



CORROSION OF PRESTRESSING CABLES AND ITS EFFECT ON THE LOAD CAPACITY OF BRIDGES

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An aerial photograph of a multi-lane highway bridge that curves along a rugged coastline. The bridge is supported by several tall concrete pillars. The sea is visible to the left, and a steep, rocky cliff with some greenery is on the right. A single car is visible on the bridge. The text "Condition of bridges in Slovakia" is overlaid in the center in a white serif font.

Condition of bridges in Slovakia

Division of bridges in Slovakia

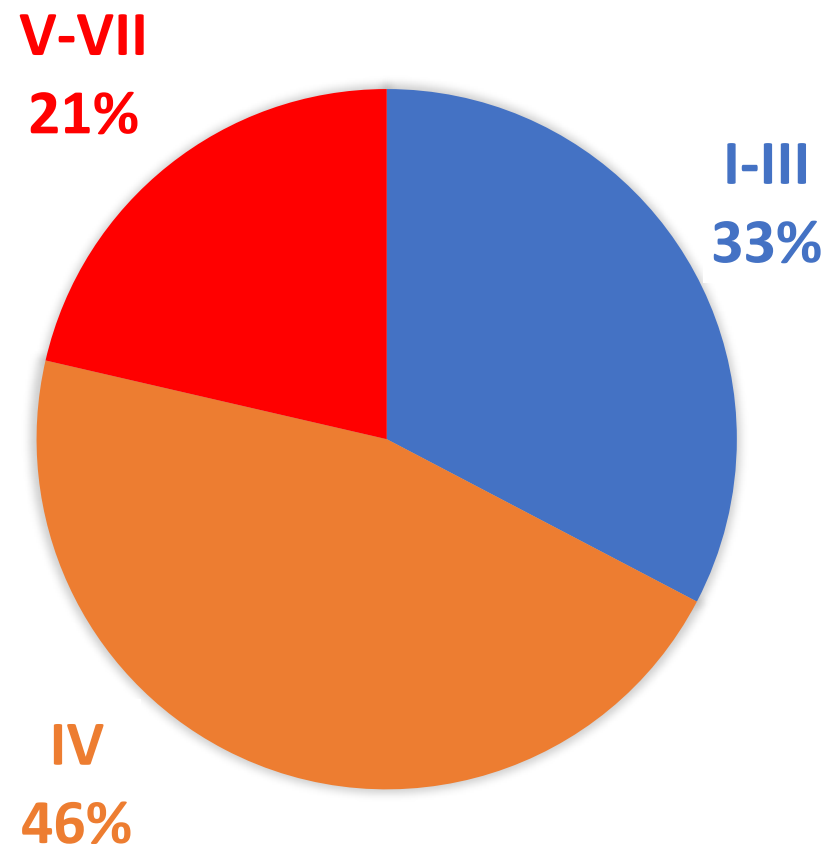
7 categories
according to the
building-
technical
condition



