



J.A. Becker & Söhne



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1 Company profile J.A. Becker & Söhne GmbH & Co.KG



The company J.A. Becker & Söhne (JAB) was founded in 1897 and is situated in Neckarsulm (Germany). Up to this day, JAB is a family-managed manufacturer of electro-hydraulic in-ground lifting technology employing 160 people. As we do not have any subsidiaries, all the development, engineering and production of our lifts is done in Neckarsulm.

This is not only the best way to assure the high quality of our products, it does also enable us to offer the highest possible flexibility regarding customized solutions and developments (whenever changes are necessary or special request come up).

Being the eldest, still existing manufacturer of lifting technology in whole Europe, the product range of today is the result of a steady and continuous developed and adjusting throughout the last decades.



Today's product range comprises electro-hydraulic lifting equipment for all demands with a lifting capacity from 3.000 to 40.000 kg per ram.



2 JAB electro-hydraulic-lifting technology

As lifting-technology belongs to the field of investments goods, the products are meant to work properly and reliable over a long period of time (several decades). From the perspective of an investor/costumer, a lifting system is a profit centre with the aims:

- ✓ **To increase the turnover and generate profit by decreasing the processing-throughput time, while offering best-possible working-conditions to its employees**
- ✓ **To amortise these investments in the shortest possible time**
- ✓ **To assure the availability of the trams/metros/bogies**
- ✓ **To be able to set up a trouble free reliable planning**
- ✓ **Offer ergonomic and safe working conditions to the employees**

To achieve these aims, investment costs cannot only be evaluated and judged with a regard to the prime- asset costs but a consideration of all incurring costs during the whole life cycle and of course the “life expectancy”, availability and reliability of the lifting system itself has to be taken into consideration.

A lifting system, based on electro-hydraulic technique is the alternative, offering the lowest life cycle costs, lowest time of non-use and highest durability due to the facts that:

- ✓ The prime costs for an electro-hydraulic lift is equal to the prime costs of an electro-mechanic lift
- ✓ The only wearing parts necessary are seals and accessories.
- ✓ No expensive parts like worm shafts, bearings nut etc. required
- ✓ Hardly any down time occurred by the change of wearing parts
- ✓ No need of storing expensive spare parts which would lead to high capital lockup and reduced liquidity
- ✓ Less energy consumption



- ✓ Annual maintenance is done within a few hours, as all components are easily accessible
- ✓ In case of a power cut e.g, the emergency lowering is quickly and easily accessible from above

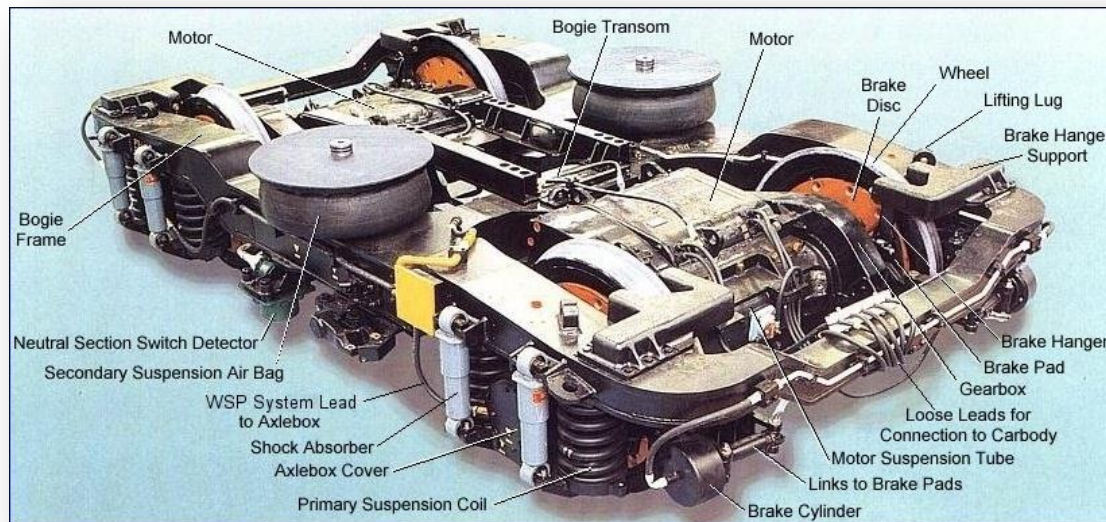
Further advantages:

