

MAINTENANCE-FREE INDUCTIVE COMPONENTS

BÄCHLI

BÄCHLI IS A SWISS TECH COMPANY THAT SPECIALISES IN THE DEVELOPMENT AND PRODUCTION OF ELECTROTECHNICAL COMPONENTS. THE COMPANY'S RANGE OF PRODUCTS COMPRISES HIGHLY SPECIALISED TRANSFORMERS, CHOKES AND WINDING PRODUCTS OF ALL KINDS THAT ARE USED IN DIFFERING INDUSTRIAL PRODUCTS AND ESPECIALLY IN THE RAIL SECTOR.

The specialists from Bächli make their expertise available to their customers over the entire product life-cycle and ensure that Bächli makes a sustainable and decisive contribution to the success of its customers.

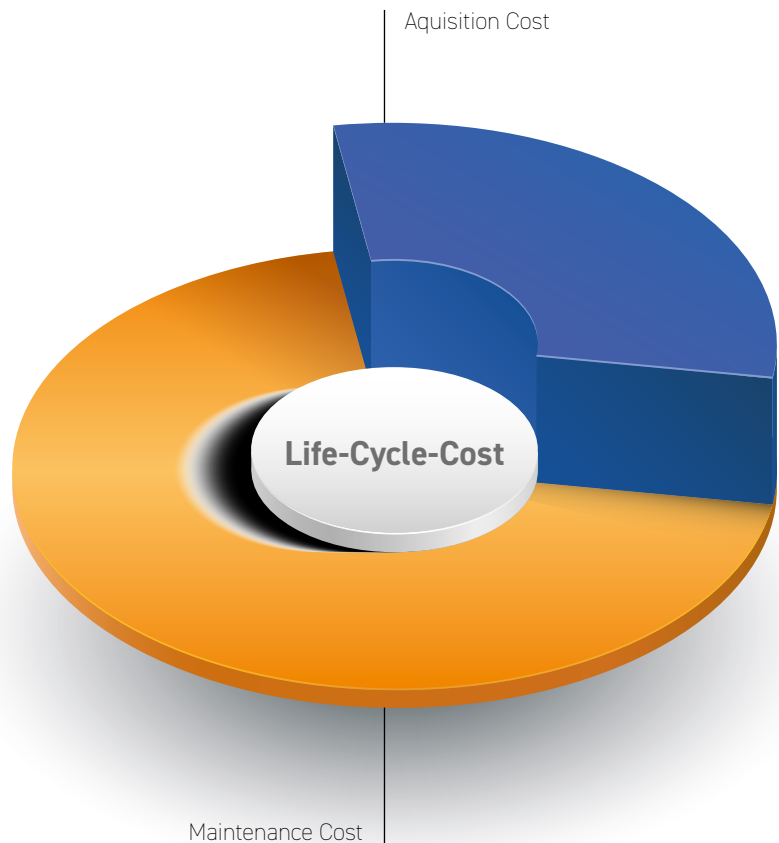
In years of close cooperation with customers is the need for Maintenance-free inductive components always has been an issue. This is the reason why bächli has developed a wide range of theoretical and practical knowledge in this field.

Maintenance costs

If we look at the costs of a normal regional train over its entire life cycle, the following can be said in general terms. The cost of maintaining this regional train is 2 to 3 times the cost of purchasing it. The average lifetime of passenger trains is generally 30 years.

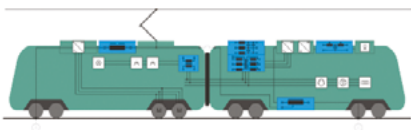
Low maintenance costs are therefore an important selling point for train manufacturers. Train manufacturers have to take responsibility for their suppliers with regard to the availability of spare parts and maintenance regulations.

As a supplier, we therefore also have a responsibility to develop and manufacture safe and low-maintenance transformers and reactors. Ideally, our components should even be maintenance-free.