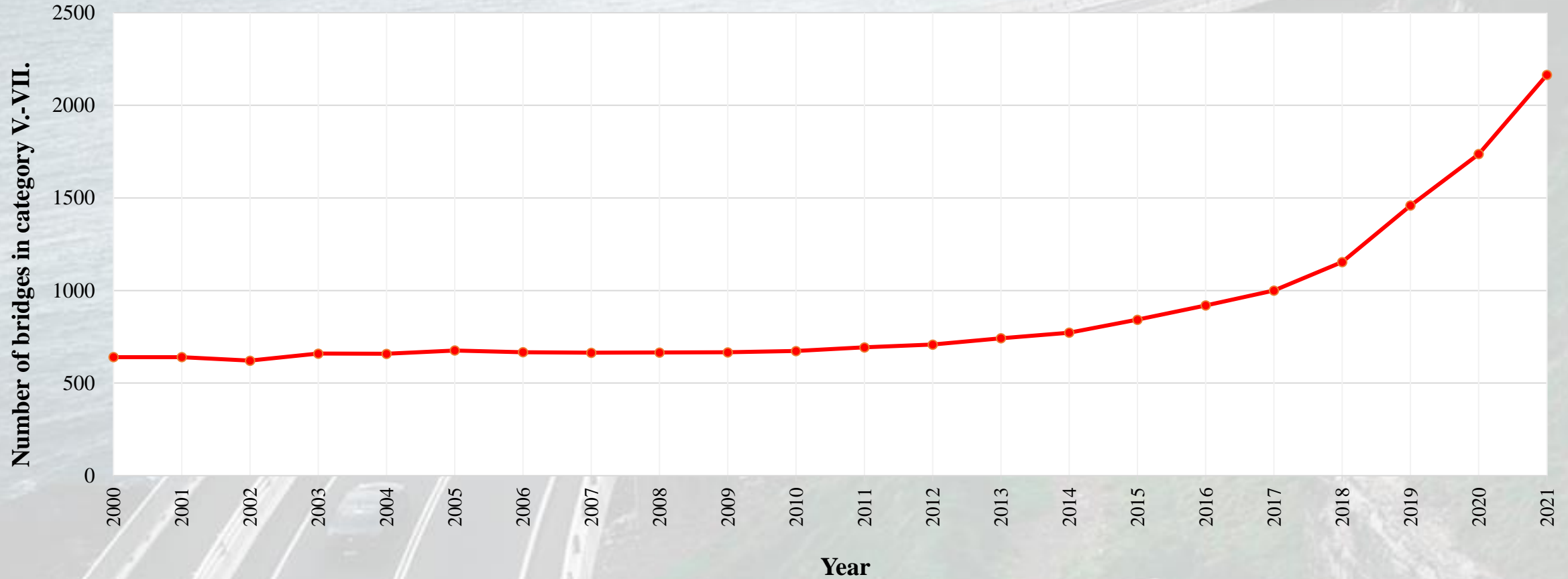
Grade	Condition	Description of failures of an element, part or object
I.	flawless	without any hidden or obvious defects
II.	very good	the occurrence of appearance defects only, which do not affect the load capacity of the bridge
III.	good	occurrence of major faults that do not affect the load capacity of the bridge
IV.	satisfactory	the occurrence of defects which do not have an immediate effect on the load capacity of the bridge, but which may affect it in the future
V.	bad	the occurrence of defects that adversely affect the load capacity of the bridge, but can still be rectified without replacing the defective components
VI.	very bad	the occurrence of faults that affect loadability and cannot be rectified without replacing faulty or missing components
VII.	disrepair	the occurrence of defects which affect the load carrying capacity of the bridge to such an extent as to require immediate remedial action to avert an impending catastrophe

Condition of bridges in Slovakia

DIVISION OF BRIDGES IN SLOVAKIA ACCORDING TO THEIR STRUCTURAL-TECHNICAL CONDITION

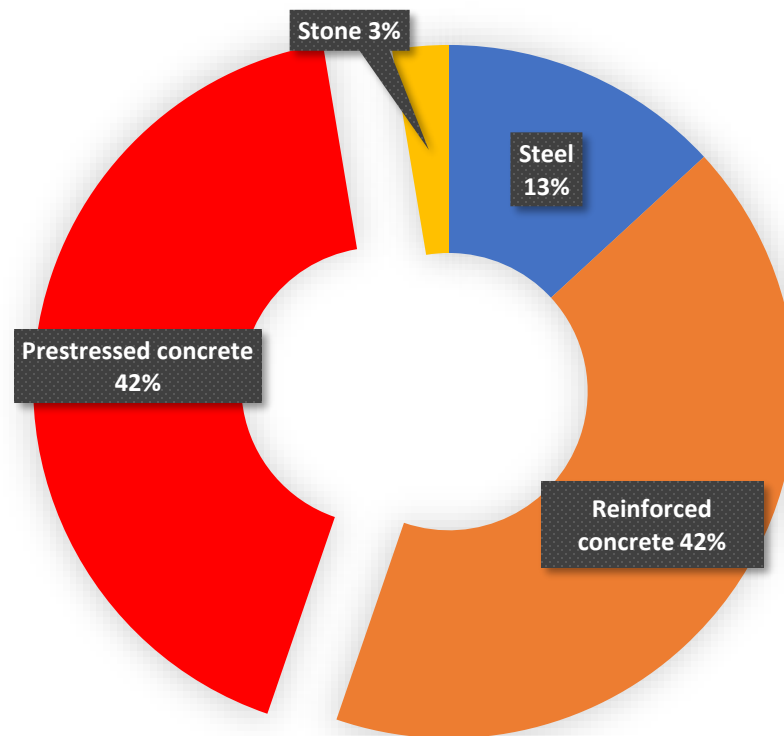


Condition of bridges in Slovakia



Typology of bridges in Slovakia

Percentage of bridges in disrepair by material



An aerial photograph of a multi-lane highway bridge that curves along a rugged coastline. The bridge is supported by several tall, dark concrete pillars. A single dark-colored car is visible on the lower part of the bridge, moving away from the viewer. The ocean is a deep blue-grey, and the sky is overcast. The bridge's design features a concrete barrier on the outer edge. The surrounding landscape is rocky and sparsely vegetated.

