BUDWEG BETTER BE SAFE



SALES PRESENTATION



Who is Budweg?

- Budweg is a leading supplier of remanufactured brake calipers for the European automotive aftermarket.
- Budweg's range of calipers covers more than 98% of the personal vehicles in operation in Europe.
- More than 40 years of experience with remanufacturing brake calipers for the automotive aftermarket.
- A product range containing more than 4,200 calipers and 2,400 spare parts.

Budweg Facts

Head Office: Odense, Denmark

• Office & Plant m2: 16,600m2

• **Employees:** 142 (BC 100)

• Turnover: 239 mill. DKK (€32 mill.)

 Product Range: 4,200 brake calipers and 2,400 spare parts

• Yearly produced calipers: 800,000 units

• Used Caliper Cores in stock: 400,000 units

• Brake Calipers in stock: 250,000 units

• Claims rate: Below 0.3%

ISO 9001:2015 certificated





Founded by Henning Larsen	The sons of Henning Larsen take over the company	100% owned subsidiary opens in Hanil, South Korea	New 10,000m2 plant in DK Insourced surface treatment Semi-automatic assembly line 2012-14	16,600m2 expansion of the plant in DK Automatic packaging lines implemented	The majority of shares are sold to the Danish equity fund Capidea. Inhouse product test facilities commissioned	Expanded application of automatic packaging line Korean subsidiary closed – production moved to DK
Employees 2	123	108	100	142	142	135
Turnover	DKK 81 mill. €10 mill.	DKK 111 mill. €15 mill.	DKK 144 mill. €19 mill.	DKK 199 mill. €26 mill.	DKK 239 mill. €32 mill.	DKK 239 mill. €32 mill.



Key Differentiators



Rubber Parts

- We have developed our own square O-ring for pistons
- We use a proprietary type of high-quality rubber, which has been qualified by the Danish Technological Institute
- We use our own molding tools for dust caps



EPB Calipers

- Inhouse test environment specific to EPBs
- An engineering department dedicated solely to EPBs
- Product improvements to OE designs



Inhouse Surface Treatment

- Specially developed liquids and carefully timed processes for each bath
- Tested to resist ozone, heat and other factors



5-year warranty

We have trust in our products, our processes, and the employees that manufacture the products. That is why all Budweg products are covered by 5 years of warranty.



Extensive range

Budweg are first-to-market with new caliper models, and we have a vast selection of caliper types and spare parts in stock.

Our range includes:

- 4,200 Brake caliper models
- 2,400 Spare part kits



Reliable Inhouse Production

- Digital document and process management system
- All work-stations have well documented work processes
- Training programme for all new employees
- Internal audits
- Competent staff with many years of experience and extensive training
- Incoming quality control (IQC) of spare parts



