CAPACITIVE SENSORSWITCHES

White paper

Capacitive buttons used in rail vehicles -

Help to reduce costs and down time for transit authorities

CAPTRON

FAULTY PARTS CAUSE FINANCIAL DAMAGE THAT FAR EXCEED THEIR OWN VALUE.

One of the major problems for transit authorities and their maintenance personnel is the unexpected maintenance down time due to failing equipment and components. Besides the additional amount of resources and manpower going into the repair of the vehicle, the loss of revenue for a non-operating vehicle is enormous – especially if the failing equipment is technically a non-critical component but must be replaced due to safety and regulatory requirements.

The frustration increases if the equipment in question fails on a regular basis and there appears to be no long-term solution to the on-going issues. The list of these types of parts is long yet the material costs are relatively low - in some case just a few dollars. However, they manage to incur thousands of Dollars in additional maintenance costs as a result of these critical yet inexpensive failures. Often a $2 Item becomes a $1, 000 replacement.

The components in question are often lights, indicators and most often – mechanical switches and pushbuttons. You can find them in passenger compartments to open a door, request a stop, flush a toilet or call for assistance. They are also predominant in the driver's cabin on the dashboard. Breaking a pushbutton is easily done - spilled beverages, careless usage, or vandalism from both passenger or driver are just some of the reasons why pushbuttons fail – but one thing is for sure, they will fail sooner or later due to the nature of mechanical design.

What if there were a solution to that?

A product that by design does not fail, can be exposed to vandalism, is resistant to any kind of fluids and can still operate? A product that reduces your maintenance costs significantly or even better, would allow you and your team to work on more important things than replacing a switch?

Our state of the art and highly customizable SENSORswitches are based on:

- **Capacitive touch**
  High ease of use, no mechanical pressure required
- **TSI PRM & ADA compliant**
  Accessibilty with braille and raised chevrons
- **Indestructible**
  More than 100 million operation cycles
- **Fully IP69K rated**
  100 % water & oil-proof

It can be operated by hand or any other part of your body, it even works with protection gear. The level of customization such as power supply, symbol, color, connection type etc. is very versatile, which makes the replacement of existing mechanical push buttons almost plug'n'play and it doesn't cost much.

SENSOR*switches*
SIGNALLIGHTS
STOP REQUEST BUTTONS

CASE STUDY A

TRAFFIC & TRANSPORT

CAPTRON has specialized in the application and distribution of capacitive sensor technology from the very beginning. During its first successful years, the company focused on further developing the relevant technology. The first capacitive SENSOR*switch* for Mass Transit was developed in 1994.

Learn more at: www.captron.com/en/industries

Project description	
Affected Train Model	X'Trapolis
Reason of Failure	Vandalism & failing of LED's require exchange. In addition to that, the customer wanted to increase compliance with Disability Discrimination Act (DDA)
Scope of Work	Providing a sensor switch including aluminum plate in order to meet existing design
Application Area	Passenger Entrance Doors
Existing Switch Model	Mechanical Push Buttons
Extent	165 Trains (5,904 Buttons)
Exchange Period	2 years

Prices & Data are based per piece	**COMPETITION**		**CAPTRON**	
Purchasing Price	120	$	149	$
Man-hours to Install	5 minutes		5 minutes	
Installation Cost	11	$	11	$
Initial Product Costs	**131**	**$**	**160**	**$**
Prospected Lifetime				
Lifetime in Years	2 years		10 years	
Lifetime in Cycles	194,400 cycles		972,000 cycles	
Estimated activations per day	270 cycles		270 cycles	
Replacement Costs due to vandalism & failure				
Man-hours to Install	10 minutes		10 minutes	
Material Costs	120	$	149	$
Installation Cost	22	$	22	$
Other Costs (wires, components etc.)	5	$	5	$
Replacement costs	**147**	**$**	**176**	**$**
Lifetime Costs				
Item Costs per Cycle	0,0037	$	0,0002	$
Item Costs on expected lifetime	**718**	**$**	**160**	**$**

Currency	*USD*
Expected Product Lifetime	*10 years*
Man-hour per Engineer	*130 $*

CASE STUDY B

OUR MISSION

"To offer customers more than just a product. Understanding customer requirements and putting their needs at the top of the priority."

Mathias Krostewitz, Head of Business Development CAPTRON Electronic GmbH

Project description	
Affected Train Model	Desiro Class 350
Reason of Failure	Providing a switch and metal housing to be mounted onto the door frame
Scope of Work	Vandalism & Mechanical wear out
Application Area	Transition Doors in between compartments, more than 50% failure rate
Existing Switch Model	Mechanical push button
Extent	160 Trains (1600 Buttons)
Exchange Period	12 Month (Replacement ongoing)

Prices & Data are based per piece	**COMPETITION**		**CAPTRON**	
Purchasing Price	75	$	92	$
Man-hours to Install	5 minutes		5 minutes	
Installation Cost	9	$	9	$
Initial Product Costs	**84**	**$**	**101**	**$**
Prospected Lifetime				
Lifetime in Years	1 year		10 years	
Lifetime in Cycles	36,000 cycles		360,000 cycles	
Estimated activations per day	100 cycles		100 cycles	
Replacement Costs due to vandalism & failure				
Man-hours to Install	5 minutes		5 minutes	
Material Costs	75	$	92	$
Installation Cost	9	$	9	$
Other Costs (wires, components etc.)	0	$	0	$
Replacement Costs	**84**	**$**	**101**	**$**
Lifetime Costs				
Item Costs per Cycle	0,0234	$	0,0003	$
Item Costs on expected lifetime	**843**	**$**	**101**	**$**

