheave should be replaced by a gear with large traction sheave or whether a gearless system with 2:1 suspension and smaller traction sheave is used. In modernization, the use of a frequency con-



Figure 4: LIOP, LOP, LIP

verter is also state-of-the-art practice and energy-efficient solutions with power regeneration are used more frequently even in the lower range of performance. Machine base frames for adaptation to local conditions can also be supplied in many cases.

In terms of service and maintenance, both drive concepts are comparable, since brake manufacturers can alternatively also supply brakes with manual release for gearless brakes.

Gears can be placed either with an adapter onto the existing frame or onto the foundation. For using gearless drives in the machine room, corresponding solutions with an optional traction sheave cover are available.

All solutions are designed with appropriate insulation for sound-optimized installation.

When adjacent drives are replaced, solutions with a gearless system and traction sheave in the shaft are available, which are placed in the wall opening.



Figure 5: ModKit with PMC 170



Figure 6: DAF210 with adaptation to TW63 frame with rope guard



Figure 7: DAF270 with adaptation to TW130 frame with rope guard

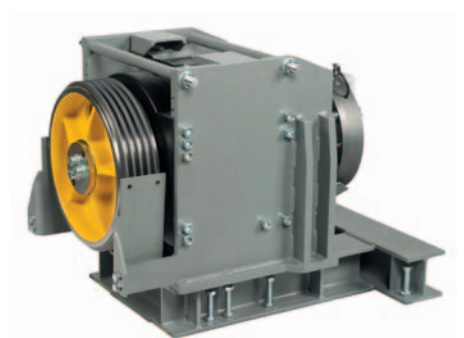


Figure 8: DAF210 as a replacement for lower

► Drum drive as a special solution

Where space is very restricted, the solution with a drum drive is a possible alternative to the hydraulic or traction sheave elevator. EN 81-1 also describes the standard requirements for drum-drive elevators. Worm gears are generally used for the drive, while the use of gearless drives is limited in terms of rated load due to the required diameter of the traction sheave.





Figure 9: DAF270 with traction sheave in the shaft

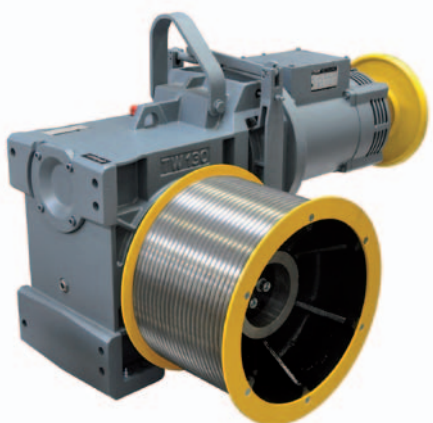


Figure 10: Drum drive with gear TW130

► Installation part replacement

When replacing parts, a check must be made to see whether components such as rails, brackets and the counterweight can, in fact, be used again. If they can, a considerable amount of installation time and effort, using dowels and transporting material, can be avoided. As a result, it may also be possible to reduce the length of time required for the conversion.

► Modular modernization

Based on an overall concept for the modernization, it is possible to implement the measures in several steps, when this is not possible in one step for budgetary reasons, for example. It is then ensured that, on completion of the entire modernization, the installation features state-of-the-art technology and no unnecessary costs are incurred through repeatedly replacing components.

► Energy efficiency

Depending of the type of use (number of runs, equipment, etc.), the focus must be placed on reducing either the travelling requirement or the standby requirement. In VDI 4707 Part 2, the process has now been defined as to how, using component characteristic values, an energy efficiency analysis can be carried out even as part of the modernization planning (forecast tool).

► Structural aspects

When the loads on an installation are increased, a change in or recalculation of the statics is always necessary. In many cases, one solution here can be to distribute the loading onto the shaft ceiling via a load distribution beam. This measure can also be helpful on occasions when, because of the installation situation, new ceiling openings have to be created. The drives are protected from vibration when placed on these beams.

To further optimise the noise situation, it may be advisable in certain cases to also provide additional anti-vibrating elements underneath the beams. In this case, the rubber-metal connections should be designed accordingly.

When individual components are replaced, all components to be changed and the different effects on the overall system during replacement must be assessed.

► UCM (unintended car movement)

As part of a modernization operation, a check must always be made to see what measures must be implemented in relation to the requirements according to A3. Replacing a drive always makes it necessary to carry out an assessment according to EN 81-1:A3 (UCM) and implement the necessary measures. In this

case, comprehensive planning is required, which, in many cases, should be combined with simultaneous replacement of the control system, since the majority of control system developers offer A3 functionality as a pre-integrated feature in their current control systems. The solution is often easier to implement than networking the different components with additional detection systems. When a control system is later replaced, these components may no longer be required.

When implementing the requirements of A3, it may be easier to forgo a levelling operation with early-opening doors and demonstrate via rope elongation that, due to the buffering during loading, relevelling is not necessary. In this case, it is sufficient if the installation is securely stopped at the landing via a safety brake, as found on the gearless system in the form of an operational

brake, or via an emergency brake system (NBS) on the gear.

### Summary

In Germany and in parts of Europe, the market volume in terms of modernization is significantly greater than the market for new installations.

Types of modernization may turn out to be very different according to the local situation and the particular supplier.

Approaches to modernization range from the typical replacement of individual components to modular and scalable replacement solutions, through to the complete replacement of the entire elevator system.

All these solution options should be viewed in terms of a project in order for a solution to be found, on the basis of a technical and economic assessment, that is customized to the requirements of both customer and operator.

In the process, flexibly adjusted car dimensions can be assessed for optimum space utilisation.

In the report, the different concepts will also be assessed on the basis of examples, in order for a technical and economic assessment of the solution options to be made.

In the view of the operators and in respect of safety for servicing personnel, continuing to use existing machine rooms is to be preferred, provided that this space is not otherwise required for reasons of building use (e.g. addition).

In existing installations, headrooms and shaft pits are generally sufficiently large, so that measures for temporary safety spaces are not necessary.

A special application where space is restricted may take the form of a solution with a drum drive.

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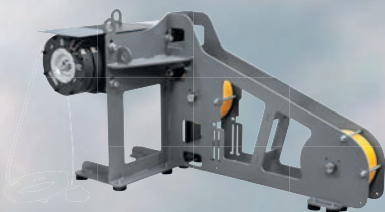
**Mit uns hoch hinaus!**  
**We lift you up to new heights!**



Trommelantrieb - Drum drive



DAF210



ModKit PMC170



DAF270

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**Modernization with Gearless Machines**

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