ISO 9001:2015 certified



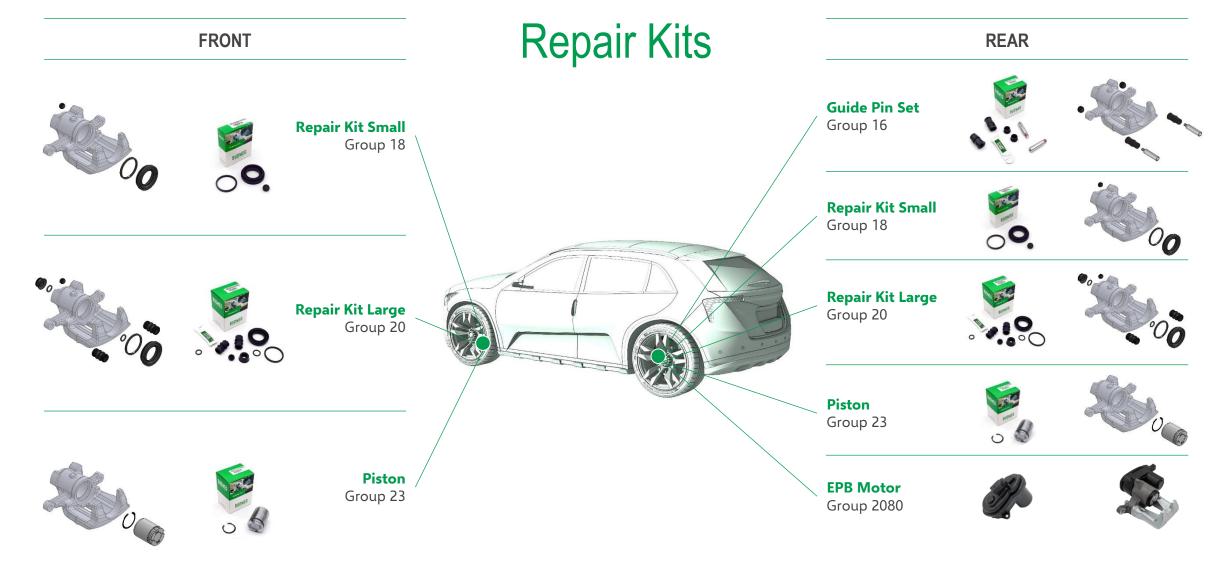
Data-driven Design and Manufacturing

- 3D scanning of caliper housings and spare parts
- Detailed technical drawings
- Critical dimensions and tolerances
- Material requirements
- 3D printing of key products
- Samples for testing
- Final approval

BETTER BE SAFE | slide 7 RANGE - CALIPERS

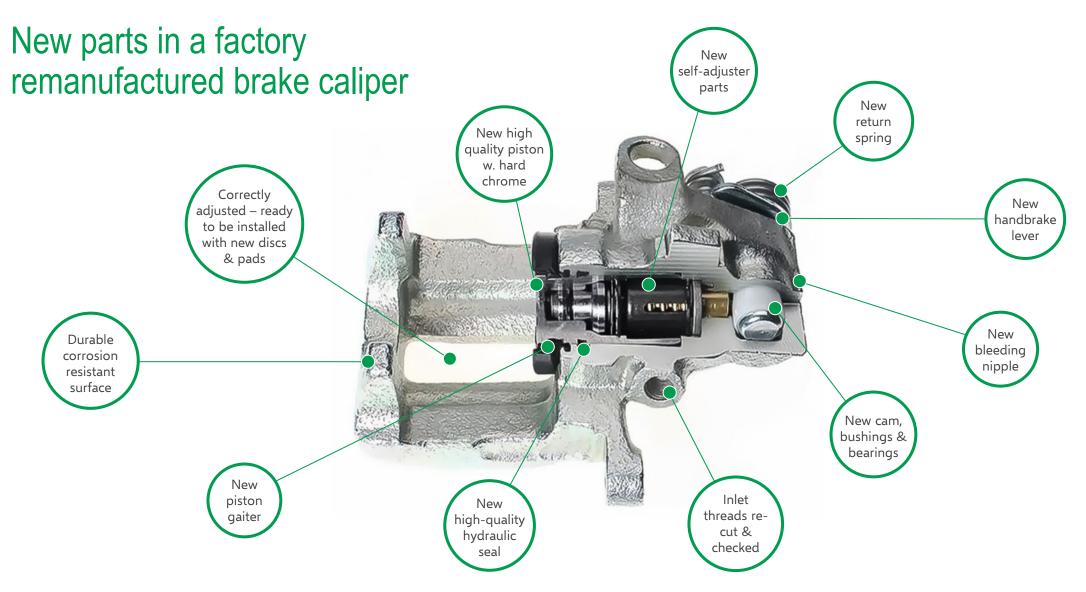
Personal Vehicle	Electrical Vehicle (EV)	Light Commercial (LCV)	Performance
Amount, Models:	Amount, Models:	Amount, Models:	Example Vehicles:
Covering: 98%VIO/Europe	Covering: 80%VIO/Europe	Covering: 92%VIO/Europe	Audi: e-tron, RS5
Example Vehicles:	Example Vehicles:	Example Vehicles:	BMW: M5 Porsche: 911
Audi: A3 Seat: Leon	BMW: i3 Kia: Ceed	Nissan: NV400 Opel: Movano	Mercedes: AMG
Skoda: Octavia VW: Golf	Nissan: Leaf VW:ID.3	Renault: Master	







BETTER BE SAFE | slide 9 RANGE





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QUALITY

Customer claims



Top 5 Approved Customer claims - last 12 months			
Error Type	%	Share	
Adjustment mechanism in piston falls out	0,02%	10,9%	
Adjustment mechanism is worn / locks up	0,02%	9,7%	
No roll-back	0,02%	9,1%	
Adjustment mechanism is loose	0,01%	6,4%	
O-ring groove not clean	0,01%	4,4%	