Inductive Components

Our inductive components (transformers and reactors) are among the main technical components that ensure the safe operation of a train. They are used in the main circuit and in auxiliary circuits. In the main circuits, they are line chokes for DC networks and resonance chokes for AC networks. HBU transformers, isolating transformers and sinusoidal filters are used for the auxiliary circuits.



component which wasn't capsuled

The transformers and reactors are resting components, which means that they have no moving parts that can wear out. Due to their robust construction, these components require very little maintenance. Maintenance essentially consists of cleaning the insulation and checking the insulation electrically. To put it bluntly, you build the transformer into the box and then you can forget about this transformer. It will do its job reliably for a long time.

Electrical Insulation

The weak point of an inductive component is its electrical insulation. This usually consists of polymer material or organic materials with long chain molecules. Over time, these materials age, i.e. the long molecules are broken up by changing dielectric and thermal stresses. Here, too, the technical development is very advanced and the polymer materials have much more stable properties than 20 years ago. Organic substances such as oils or impregnated substances are hardly or no longer used. Today, very high demands are also placed on these materials due to fire protection. This includes not only the fire resistance but also the toxicity of the combustion gases of the respective insulating material.



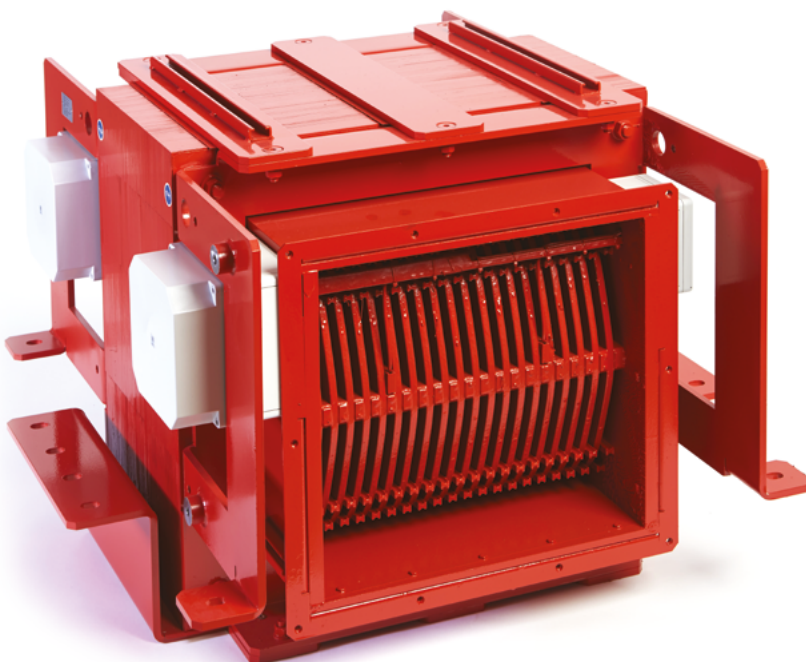
component which wasn't capsuled

Contamination of the components

The components are exposed to many influences during operation or use on a train. As a result, the components are exposed to a very high level of pollution, which varies from region to region. This pollution includes brake dust, coal dust (e.g. from the pantograph) and, above all, salt spray near the coast. These deposits are caused by moisture (water); dielectric and thermal influences become aggressive substances and can lead to material decomposition processes at the components.

Therefore, one of the most important and costly maintenance tasks is the cleaning of the components or the complete train.

To remove the losses, the transformers and reactors are cooled with air from the outside. As a result, a great deal of dirt gets into the cooling channels of the windings despite filtering. Over time, the channels become clogged and the decomposition processes described above occur. The cooling components must also be thoroughly cleaned at regular intervals.



Example of a Bächli component in a box.

VISIT
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01.10.2019 – 02.10.2019
Berlin - Germany

Deliberation

When designing transformers and reactors, there is always a compromise between weight, size, power dissipation and, of course, price. Usually there is no space available and the weight must always be carried along. With the same power, it is physically the case that small devices always have high losses and larger devices tend to have lower losses.

Renowned customers rely on the proven expertise offered by the specialists from Bächli. Bächli forms close corporations with its customers to develop innovative solutions with exceptional performance characteristics that make a significant and sustainable contribution to their success. It's the customer's choice which criteria they weigh. The components will be designed from the Bächli engineers for the tailor-made solutions for this customer needs, so the customer has the best possible product.

