Ingenieure ohne Grenzen

Engineers without borders e. V.
Working group Bridge Building and Structural Design

We build bridges

and bring people together

Engineers without Borders e. V. – *Working group Bridge Building and Structural Design*

The association *Engineers without Borders e. V.* is charitable aid organisation trying to solve engineering tasks in developing countries. *Engineers without Borders e. V.* is a member of the network *Engineers without Borders International*.
The association's main office is located in Marburg. 25 regional groups offer the opportunity to participate locally in activities. National competence groups bundle internal knowledge and assure quality of the individual projects.
The main activity of the working group Bridge Building and Structural Design is the construction of footbridges in rural areas. Until now, projects in Rwanda, Kenya and Tadzhikistan have been realized.
Since the year 2000 we work in close cooperation with KIST (Kigali Institute of Science and Technology) in Kigali, Rwanda. Together with students of KIST, numerous projects have been implemented, whereof each one is of great benefit to the people of Rwanda living in rural areas.
The already built bridges are situated in underdeveloped regions and provide the necessary infrastructure to cross rivers at crucial points. The inhabitants of remote villages have now guaranteed access to markets, schools and hospitals.
Thanks to this cooperation, not only has the quality of life and safety of the population have been improved, a comprehensive exchange of knowledge between engineers from Germany and Rwanda has taken place as well. Members of the working group Bridge Building and Structural Design travel to Kigali on a regular basis to lecture at KIST on the construction of bridges and their maintenance. Students of civil engineering at KIST and responsible government engineers contribute essentially to the success of construction projects and conservation and renovation schemes.
In the last years a large number of students have not only been trained in technical execution but have also been able to put their new knowledge into practice on site. This leads to numerous improvements and simplifications of the projects, which are to the population's advantage.

Already implemented projects

• 2001/ 2002	In October 2001, in Rwanda at Nyabukono, a bridge, which was vital for the country population, had been washed away. In cooperation with students from KIST a new bridge is built.
• 2004	Location assessments in Rwanda by KIST and *Engineers without Borders e. V.*
• 2005	KIST and *Engineers without Borders e. V.* relocate the bridge built in 2002 at Nyabukuno to Nyagisenyi.
• 2006	KIST and *Engineers without Borders e. V.* rebuild a road bridge at Kirambo, which had been washed away in 2001 at the same time as the bridge at Nyabukuno.
• 2006	*Engineers without Borders e. V.* builds two bridges in the Kenya Highlands: the Mosoriot road bridge and a footbridge for a children's home at Ngechek.
• 2007	In May, KIST and *Engineers without Borders e. V.* sign a cooperation agreement defining the future mutual activities of both groups.
• 2007	The project team of *Engineers without Borders e. V.* wins the first price at the Mondialogo Engineering Award for design of a modular system made of available local construction materials for bridges in rural areas.
• 2007	KIST and *Engineers without Borders e. V.* proceed with further location assessments.
• 2008	*Engineers without Borders e. V.* assesses locations in Tadzhikistan.
• 2008	KIST and *Engineers without Borders e. V.* build a footbridge at Vunga.
• 2009	The project team of 2007 wins the Continuation Mondialogo Award.
• 2010	Seminar on bridge construction at KIST and location assessments in Rwanda · introducing students at KIST to solutions for engineering tasks · finding solutions for missing bridge infrastructure in Rwanda · practical application of the learned knowledge

NYAGISENYI
Footbridge, Rwanda 2005

The footbridge has been implemented after location assessments and careful design elaborated *by Engineers without Borders e. V.*
Thanks to the good cooperation with the local population, the project has been widely accepted.
Over one hundred voluntary workers offered their help to complete the bridge within only three months construction time.

Technical data
- suspension bridge
- length 50 m, span width 38 m
- materials eucalyptus wood, steel cables, concrete
- completion September 2005
- costs 9.000 €



NGECHEK
Footbridge, Kenya 2006

The new suspension bridge crosses a river with bluffs dividing the property of a children's home. The home accommodates children infected with HIV.
Thanks to the bridge they can now cross the river without danger.

Technical data
- suspension bridge
- length 54 m, span width 40 m
- materials concrete, steel, wood, steel cables
- completion January 2006
- costs 12.400 €



MOSORIOT
Road bridge, Kenya 2006

Technical data
- single-span girder
- length 10 m
- materials reinforced concrete
- completion January 2006
- costs 7.600 €

In the Kenya Highlands, a road bridge was built in 2006, replacing an old crossing which broke down under the weight of a truck. In a region where the majority of families live by selling their rural products, the new bridge assures the fundamental connection to the market.

KIRAMBO
Road bridge, Rwanda 2006

Technical data
- single-span girder trough bridge
- length 33 m
- width 4.1 m
- materials steel, concrete, wood
- completion December 2006
- costs 14.800 €

During the five month of construction, a team of five students together with local workers rebuilt an old Bailey system bridge. The bridge connects the provinces of KIBUYE and GIKONGORO and assures access to a large hospital in KADUHA as well as the markets and the health center in BIGUHU. The bridge was financed by the Rotary Club Stuttgart-Wildpark.

VUNGA
Footbridge, Rwanda 2008

Technical data
- stressed ribbon bridge
- length 54 m, span width 30 m
- materials concrete, steel, wood, steel cables
- completion October 2008
- costs 15.000 €

In the north-west region of Rwanda, a footbridge has been built replacing an old crossing built of tree-trunks.
The new bridge can handle the large traffic frequency on market days and guarantees safe crossing of the Mukungwa during the rainy season for patient transportation and market visitors.

Projects 2011

Project

Verification and optimization of load-bearing capacity of Kirambo bridge and workshop on load-bearing behavior of truss bridges in view of renovation of Kirambo bridge, Rwanda

Project managers

Donata Trost, Mathis Eglinger

Project period

May/June 2011

Project aim and planned measure

In addition to training on load-bearing capacity of truss bridges in general and the Kirambo bridge in particular, the participants are sensitized for the necessity of regular maintenance and its importance. At the end of the workshop, together with the District Engineer, a check-list for maintenance and renovation of the Kirambo bridge is developed.
The aim of the adaptation of Kirambo bridge is to re-establish the original load-bearing capacity of the bridge to make it passable for the planned expansion of the road and the expected truck traffic.

Target group

– students and teachers of civil engineering at the University KIST
– local engineers of the Ministry for Infrastructure
– rural population

Project

Long-term strengthening of bridge at Vunga, Rwanda

Project managers

Jannis Hülsmann, Christoph Winkler

Project period

September/October 2011

Project aim and planned measure

The footbridge built in 2008 is subjected to increased vibration stresses because of the high traffic frequency on market days and the light construction type of a stressed ribbon structure. To reduce occurring fatigue damages, the construction is optimized.

Target group

– students and teachers of civil engineering at the University KIST
– local engineers of the Ministry for Infrastructure
– rural population

Project	**Seminar on bridge construction 2011, Rwanda**
Project managers	Sebastian Lübke, Christoph Winkler
Project period	September 2011
Project aim and planned measure	At KIST, under the lead of two engineers from *Engineers without Borders e. V.* – working group Bridge Building and Structural Design, a compact seminar with the subject "Footbridges in Rural Areas" is offered to students in third year of civil engineering studies. The aim of the project is to improve the durability of the infrastructure in rural regions of Rwanda. By training students of civil engineering students in Rwanda, the basis for development, design and execution of bridge projects is created in situ.
Target group	- students and teachers of civil engineering at the University KIST - rural population of Rwanda as final project aim

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The project is supported by

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