Top 5 Rejected Customer claims - last 12 months			
Error Type	%	Share	
Other (not caused by Budweg)	0.07%	95,7%	
Damaged threads, aluminium	0.00%	3,4%	
Order/delivery issues	0,00%	0.4%	
Deformed caliper	0.00%	0.2%	
Damaged thread, cast iron	0.00%	0.2%	





EOL-test with test block

End-of-line test (EOL)

Standard pneumatic end-of-line test

The end-of-line test (EOL-test) is performed by an experienced technician on ALL calipers that are being manufactured.

Test methodology:

The brake calipers are tested with compressed air during the EOL, where a metal test-block is inserted between the caliper claw and the piston(s). All products that deviate from the EOL test will either be discarded or re-remanufactured (if possible). All EOL test are likewise registered and evaluated.

During the test, the following points are verified:

Pressure testing with a testing block:

- Max. acceptable deviation of the test block is ± 0.3mm
- The test block's dimensions are verified with a pair of calipers.
- The brake caliper is tested with pressurized air @ 23 ±2 bar
- The roll-back functionality of the piston is tested by verifying that the testing block can slide out.

Handbrake functionality test:

- Movement of 3-5mm between the "stopping"point and the handbrake lever.
- The return movement of the piston.
- · Noise from bearings.

Product data for the specific caliper is being verified:

- Casting code
- Engraving
- Correct left/right configuration

Final visual inspection:

- Are all parts mounted correctly
- Is the product presentable (does it look well)
- Is the surface of the piston parallel with the caliper claws
- Is the sealing surface correctly manufactured
- Is the product properly lubricated with silicone grease



Benchmark Test Conditions

Methodology

The saline solution is controlled with a refractometer to ensure proper salt content.

The saline solution is pH-corrected prior to the test with an electronic pH-meter

- All components are examined for defects prior to the test
- All components are rinsed in destilled water prior to the test
- All components are spaced 35cm apart in the chamber

Test duration

72 hours

Caliper Components

The Budweg calipers are calipers picked from our ordinary stock. The competing calipers are unaltered calipers purchased through ordinary retailers.

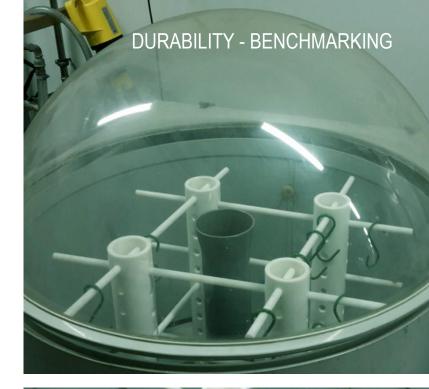
Saline Solution

Saline solution w. 5% salt (5kg salt w. 95l water) pH 6.5-7.2 @ 23±3°C

Salt Spray Chamber Conditions

The conditions for the salt-spray chamber conforms to ISO standard 9227

Chamber temperature	35±2°C
pH value	6.5 – 7.5
Pressure	1.1 bar
Pressure chamber temperature	46°C
Reservoir Volumen	200 I





BUDWEG			
Part	Before	After	
Caliper Housing			
Piston		S. S. O.	
Guide Pins	The same of the sa		

♥ COMPETITOR			
Part	Before	After	
Caliper Housing			
Piston			
Guide Pins			



BETTER BE SAFE | slide 14 DURABILITY

Not approved calipers

All calipers are inspected visually during the manufacturing. Any deviation from the Budweg quality standard is discarded. The below examples show various causes that will result in the caliper being discarded during manufacturing.

















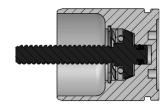
Product improvements

Improvements based on customer feedback

Old version



New version







Improvements to EPB motors

Structural improvements to the EPB housing

To ensure better structural stability, the mounting area (the fin) of the EPB-motor was extended and the height increased.

- The length of the "fin" was increased from 10mm to 50mm on the Budweg housing.
- The thickness of the "fin" was increased from 4mm to 6.5mm





Metal Gears for improved durability

During benchmarking we perform 100,000 activations of the motor.

EPB motors equipped with plastic gears were subject to deformities and abrasion after 75,000 activations.