- ✓ The lifespan of JAB lifting systems is designed for a minimum of 20 years. In accordance with proper maintenance and product-monitoring, a significant increase of the lifespan is realistic.
- ✓ All components used for our bogie- and metro/train lifting systems are serial components which are proved over the last decades in thousands of lifting units all over the world.
- ✓ All components are located in-ground in a safe environment
- ✓ If wanted wireless, remote diagnosis from JAB (in Germany) is possible
- ✓ Due to the above mentioned reasons, a growing, trans-European trend to hydraulic lifting systems in the last few years.

Well-known companies like “Wiener Linien” in Vienna (Austria) or Mercedes- Evobus (Germany) replaced their electro-mechanical lifting units with hydraulic lifting units due to the above mentioned reasons. (Of course a visit to these references and a conversation with the operators can be arranged)



3 Boogie lifters



The bogie is the centrepiece of every rail vehicle where not only the wheels, brakes and suspensions, but also the complex drive train is situated. The unrestricted accessibility to all components which enable the quick and trouble-free maintenance is absolutely essential.

Sophisticated and reliable equipment specially customized and adjusted to local conditions and procedures form the basic foundation of the whole service- planning. Due to these facts, JAB has developed and manufactured a great variety of different bogie-lifting-systems for our customers all around the world during the last decades.

- Always focused on our customer and precisely adjusted to local conditions -

Various many-faced factors influence the specific technical design of the bogie-lift. The three main criteria are:

- ✓ **Number and different types of bogies**
- ✓ **Planned Work (Replacement of wheels, brakes, motor etc.)**
- ✓ **Local situation (ceiling, foundation, heigh ground water)**



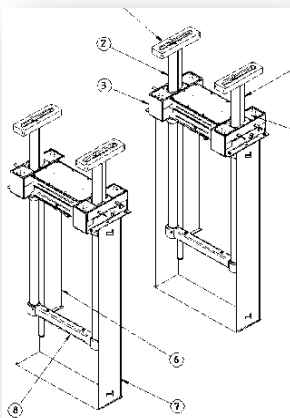
3.1 Lifting the bogie on the wheels

By lifting the bogie on its wheels, these types of lifts offer a great accessibility to all areas of the bogie (especially the underside).



a.) This lift is created and highly recommendable for depots where only one type of bogie, or better said boogies with equal gauge and axial distances are maintained. Due to its four single wheel-pick-ups, this type of lift is installed in a separate workshop, without a connection to the rail. As it is completely flush mounted, the workshop area can be used for other purposes if the lift is not in use. In lifted position, all gaps are closed by automatic bottom levelling device.

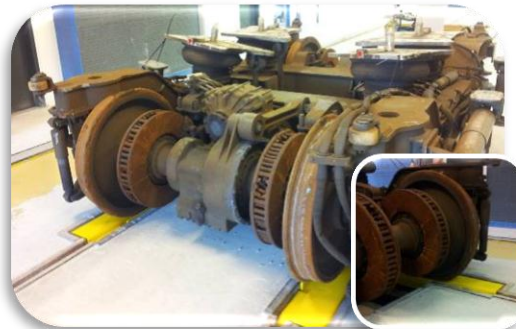
As this bogie lift consists of two individual 2-ram lifts, the axial distance of the lift can easily be adapted to the customer's boogie fleet.