Evaluation of the condition of reinforcement

Main factors of reinforcement corrosion

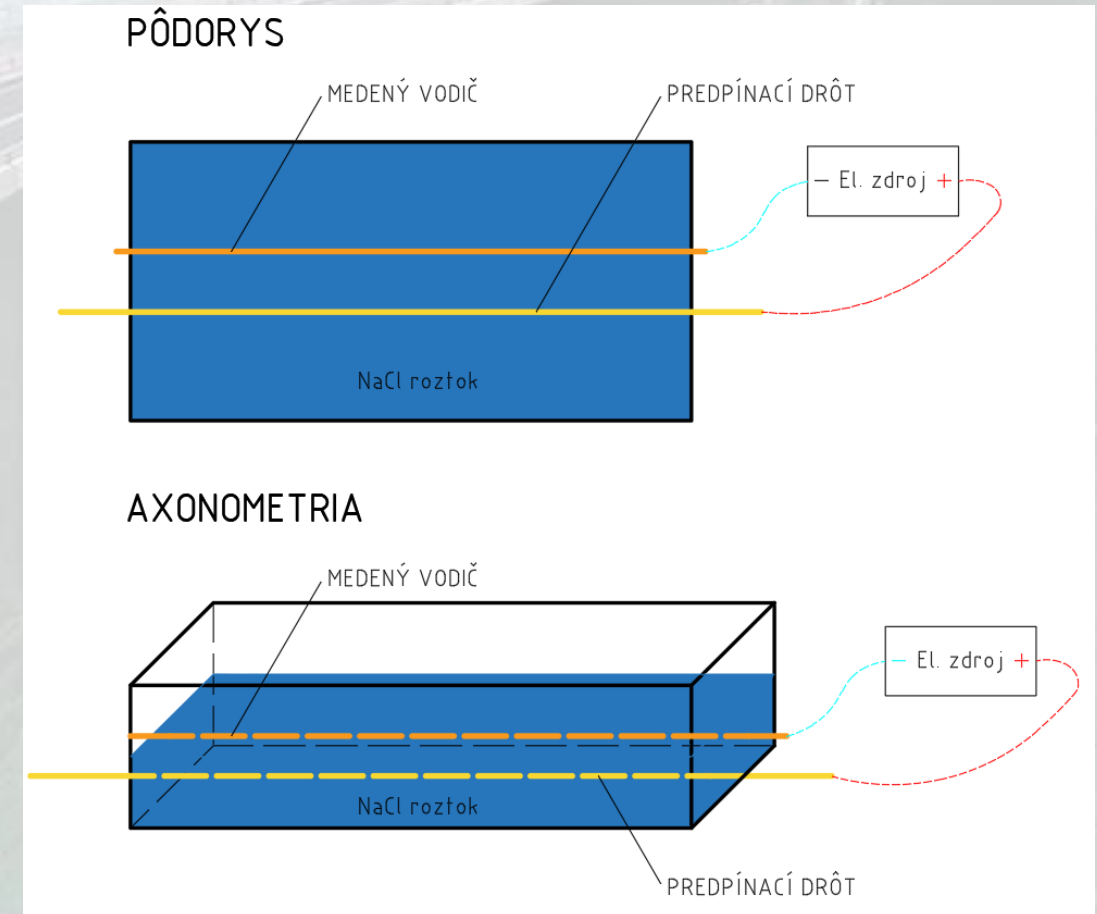
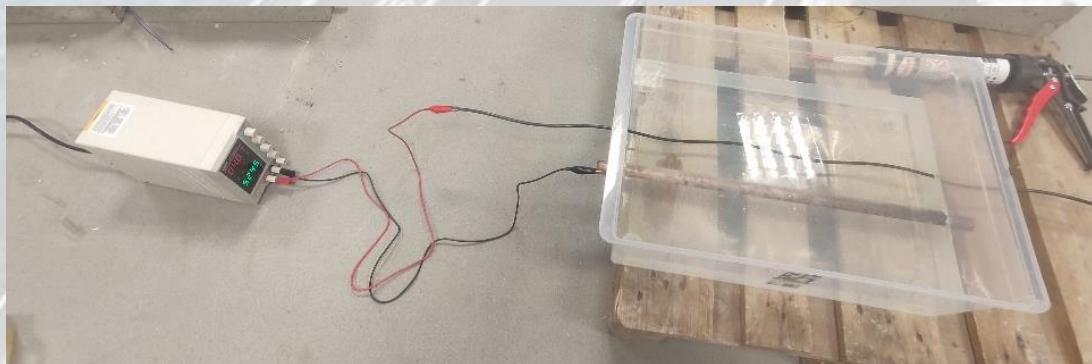
- Carbonation
- Chlorides
- Combination carbonation + chlorides