Additionally to that, the products of Bächli are designed in such a way that the insulation is completely protected against contamination, the maintenance effort and costs are reduced. This means a complete encapsulation of the device. As you can see in the following picture.

But the encapsulation makes it much more difficult to dissipate the heat loss. Here it is now necessary to use highly efficient materials and low-loss designs, so that the components are not significantly larger and heavier than a forced-cooled component. The knowledge of designing the components in this way is part of the daily work

of the Bächli engineers. We have already worked on many successful projects in this regard.

The complete encapsulation of the insulation eliminates the need for time-consuming cleaning and reduces maintenance to a minimum. This not only reduces the maintenance and cleaning intervals to a minimum, but also the operating costs of our inductive components. And because there are a main part of the technical components of a train, there is the chance to save a lot of energy costs.

Solution of the company Bächli AG

Profitability and energy efficiency are becoming more and more important. The political debate on climate change and the associated CO₂ impetus is being conducted on a daily basis.

For these reasons we as Bächli AG rely on our program **SMART E POWER®**

This means that we use highly efficient materials such as grain-oriented ARMCO sheet metal. We use low-loss constructions such as UNICORE cores.

We thus combine a maintenance-free solution with an energy-efficient solution.

In our eyes, energy efficiency means **protecting natural resources**. And in the same time it is a key goal is to **minimize power consumption** many times, so as to **reduce the operating costs** incurred or keep it low. Of course, that also contributes a lot to the **protection of our environment**.

Advantages for the customer through cooperation with the Bächli AG

The Bächli company works over 44 years in the field of transformer development and has its one production in Switzerland.

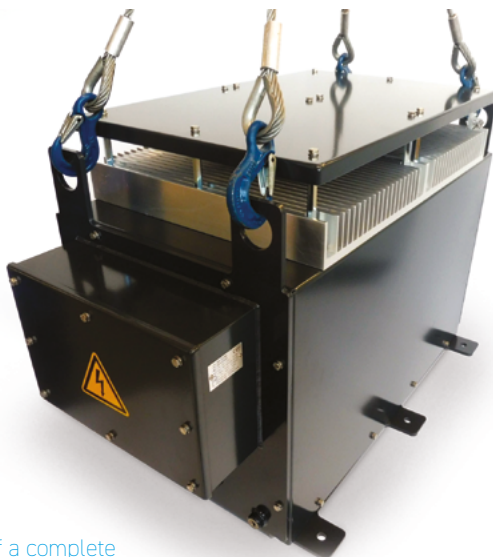
Over the past few years Bächli built a very professional cooperation to its customers in the field of rail vehicles. Especially the discussions from engineering (customer) to engineering (Bächli) are technically deep and absolutely solution-oriented. This results in solutions specially tailored to the customer's needs.

Bächli is also experienced through repair orders. The core competence in railway technology, tunnel supply and signalling could technology, long-distance energy transmission, point heating supply, energy management, and much more.

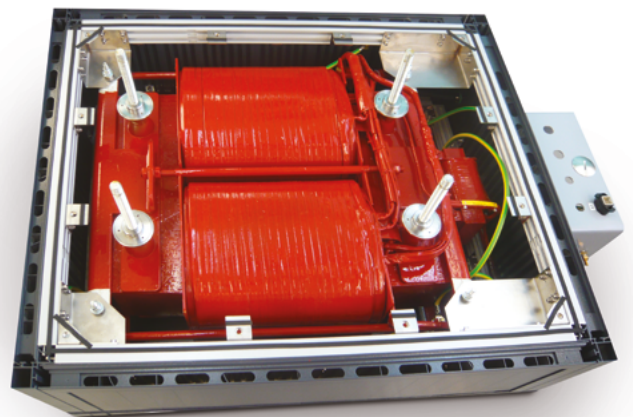
To built the best products we use the latest innovative materials to solve energy efficiency requirements. We guarantee the quality of our products throughout their life-cycle by planning and conducting extensive shaking tests, strength analyses, climatic tests and electrical load tests in cooperation with professional institutes.

WE'RE LOOKING
FORWARD
TO TALK WITH YOU
ABOUT YOUR NEEDS.

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Example of a complete encapsulation of a Bächli product.



Bächli components