- ✓ Lifting capacity: 6.000 kg
- ✓ Lifting height: 1.880 mm
- ✓ Lifting time: 30 s
- ✓ Two individual, redundant lifting units
- ✓ Synchronised through measuring system and PLC
- ✓ All forces are lead into the base plate

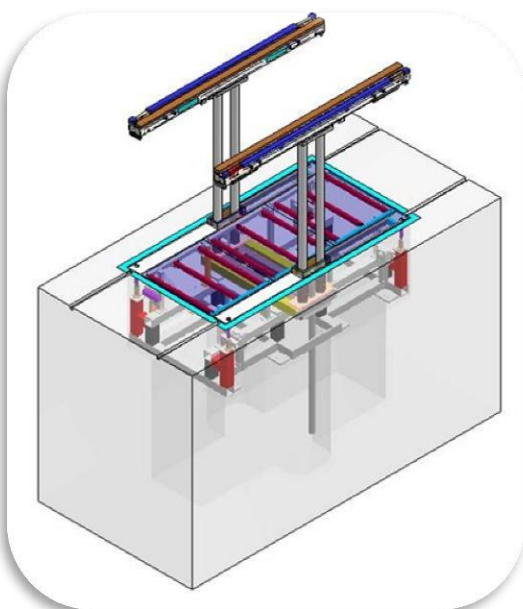


b.) With its special head pieces, basically consisting of two 3 m long rail-profiles, this lift offers highest flexibility and is able to cope with a wide range of axial distances. It can be integrated perfectly into the depot rail-track.



Each sole bar is equipped with two roll-off-devices. To assure highest possible safety, the roll-off-devices are monitored by integrated sensors.

In lifted position, all gaps are automatically closed by a pneumatic levelling device.



The synchronisation and redundancy of the left and right pistons is assured by a mechanical connection.

For best working conditions, the lift (rail profiles) is available with integrated illumination on demand.

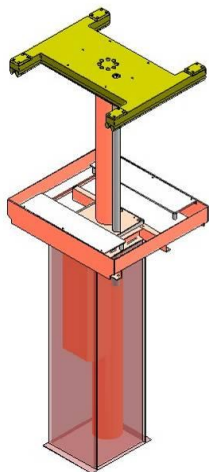
- ✓ Lifting capacity: 8.000 kg
- ✓ Lifting height: 1.800 mm
- ✓ Lifting time: 120 s



3.2 Lifting the bogie on pick-up points/ the frame

c.) This type of bogie-lifting-system is equipped with a rigid head piece, specially adjusted to the customers` bogie fleet. As the head piece is fully recessed in lowest position, the workspace can be used for other applications.

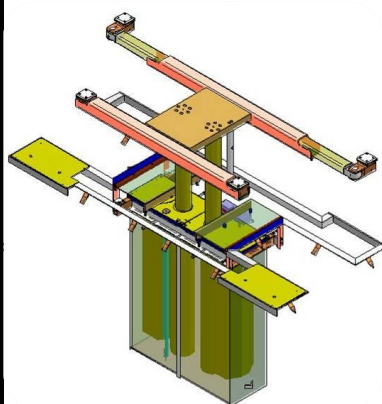
This lift enables free accessibility to all parts of the boogies and offers free access to the wheels and brakes. This makes it a great choice for maintenance, repair and service work.



- ✓ Lifting capacity: 8.000 kg
- ✓ Lifting height: 1.800 mm
- ✓ Lifting time: 120 s

d.) This telescopic lift only requires an installation depth of approx. 1.300 mm.

Due to its construction with a head piece and the pluggable pick ups, this bogie lift is designed to lift a great variety of different types of bogies. Designed for the wheel-free lifting and flush mounted, this bogie-lift is a real allrounder.



- ✓ Lifting capacity: 6.000 kg
- ✓ Lifting height: 1.500 mm
- ✓ Lifting time: 35

The shown bogie lifting systems are only an extract of the variety of bogie lifts we have already delivered. Also execution for special use e.g. washing area, spray-cabin, explosion-proofed is available on demand.



4 Lifting systems for lifting complete trams on the body

As the bogie contains the drive train, where the key-components are situated, its service, maintenance and repair is the crucial assignment of every tram depot.

The service and repair itself is normally done in an adjoining workshop. To guaranty a good workflow and safe working conditions, reliable equipment for this work step is crucial.

A solution offering a good workflow and working-conditions is a lifting system integrated in- or mounted next to a pit, where complete trams can be lifted on the body.