Currency	*USD*
Expected Product Lifetime	*10 years*
Man-hour per Engineer	*112 $*

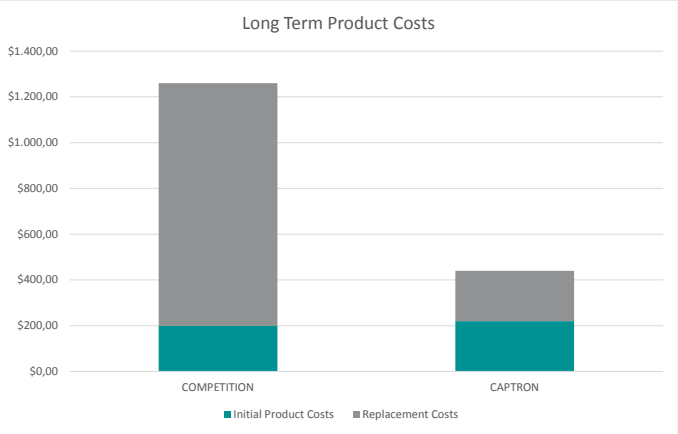
LONGLIFE COMPARISON

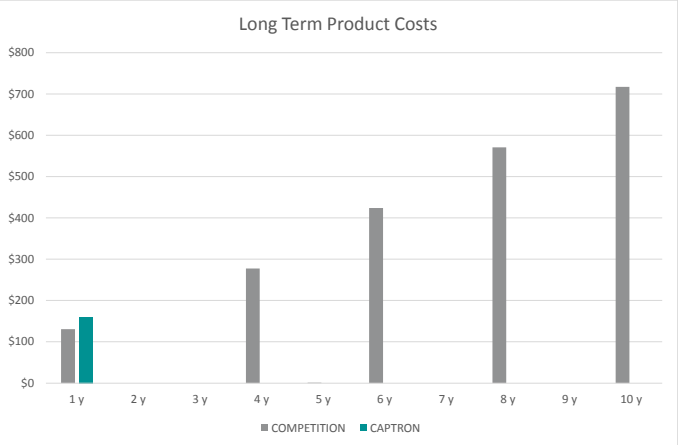
CUSTOMISED PRODUCTS

"We provide our customers with solutions: We make our know-how and experience available to your specific requirements."

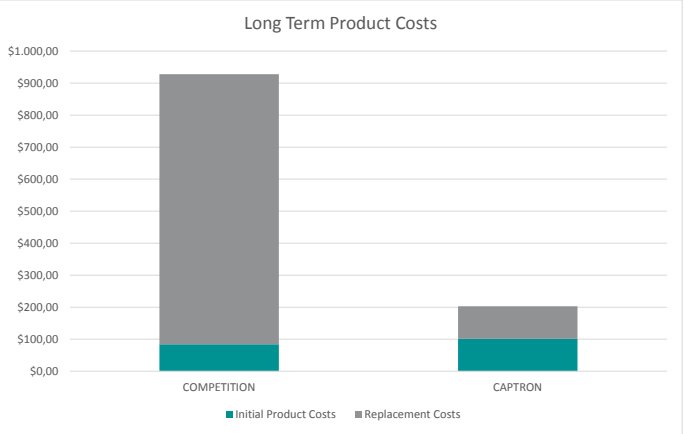
Reinhard Bellm, CEO CAPTRON Electronic GmbH

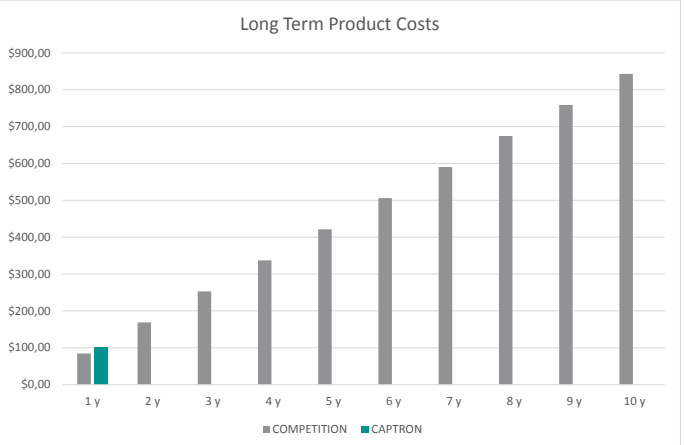
CASE STUDY A





CASE STUDY B





NEW:
STRESS TEST VIDEO 2.0

Not convinced yet?
Please watch our latest stress test video (2.0) which pushes the SENSOR*switches* to their limit.

Go to: bit.ly/SENSOR*switches*

ABOUT CAPTRON

CAPTRON Electronic has been manufacturing electronic capacitive sensors production for over 30 years. CAPTRON focuses on the requirements and application in the automation, traffic and transport and building technology sectors.

Based on the same operating principle as capacitive sensors, SENSOR*switches*, fluid sensors and two hand safety control “safeCAP“ form part of the product range of the sensor manufacturer. Furthermore, CAPTRON develops and successfully produces LED light signals and optical sensors. The development of innovative solutions is an additional strength of CAPTRON.

When it comes to customers special solutions and requirements, CAPTRON can at all times be relied upon as a competent partner. Together with its customers, CAPTRON designs and develops special sensors and customised products for individual application. All products are impressive with a maximum on functionality, longevity and precision.

If you are interested to learn more about our company and products, please feel free to visit our website www.captron.com.

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