

MIKLÓS ZRÍNYI NATIONAL DEFENSE UNIVERSITY

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**RESEARCH OF TEMPORARY BRIDGE REPAIRING CAPABILITIES AND
POSSIBILITIES OF HUNGARIAN DEFENSE FORCES**

PhD thesis

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Formulation of the scientific problem

Due to the changes of social system and joining NATO, defense policy of our country had to be placed on new basis. Varied political, economical and allied conditions essentially modified tasks and accompanying structural and technical requirements of the Hungarian Defense Forces.

In preceding period of time measures implemented for home defense, requirements for functioning and preparing based on a military warlike conflict.

Termination of bipolar world order, as well as democratic transformations in Europe, the hazard of a global conflict significantly decreased, but at the same time hazards and danger sources of security increased and became more complex.

We don't calculate upon a direct armed attack, threatening our country, but it is just possible the chance for a rise of an armed conflict in our region (neighborhood).

Based on the facts and experiences mentioned, i.e.: reasons of conflicts and wars in the past, their outcome and consequences, we can declare that there is a risk in future of an armed conflict between different alliances, states or groups. All this makes it necessary to systemize and analyze our knowledge and experiences, and get or work out new, effective principles and methods.

We have to permanently research and review the theory and practice of military science, armed fights, and its engineer support as a part of armed activity, and then we have to use and establish our results, scientific proposals and experiences during working out process of new principles and methods. The *timeliness of the topic of my PhD thesis is supported by numerous factors* but I only mention the followings:

After joining NATO, new expectations and requirements raised in relation with possible tasks and employment of Hungarian Defense Forces, which make it essential to review our current principles and if necessary, to modify them.

During our research we have to set down the new basis of peace support and military bridge-building, that we reach the ability to cooperate with other allied countries, but maintain our special national features. All that means, that is not practical and necessary to completely adapt hypothesizes and practice applied by other NATO nations, but those have to be align to our specific conditions.

Conflicts in recent past, experiences of peace support operations enlarging the Alliance and reform its military command system generated new theoretical and practical questions related to bridge-building.

Technical-technological modernization in our days makes it — or has to make it — possible to procure new, modern equipment and machineries.

Designated troops of Hungarian Defense Forces participated in activities of different multinational units; therefore applied bridge-building technology has to be interoperable with technology used by allied forces.

Maintenance, development of technical equipment in service with the Hungarian Defense Forces and procurement of new technology and devices seems to be very urgent. It has dual demand: on the one side there are tasks of home-defense and disaster relief, on the other side there are participation in international military operations and bridge-building capacity offered to NATO.

Now I feel necessary to highlight arranging and friendship cultivation role of a bridge-building, beyond on that, to realize a bridge — independently from the surroundings — nevertheless a constructive work, to which deservedly proud of builder, designer and constructor equally.

Accomplishment of requirements and executing the tasks generated by the facts mentioned above, make it necessary to implement significant changes and development related not only to military leadership, but in attitude of personnel, too.

Research purposes

According to the facts mentioned above, I determined the following main research purposes: systematization of scientifically established requirements related to bridge-building; to accurate basic principles, revelation of reasons of the deteriorations of bridges and methods of bridge recovery.

Additional purposes of my research were:

- *to reveal* current stage of bridge-building, and its feasibility during home-defense, disaster-relief and peace support operations;
- *to summarize* necessary changes of principles and classifications in national terminology;
- *to examine* the reasons of bridge-destructions, to systematize their structural construction;
- with analysis of bridge-building equipment in service with Hungarian Defense Forces, *to confirm* the need for their immediate development;
- *to analyze* experiences and observations we got during IFOR—SFOR peace support missions, and relying upon these findings *to reveal* general features of bridge-building and also *to summarize* main requirements for bridges in the future;
- *to work out* view points of engineer tasks of theater military evaluation, taking into consideration obtaining method of information necessary for bridge-reconstructions;
- *to make proposals* to work out national regulation of bridge-building, in consideration with deployment of STANAG 2021.

Research methods

To fulfill my research purposes I used the following methods during my research work:

- I searched World Wide Web and libraries of universities and Institution of Military Technology for publications, thesis and regulations in relation with the topic.
- I studied national and international special literature, issued publications, essays in relation with the topic, as like as results and recommendations of other special researches;
- I studied and analyzed provisions of law and resolutions related to topic;
- I participated in different international, national and local conferences, symposiums and lectures of which themes were in connection with my research area;
- I systemized my knowledge and experiences I have raised during my military carrier;
- with analysis of empirical facts, I drew conclusions have relation to stock of bridges, sustainability of traffic, satisfaction of home-defense requirements;
- I consulted military experts and scientific researchers on my topic, and compared my results with their ideas.

Partial results of my research were published in different magazines, transactions and were introduced in scientific conferences, meetings.

Short description of scientific examination

In chapter one I outlined short history of bridge-building and its military importance, as well as general characteristics of military bridge-building. I also determined role of bridge-building in defense and peace support operations.

In chapter two I examined potential reasons of bridge deteriorations and I analyzed characteristics of bridges damaged during disasters or warlike activities.