-Reference: RET Rotterdam (Netherlands)-

To guarantee a fast pass-through-time and height availability of the trams, it is the main challenge of every depot to reduce the downtime to a minimum. With this lifting solution, the tram is ready-to-use within a short time. Following steps have to be done:

- ✓ Tram is located above the pit
- ✓ Bogies get disconnected
- ✓ Tram is lifted
- ✓ Bogies are moved on rails to the adjacent workshop for repair and maintenance
- ✓ New boogies are re-move below the lifted tram
- ✓ The tram is lowered again
- ✓ The new bogies get connected
- ✓ Train is ready to go on track again



JAB lifting systems for rail-vehicles are constructed and designed project-related. The lifting system can be mounted and adjusted directly next to an existing pit. As shown on the pictures below, the lift is completely flush mounted and covered. Only while the lift is in use, the grating is automatically opened and the rams are raised.

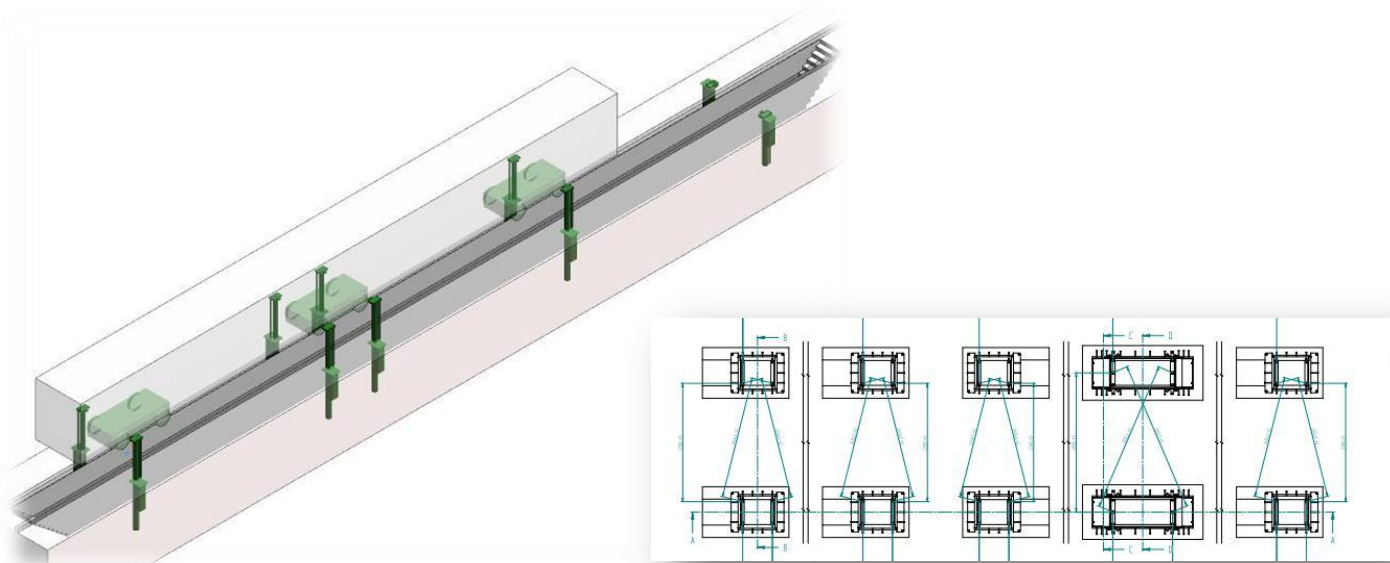


For this project the lifting units have directly been mounted on the bottom of a working pit.





Depending on the different tram models (different chassis pick-up points), the lifting-system is also available with moveable lifting columns. Based on the total pick-up points of all different trams-models, JAB works out the best solution; deciding which rams have to be moveable and which moving-range is required.



Exemplary view of customized lifting – system with stationary and moveable body-wok lifting units

On demand the rams can also be mounted on top of a rail, fixed on the bottom of the pit, so that it can be moved by hand or electromotivly-driven.