An aerial photograph of a multi-lane highway bridge that curves along a rugged coastline. The bridge is supported by several tall concrete pillars and spans over a deep blue sea. A single dark car is visible on the lower part of the bridge. The surrounding landscape is a mix of dark rocks and green vegetation. The sky is overcast and grey.

Experiments carried out

Accelerated corrosion experiment

- Accelerated corrosion involves the use of sodium chloride (NaCl) and electric current, which together simulate the corrosive process of materials (metals). It is a method of artificially accelerating the natural corrosion process. This process is called electrochemical corrosion

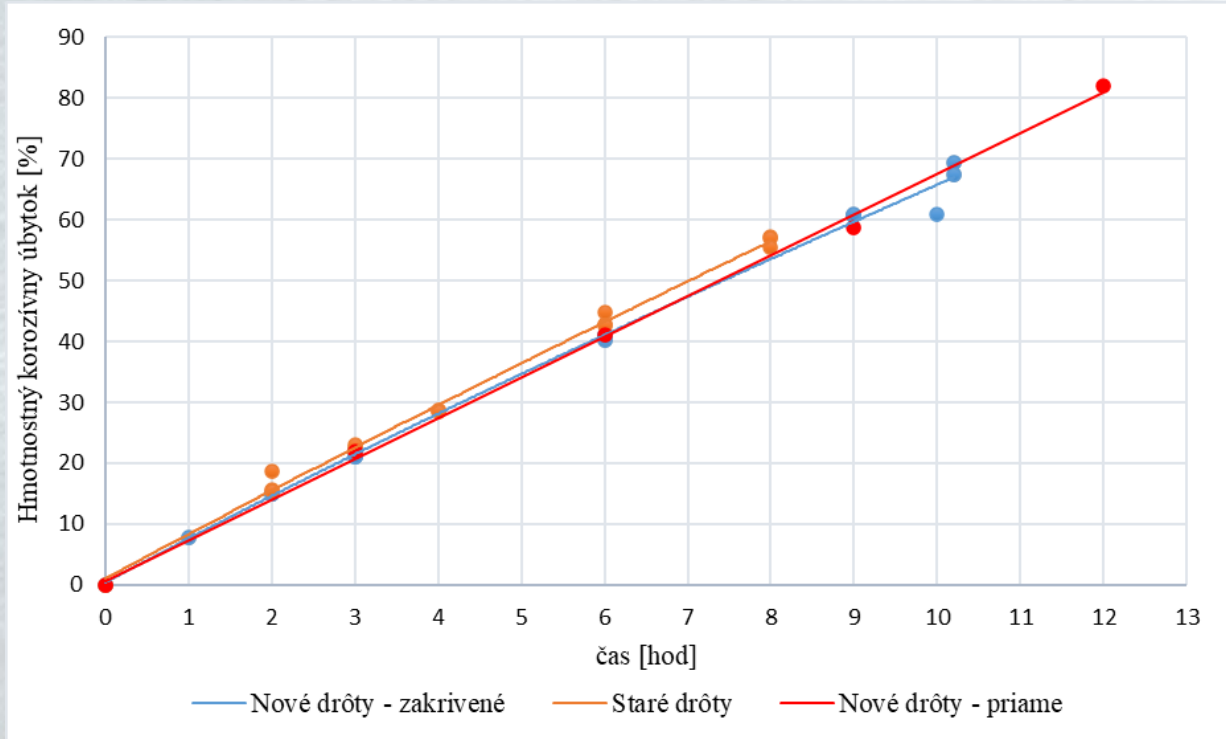


The actual experiment

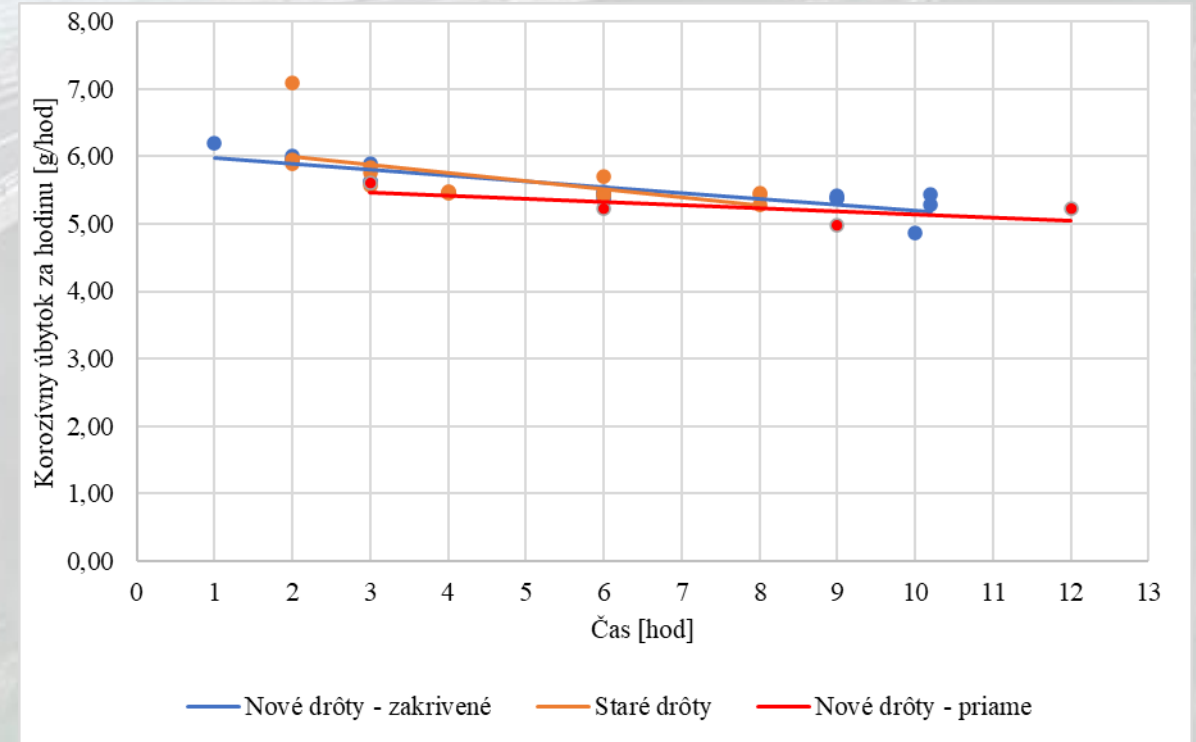


The course of the corrosion experiment a)before starting, b)during, c)after finishing, d, e, f)corrosive residues on the corroded reinforcement

