

# Technology Development

## Braking Systems for Shaft Hoisting

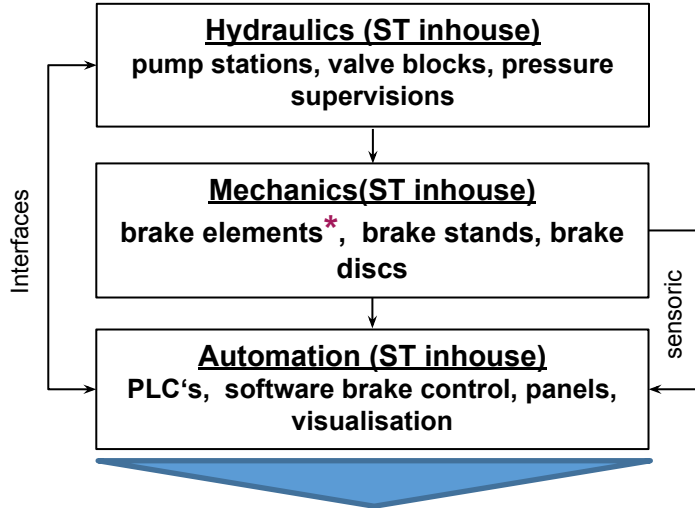
**SIEMAG  
TECBERG**  
group

**SIEMAG  
TECBERG**

17.12.2018

Competencies for “Technology Development“ lead to successful market references with Ø 6 larger Hoists p.Y. - an Unique Selling Point (USP)  
 - a proof of state of the art in Shaft Hoisting Design

**3 inhouse Engineering Disciplines for Key “OEM Product Applications“ ...**



**USP: System-Integration 100% inhouse by SIEMAG TECBERG**

\*ST OEM Products with TAS Certification Germany:  
 BE50/65; BE100/125; BE200/250; BE300/350 – brake force in [kN]

**... created 5 Technology Steps since the late 1970's**

Product Name	Product Category	Characteristics	Innovation Date	Run out Date	No. of larger Hoist Applications since 1980
ST1/2 1	Single Channel I	not controlled, residual pressure with constant braking force	1977	2005	15
ST3 2	Single Channel II	controlled with constant retardation, <b>in case of element failure:</b> system switches to constant braking force	1987	2015	97
STN 3	Multi Channel	controlled with constant retardation, <b>in case of element failure:</b> system stays totally open or applies fully + 1: spare channel on demand as stand by Note: relaunch of hydraulic design in 2014	1988	on going	27
SB1 4	Single Channel controlled	controlled with constant retardation <b>with redundant hydraulic and control units, in case of element failure:</b> system still controlled with constant retardation!	2007	on going	82
SB1-2 5	Twin Channel controlled	controlled with constant retardation with redundant hydraulic and control units <b>per channel, in case of element failure:</b> system still controlled with constant retardation!	2013	on going	8