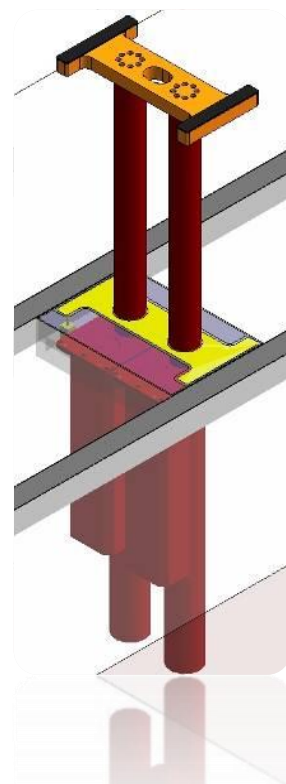
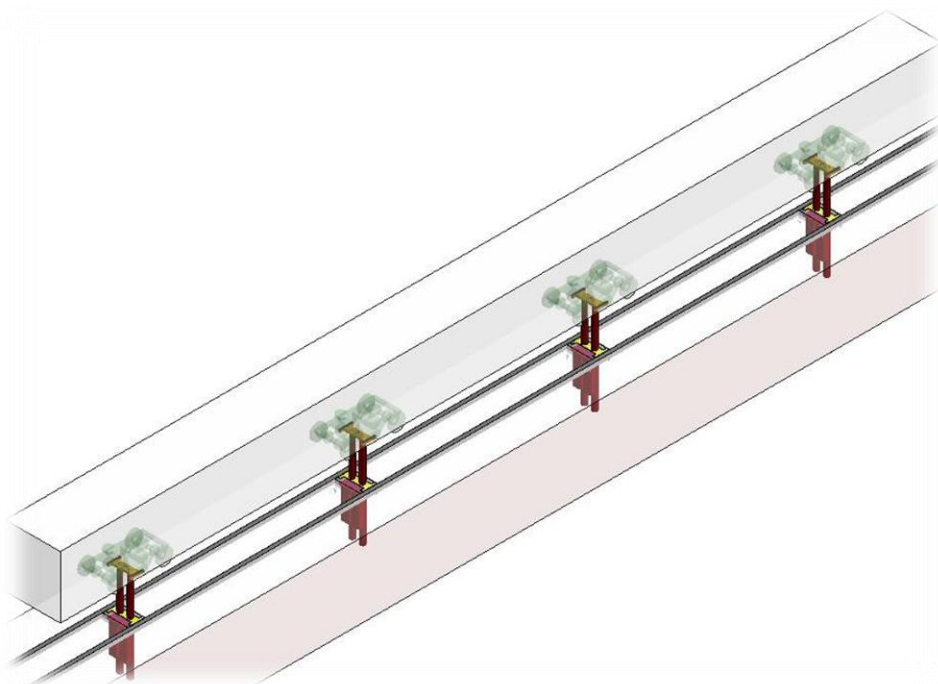
5 Lifting systems for lifting complete trams on the bogie

Both depot-structure and repair- and maintenance processes are different in every depot. If the maintenance and repair-work of complete trams- and of course their bogies- is directly done “on spot”, a lifting system picking up the train on its bogies is the perfect choice for best possible working conditions. Not only best accessibility to all components and flexibility regarding the ergonomic working conditions, but also best possible illumination and space is reached. As free- access is guaranteed; all necessary tools can comfortably be placed next to the workers. All works can be done comfortably and quick.





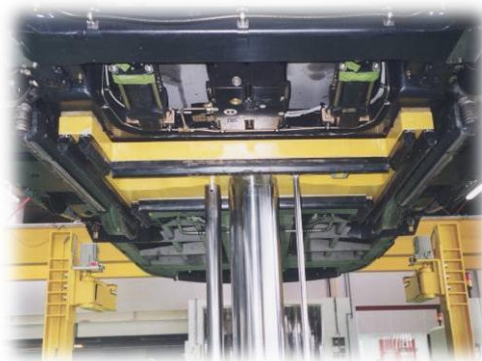
These kind of lifting systems, picking up the tram by the bogies and are a succession of several (depending on the length of the tram) single lifting units which are electronically synchronised to each other.