Plastic gears are therefore exchanged for metal gears in Budweg's EPB motors



BETTER BE SAFE | slide 16 PRODUCT TESTING

Meeting OE Requirements

Our calipers are designed to meet OE standards, and all Budweg calipers have passed a sequence of extensive inhouse testing before being made available to the market.

Furthermore Budweg's products are being tested against competing products to ensure that our products maintain the highest level of product quality on the aftermarket.









1. Fatigue Test EPB

Cast Iron: 100,000 strokes **Aluminium:** 100,000 strokes

2. Hydraulic fatigue test

2.1: 70,000 strokes endurance test2.2 Cast Iron: 210,000 strokes2.3 Aluminium: 225,000 strokes

3. Burst Test
350 bar / 10 sec.

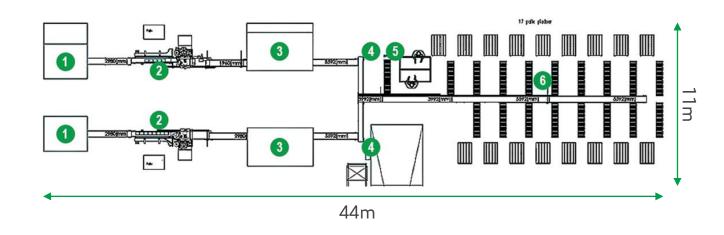
4. Salt Spray Test



BETTER BE SAFE | slide 17 PACKAGING

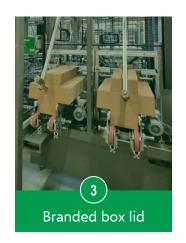
Packaging line facts

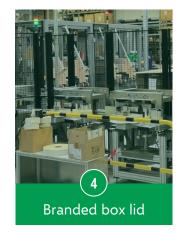
- Max capacity of 5500 units / shift
- 8 brands can be packaged simultaneously
- Can handle two different standard box-sizes