**ST References of larger Hoists Application “ST Headquarter Design” since 1980 (by regions):**

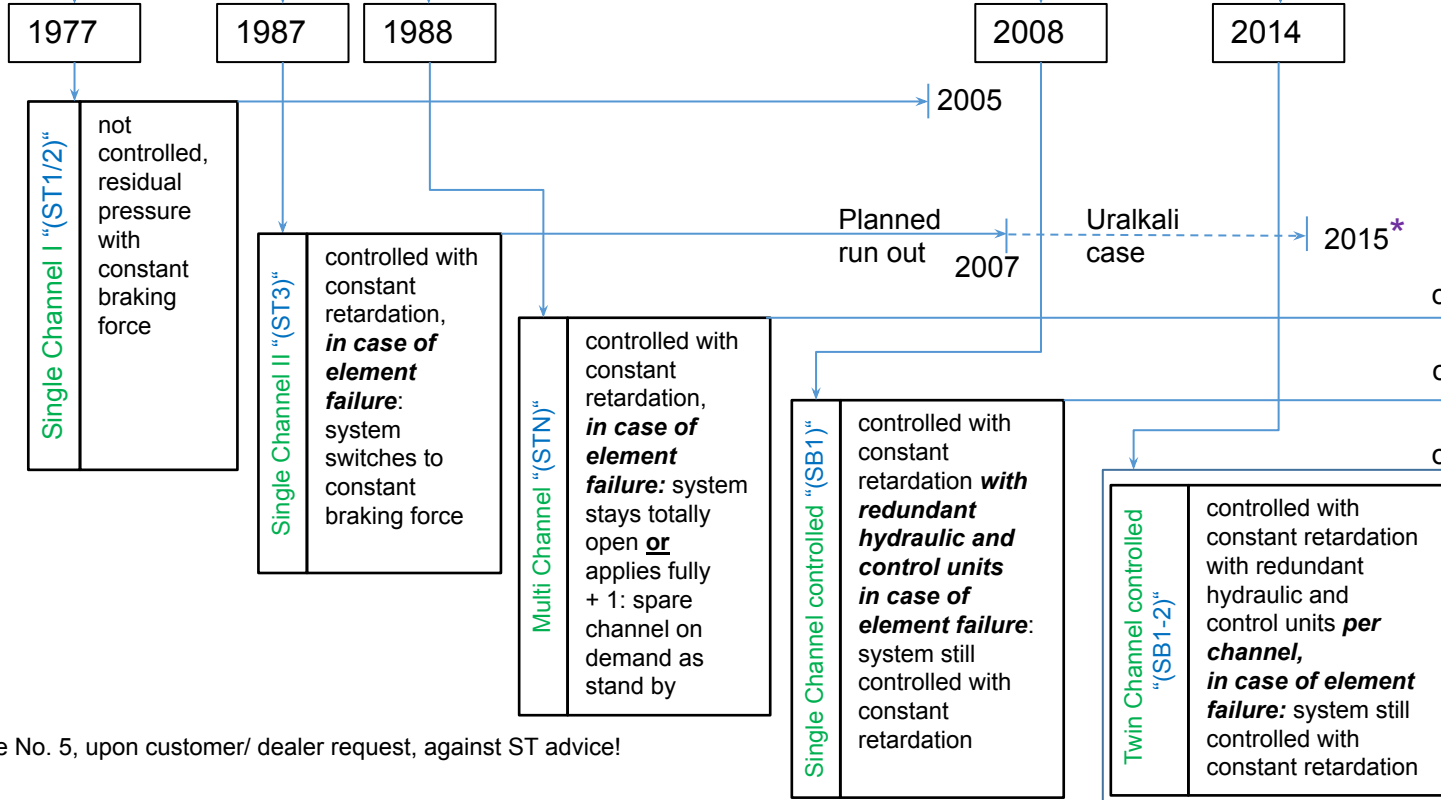
ANGLOSAXON (north America, southern Africa, Australia): **19**  
 EUROPE/C.I.S.: **66**  
 ASIA: **144**

**Σ=229**

# The Proof of Shaping the Mine Hoist Industries by SIEMAG TECBERG due to Development of Braking Systems Technology

1970 1980 1990 2000 2010 2018

Innovation Milestones:



Single Channel I "ST1/2"  
not controlled, residual pressure with constant braking force

Single Channel II "ST3"  
controlled with constant retardation, **in case of element failure:** system switches to constant braking force

Multi Channel "STN"  
controlled with constant retardation, **in case of element failure:** system stays totally open **or** applies fully + 1: spare channel on demand as stand by

Single Channel controlled "SB1"  
controlled with constant retardation **with redundant hydraulic and control units in case of element failure:** system still controlled with constant retardation

Twin Channel controlled "SB1-2"  
controlled with constant retardation with redundant hydraulic and control units **per channel, in case of element failure:** system still controlled with constant retardation

No. of significant Hoists by ST:

15.

97.

27.

82.

8.