Results of the primary experiment

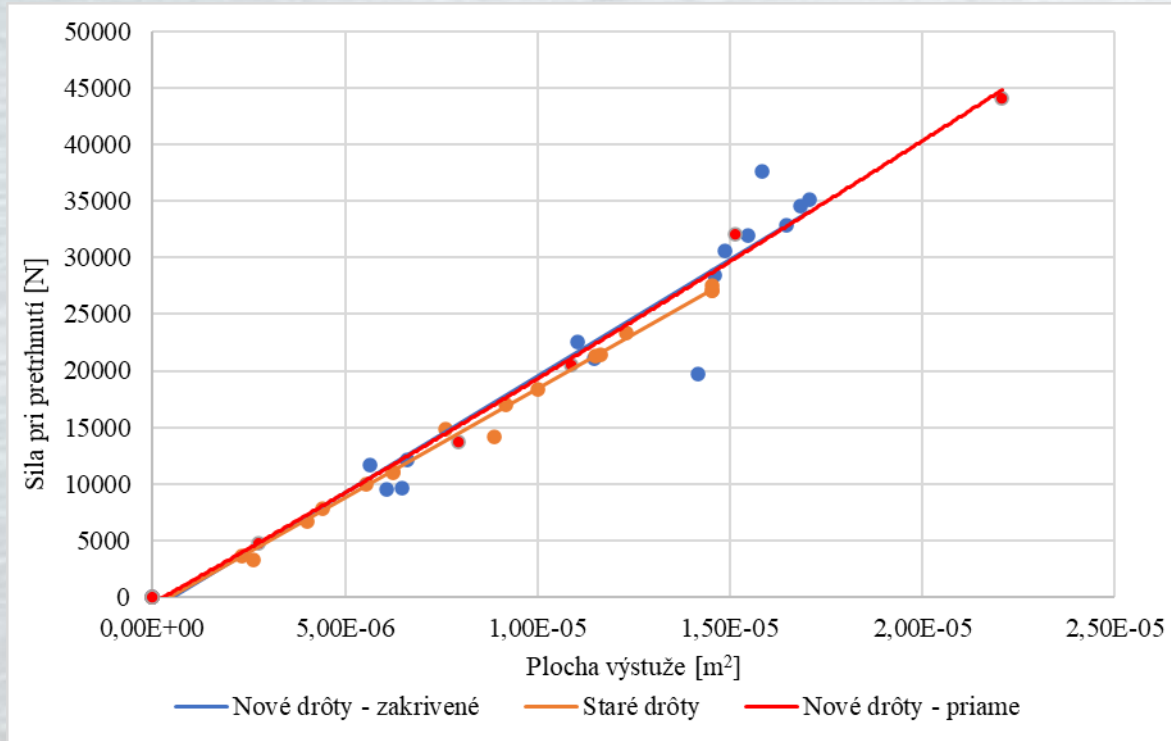


Corrosion mass loss versus corrosion time

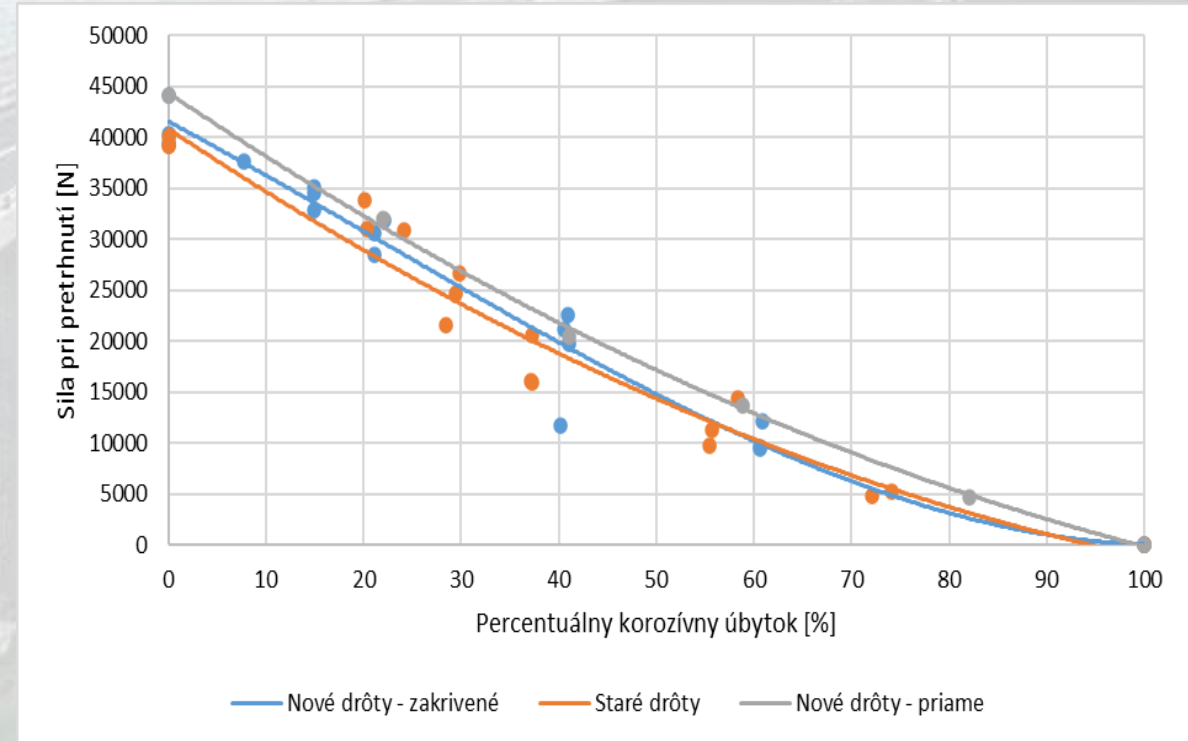


Corrosion rate per hour to the length of the corrosive process

Results of the primary experiment

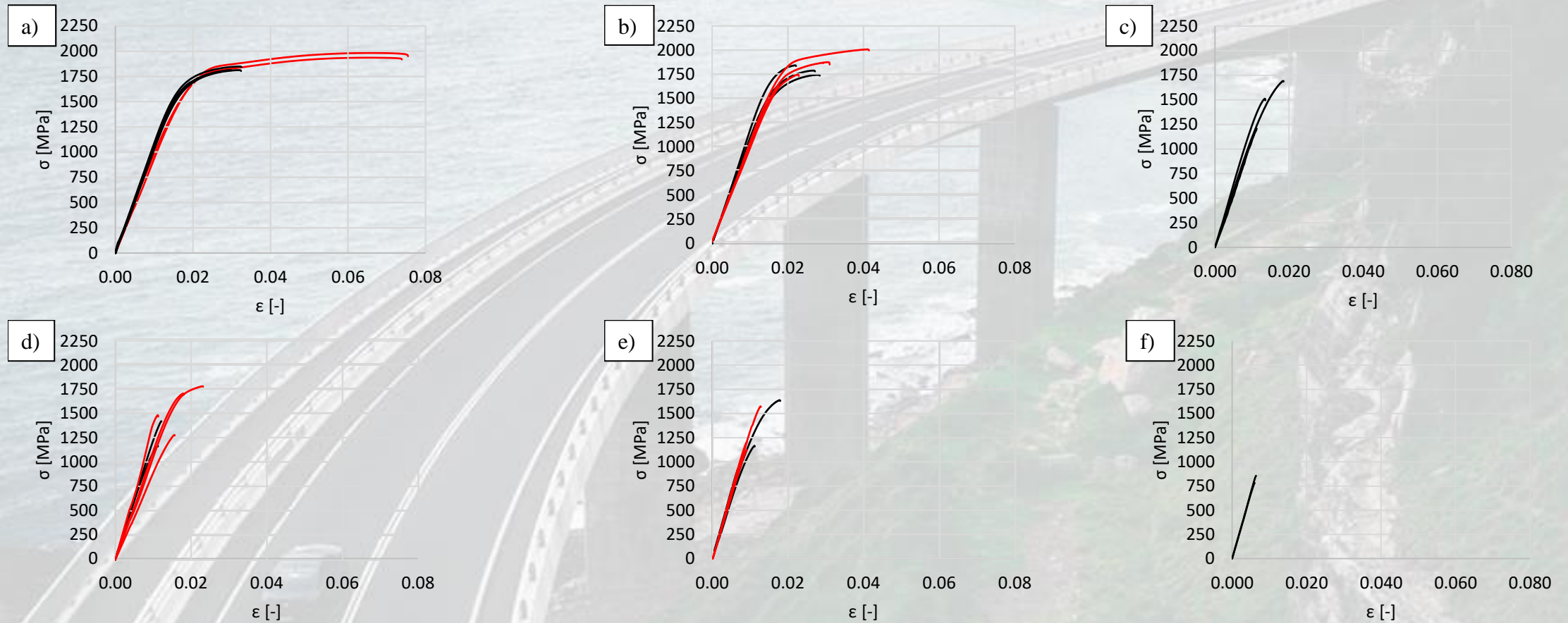


Breaking force to reinforcement area



Breaking strength due to corrosive mass loss

Tensile test



Prestressing reinforcement diagram - mass corrosion loss
a)0%, b)20%, c)30, d)40%, e)60%, f)80%

An aerial photograph of a multi-lane highway bridge spanning a body of water. The bridge is supported by several concrete pillars. A single car is visible on the bridge, moving away from the viewer. The surrounding landscape includes a rocky coastline and some greenery. The text "Thank you for your attention." is overlaid in a white serif font, with a horizontal line underneath it.

Thank you for your
attention.

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