In chapter three I systematized requirements of bridge reconstructions and revealed potential methods. I analyzed questions and problems in relation with bridge-building capability of Hungarian Defense Forces. I also search answer for questions of capability-development.

In chapter four I analyzed the current stage of bridge-building regulations of Hungarian Defense Forces, conditions of its working out and tasks of deployment STANAG 2021.

In chapter five I summarized the conclusions of my research work and my scientific results. In this chapter I made proposals to utilize my results and areas need further research work.

Summarized conclusions

My research work verified that our joining NATO generated new challenges and requirements in deployment and usage of STANAG 2021. A section of these new challenges originate to joining NATO. But the other section resulted from our security conditions, role of home-defense and functionality of Hungarian Defense Forces. HDF has to give scientific answers to these challenges in the near future.

My research work verified that we have to start the development from the current stage and condition. We have to determine the areas that primarily need bridge-building support. At the beginning of development we have to reveal main features of military bridge-building. We also have to define new requirements related to military bridges.

We have to classify military bridges according to civilian classification, but maintain military aspects. Advanced classification showed in my thesis introduces a novel display, establishing a connection between civilian and military bridges.

With examining the reasons of bridge degradations, it can be realized that the most drastic effect produced by intentional demolitions. We need thorough and exact intelligence data for starting a bridge-building or bridge reconstruction. But reconnaissance reports are filled out in different level.

It is very important to know the reasons of bridge degradation and the military geographical situation for the reconstruction.

As I established, nowadays the bridge-building possibilities of the Hungarian Defense Forces are limited, maximum span width of a fixed bridge is 19 meters.

Stockpiles of bridges service with Hungarian Defense Forces are not enough even in quantity nor quality to fulfill the requirements of home defense.

As a result of my research, I established that length of the bridging equipment and the reserved stockpiles are not enough to maintain the traffic network in a situation similar to the situ in Balkan. Even a smaller bridge degradation or demolition can cause serious problems.

I drew as a conclusion that procurement of panel bridges may assure demands of bridge-building. *During my research I verified*, that we should have to keep our capability and preparedness to build, reinforce or reconstruct bridges with local material and equipment.

Military regulations for bridge-building are not modern, even not compatible with today's principles and methods. During the research work I verified, that our joining NATO makes necessary to harmonize our existing and expected bridging equipment with the requirement of NATO standards, and to work out a new military regulation or handbook for bridge-building.

Scientific results of research

I think, I achieved my aims with my research work. With the research methods I used, I verified that hypothesizes were correct. After summarizing the results of my research work, I esteem the followings as new scientific results:

1. *I worked out and made proposals* to insert the different military bridges into the civilian classification and for the novel classification of military bridges.
2. Analyzing the reasons of bridge degradations, *I worked out* a structural layout of bridge degradations.
3. On the basis of Balkan experiences, *I worked out and made proposal* in relation with engineer support aspects of military geographical evaluation of theatre of operation.
4. *I worked out and made proposal* for the requirements should raise related to bridges procured in the future, I also verified the need for development and established the areas (between 20 and 60 m free span) that need modernization.
5. *I made a proposal* for determination of maximal stresses in SI measurement units on the basis of STANAG 2021 that ensures safe crossing with vehicles on all NATO bridges.

I esteem as further results of my research work:

1. *I examined* the current bridging stockpiles, *systemized and summarized* the possibilities of bridge reconstructions.
2. *I analyzed* the condition of the Hungarian bridge regulations and *made proposal* for its contents, for load classification of bridges in accordance with STANAG 2021.
3. *I determined usage areas of NATO STANAG 2021* in Hungarian Defense Forces, where, in my opinion, its usage is essential and urgent question to correctly classify bridges and vehicles into MLC categories.
4. *I determined the main tasks of the Hungarian Defense Forces related to use STANAG 2021* that is very important due to the NATO-offered bridge-building capability.
5. *I pointed to the* importance of engineer reconnaissance data, which must have priority in the field of engineer support tasks, at the same time *I evaluated* experiences in this field and drew attention to the insufficiencies.

Applicability of results, recommendations

I recommend using my results in the areas of:

- the decision making process during procurement bridge-building equipment;
- the employment, maintenance and development of bridge-building equipment by the users;

- the education as auxiliary material during the education of bridge-building in the Miklós Zrínyi National Defense University;
- the self-education as an aid for the elaboration of topics related to bridge-building equipment;
- the formation of the basic theories and working out process of military bridge-regulations;
- the further scientific research of the topic.

In my opinion, more detailed and extended research is necessary on the following fields:

- determination of the classification and marking method of the load class of bridge structures, MLC classification of all bridges in the country and MLC classification of military vehicles;
- determination of the claims coming from the new challenges, examination of tasks in relation with the host nation support of deployment STANAG 2021;
- the working out and determination tasks sphere of authority, relations of organizations deal with operating bridge-building equipment.

I am sure, that my research work provide proper basis for the further scientific research in the field of military bridging and serve its implementation.

To continue my work, I would like to carry out further researches and scientific investigations in relation with military bridging.

Szentendre, 20th January 2007.

(LTC Eng. Zoltán Havasi)