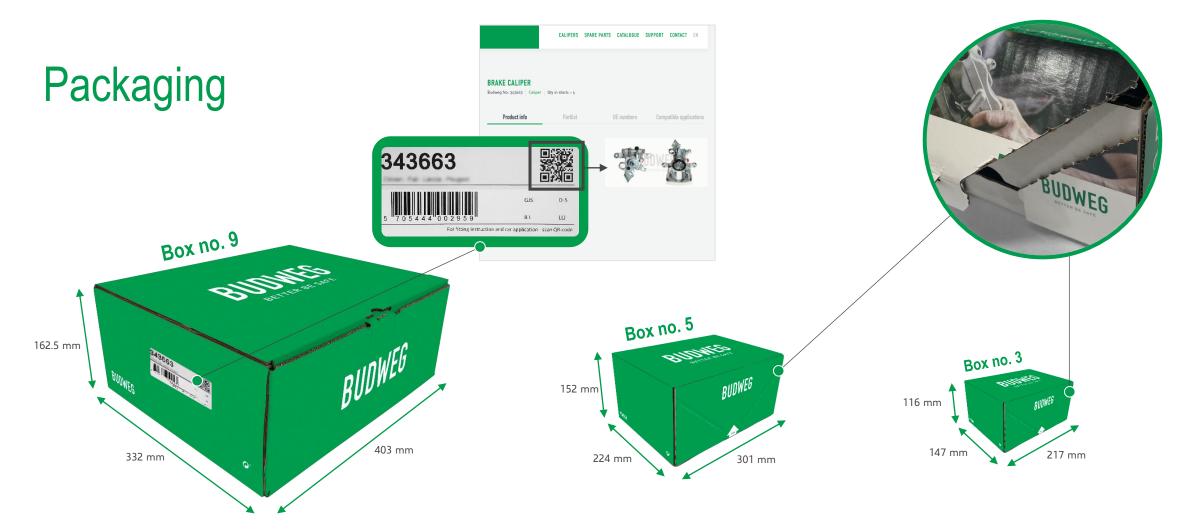










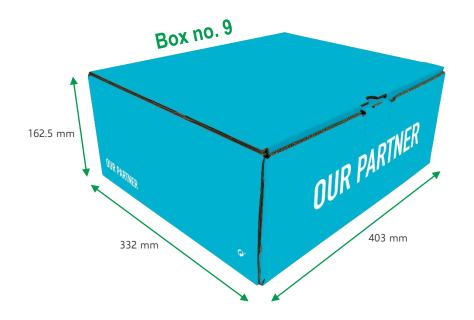


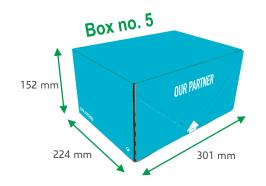




BETTER BE SAFE | slide 19 PACKAGING

Private Label











BETTER BE SAFE | slide 20 ASSEMBLY

Assembly lines



Automatic shuttle line
Main production line

Workers: 12

Capacity: 6600 pcs/week



Small series assembly line

Unique caliper assembly

Workers: 6

Capacity: 1150 pcs/week



Line assembly

Extended production line

Workers: 8

Capacity: 3700 pcs/week



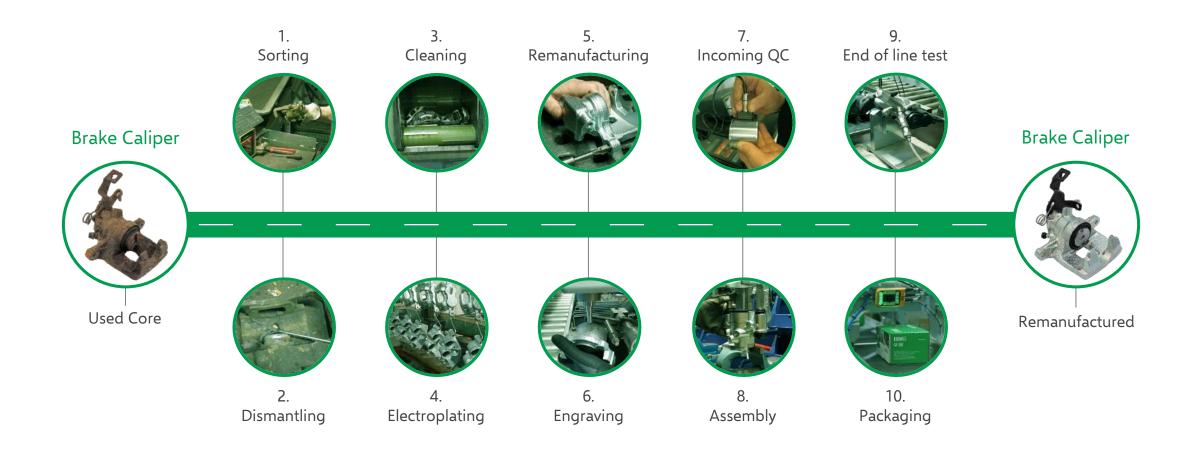
In-line assembly

High volume assembly mostly newman calipers

Workers: 5

Capacity: 3800 pcs/week





MATTERPORT online factory tour





7 AFFORDABLE AND CLEAN ENERGY



Results 2020

 82% of Budweg's energy consumption is generated by sustainable energy sources like sun, wind and water. B DECENT WORK AND ECONOMIC GROWTH



Results 2020

- 3 workplace accidents with leave but without permanent injury
- 0 workplace accidents with leave and with permanent injury
- 4% sick-leave
- 6% employee turnover including new employments
- Average retention rate of 10 years

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Results 2020

- 85% of the generated waste is recycled
- Initiating process for systematically monitoring Budweg's Code of Conduct for key suppliers

4 QUALITY EDUCATION

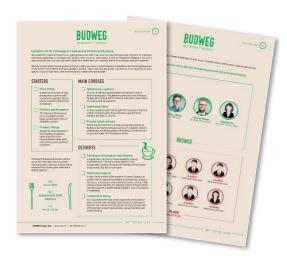


Results 2020

 6 initiated educational programmes for trainees/students



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BETTER BE SAFE | slide 24 EVENTS













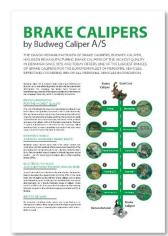
BUDWEG

ZAPROSZENIE DO FIRMY BUDWEG CALIPER A/S









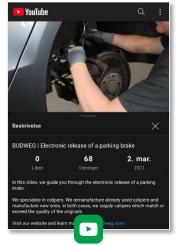














BETTER BE SAFE | slide 26 PRIVATE LABEL