$\Sigma=229$

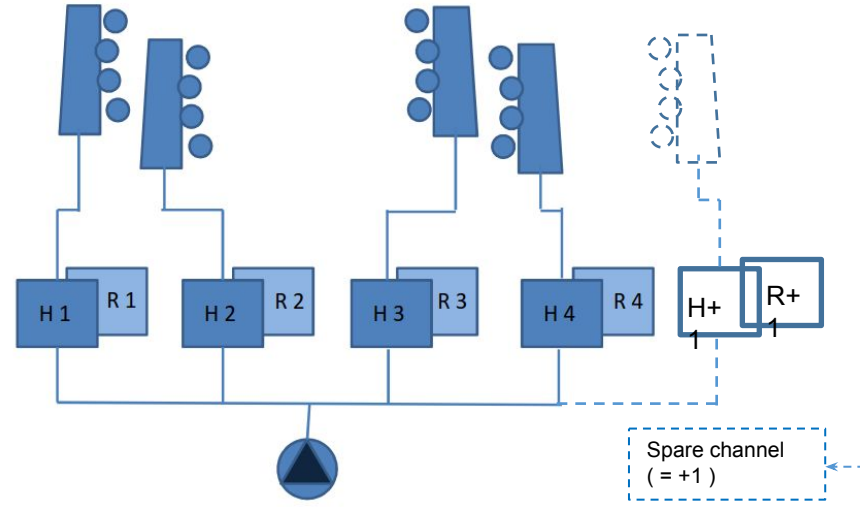
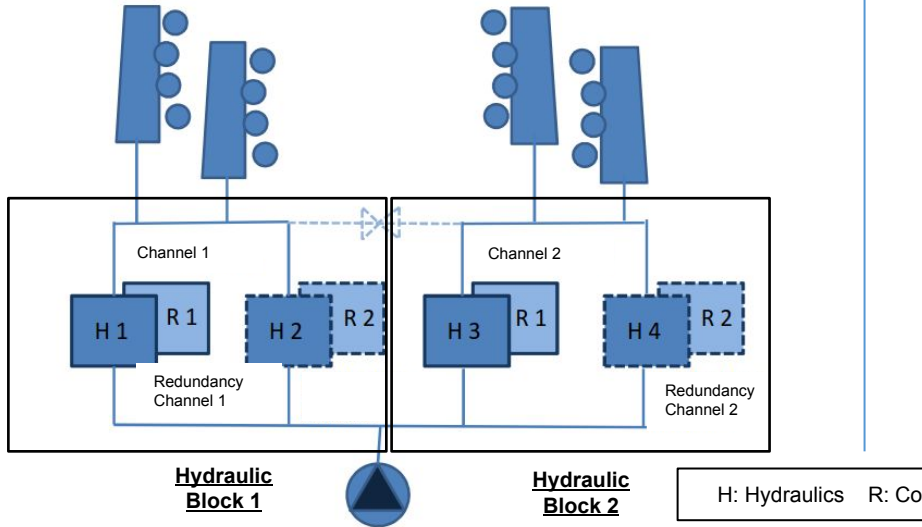
ST proposal for Slavakliy

\*Uralkali Mine No. 5, upon customer/ dealer request, against ST advice!

SIEMAG TECBERG is in the position of offering 2 solutions as options as state of the art for the permanent hoisting application: “SB1-2“ (Twin Channel) and “STN+1“ (Multi Channel)

**Twin Channel SB1-2** (brake system with 2+2 hydraulic channels)

**Multi Channel STN+1** (brake system with 4 channels)



**Rating by professional Engineers:**

++

**Safety Level**

++

0\*

**operational availability in the unlikely case of a unit failure**

(+)

+

**Economic Efficiency**

--!

\*to be compensated with adequate management for spare parts and technical service

**SIEMAG TECBERG's Engineering Services are a matter of course:**



1. keeping international compliance to statutory mining regulations
2. providing certified and field references for brakes with constant braking force, constant retardation and Safety Integrity Level [SIL 2 & 3] special applications
3. providing compliance for all risk analysis scenarios through robust designs and peer reviews
4. providing compliance in international safety standards and features with brake control philosophy for Man Riding Hoists
5. providing a dedicated fully comprehensive diagnostic system to support service personnel in the maintenance of the brake control operation

# Contact Persons



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