Every lifting unit consists of two hydraulic cylinders and one head-plate. The head-plate is designed with a special cut-out, to provide access to the central bolt of the bogie. As the head-plate is screwed to both of the cylinders, it is a mechanical synchronization and assuring the redundant security. Due to its design, these lifting units offer great access to all components, wirings and lanes and unproblematic changing of the wheels is possible. The fully recessed execution with automatic bottom levelling device makes it completely disappear while the lift is not in use. The construction with two round rams offer best possible closeness against water and dirt and guarantees the durability of JAB lifting-systems.



To increase the range of application of JAB bogie-lifting-systems, a combination of a lifting system and stationary columns is also possible.



The tram is lifted via the bogie and is set down on the lifting columns. Every lifting column is equipped with a swivelling arm. If required, the bogie can be disconnected easily, can be lowered via the bogie lifters and new bogies can be mounted while the tram is held by the side lifters.



6 Combined lifting systems for complete trains/trams

The high-end solution, offering both, a bogie-lifting-system and a body-lifting system in combination, is the JAB Giant-lift, specially engineered for the “Wiener Linien” (Vienna-Austria).



With its modular design, every GIANT consist of seven segments. Every segment comprises 4 track lifts, two (or four) moveable body lifting units and is controlled by an individual slave-control-unit. As a whole, each GIANT consist of 44 single rams, 7 Slave Control-units, 1 master control unit, 1 individually designed touch-screen panel, roof-working spaces and spans over a length of more than 40 m, offering a total lifting capacity of more than 150.000 kg

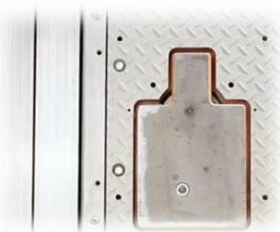


This bogie-lifting system is composed of seven single lifting units which can individually be combined to each other. Due to a synchronisation accuracy of only 4 mm, all kind of trams can safely be lifted. In lowered position, the rack-lift is completely flush-mounted. To close all gaps, the track lifting system is equipped with a mechanical bottom levelling device. Within each track-lifting segment, the synchronisation and redundancy is assured by a combined programm-controlled and mechanical solution (differential gear).



For best and safest working conditions, every track-segment is equipped with illumination, power-outlets, roll-off-devices and special safety strips.

The body lifting system consists of eight (electromotive) flush-mounted moveable side lifters. With this solution a great variety of different trams with different length and pick-up points can be lifted.



To assure that all gaps are closed at any time, the body lifting system is equipped with an aluminium-segment-cover with a capacity of 5 tons wheel-load. The sliding head-plate is equipped with a sensor, ensuring that it is always in the correct position.

The redundant security of every single lifting unit is assured by an additional safety bar with a mechanical locking by ledge. The synchronisation within a range of 4 mm among the body-lifting units is guaranteed through electronical synchronisation by volume.



The combination of the bogie- and side-lifter is the most flexibly solution for all kind of maintenance, service- and repair work of tramways and streetcars, ensuring best through-put time and excellent working conditions.



Due to its design and the complemented additional roof-working-stations, a maximum productivity with a minimum space requirement is achieved.

All shown lifting systems are only an extract of the great variety of lifts we have already delivered. They all meet the latest requirements and standards. As the rail-vehicle-lifting-systems and the required redundancy and synchronisation (EN 1493) is individually realized in every project, we are looking forward to explain it in detail.

- ✓ Weather your depot is a new construction or a modernization of an existing Depot -we work out a solution maximizing the utility of the lifting system-
- ✓ Upon request we are happy to outline different lifting solutions for your project

JAB lifts

Hydraulic universal and special lifts with a lifting capacity of up to 140.000 kg for cars, trucks, busses and for tracked and tramway vehicles. The JAB Product program includes all elements of 1-, 2-, 3-, 4- and multiple ram inground lifts.

JAB-Special equipment

Hydraulic lifting systems for plant engineering, production facilities and installation devices.

JAB compressors

Low-, medium- and high-pressure compressors for workshops, garages, industrial facilities and the energy industry, ranging from 10 to 350 bar; special filling equipment for breathing apparatus for professional use, pressure tanks up to 200 bar, compressed air cold driers, oil and water separation.



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