

*The Engineering Professions Association
Of Namibia*

YOUNG ENGINEERS' CONSTRUCTION PROJECT

EPA Young Engineers' Construction Project 1998
Bridge Building

The Namibian Bridge Building Competition as a starter...

Being an institution committed to promote the science of engineering in Namibia, kindling an interest in engineering among the young generation is one of EPA's premier aims. For a number of years in the past, EPA has arranged competitions among secondary schools based on the construction of engineering models. The most recent projects were a water pump installation and a lifting electromagnet. The main sponsors of these two competitions were Grinaker and Siemens, respectively.

These competitions, which became known in Namibia as the "Young Engineers' Construction Project", originally started many years ago as a bridge building competition. EPA is proud to have been one of the pioneers of this idea, which was then turned first into a great success in South Africa, and later into an international competition, by the South African Institution for Civil Engineering (SAICE).

An invitation by SAICE for a Namibian team to participate in the "International Bridge Building Competition 1998", triggered EPA into reviving the bridge building competition as a premier annual event in its "home country", so to speak, and at the same time open the opportunity for Namibian school pupils to compete internationally. Whereas the most recent competitions were quite demanding and thereby tended to limit the number of pupils and schools able to compete, the bridge building competition is fairly simple, yet challenging. That the competition focuses on a civil engineering problem in no way derogates from the principles of encouraging pupils to think like engineers, and in an extended sense build bridges to a better future.

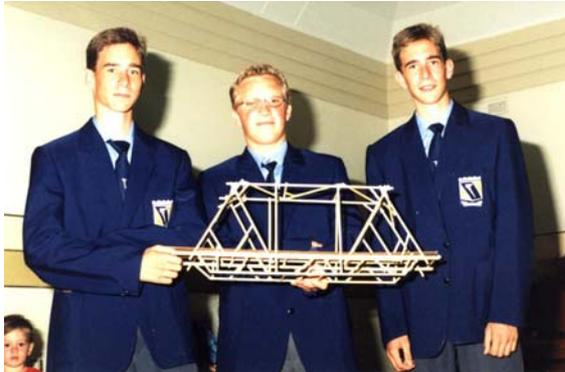
On 28 March, with the Namibian Bridge Building Competition 1998 held at the Windhoek High School, EPA reached out to about ninety Grade 11 and 12 pupils from eleven schools throughout Namibia, introducing them to the challenges that engineers have to meet when designing and building a bridge. Thirty school teams, of mostly three pupils per team, tried their hand at the design and construction of model bridges using a minimum of tools and materials, all supplied through generous sponsorship. In the invitation to the competition, pupils and their teachers had been encouraged to do some "homework", but the bridges were designed and built at the competition venue on a single day, using only materials and tools provided free of charge to all competitors. The competition largely followed the rules of the SAICE Bridge Building Competition 1997, which were provided to competitors beforehand. However, to make the "playing field" more equal, on the day of the competition the rules were changed somewhat to prevent better prepared teams from applying "pre-fabricated" solutions. After a brief lecture on structural design, it was amazing to see the ingenious solutions a group of enthusiastic youngsters can achieve with only a fistful of wooden dowels, a strip of hardboard, a piece of string and some glue. As in "real" engineering, contestants were obliged to observe prescribed bridge specifications and time limits, failing which the bridge was disqualified.

The main evaluation criterion for the bridge building competition was the ratio obtained by dividing the load that a bridge could carry by the bridge's own weight. This criterion emphasised the principle of providing strength in an economical way. Additional points were awarded for ingenuity and workmanship. The models which the contestants eventually presented in response to these criteria ranged from the simple, ingeniously attempting to utilise weight savings, to an exquisite arch bridge which captured the judges' imagination. The latter was in fact one of the strongest bridges tested, but flaws in detail proved to be its undoing. The winning bridge was largely a tried and trusted conventional design, but with some clever tweaks and meticulous attention to the kind of detail that makes the difference between a good and an excellent construction. This bridge, with a span of 650mm and a mass of 514g, carried a respectable 43kg before breaking. Not only was this by far the

highest load, with the next highest load of 29kg achieved by the bridge taking second place, but at 84 times its own weight it also achieved the highest load carrying factor.

The winning teams and their schools, walking away with three generously sponsored prizes, were:

1. Team 1, Etosha High School, Tsumeb: Sergey Petrov, Gobi and Nubian Kastelic



2. Team 3, Etosha High School, Tsumeb: Uwe Oeder, Malti van Rensburg, Dewald Louwrens



3. DHPS Team, Deutsche H6here Privatschule, Windhoek: Dirk Sauber, Michael Hassel.



The competition day was concluded with the prize-giving and a generously sponsored cocktail party for competitors and guests. The guest speaker was the Deputy Director for Basic Education in the Khomas Region, Mr Esslinger, who thanked EPA for helping education to come out of its isolation. Mr Esslinger provided an insight into the problems that basic education is battling with, and it became quite clear that there is ample scope for cooperation between EPA and the Ministry of Basic Education in order to help prepare school pupils for the "real world" and a career choice.

...and the International Bridge Building Competition as an eye-opener

EPA is very grateful to have had TransNamib Limited and Burmeister and Partners Consulting Engineers as sponsors for the travel and accommodation costs, respectively, for the winning team to take part in the International Bridge Building Competition in East London, South Africa, on 6 April 1998.

After some last-minute flurries to get travel arrangements, passports and visas sorted out (here EPA gratefully acknowledges the prompt service obtained from the South African High Commission, the Namibian Ministry of Home Affairs and TransNamib Travel), the threesome of Sergey Petrov and Gobi

and Nubian Kastelic, accompanied by Dirk Reed and Günter Seydack of EPA, arrived in East London on the evening of 3 April. The bonus of a weekend in East London, brought about by flight availability, was thoroughly used by the winners of Namibia's bridge building competition to splash into East London's Water World, chase their mentors in go-kart races, and then finish them off at laser games. Oh, to be young again!

After an evening of seriously huddling together over bridge design plans (unfortunately, the promised competition rules eventually didn't materialise in time), the day of the international competition broke. In the picturesque historic East London Town Hall the best bridge building teams from the host country, South Africa, and visiting countries Namibia and Zimbabwe, were pitted against one another. Professor Derek Sparks of the University of Cape Town presented to the competitors an exemplary introduction into the science and art of bridge building (the EPA team mentors pricked their ears to catch some tips for future Namibian competitions, too). Similar to the Namibian competition, the final bridge building rules were somewhat different from the examples distributed beforehand, and all materials and basic tools were provided by the organisers. A significant difference, for which the Namibians were not prepared, was the admissibility of teams bringing their own tools to facilitate the design and construction of their model bridges, such as drawing boards and clamps. Initially, the Namibian team was buoyed by the comparison of their Namibian winning bridge with winning bridges of schools from previous South African competitions. However, it soon became clear that some of those schools had since made good use of opportunities to hone their skills and even surpass the expectations of the competition judges. Eventually, some of the bridges broke the loading apparatus, instead of vice versa! This must surely rank as a unique accomplishment of school pupils versus engineers, and severely taxed the poor judges' ingenuity in order to save the competition after a nail-biting intermission to effect crisis repairs. Some of the competition organisers and judges still dared to compete unofficially, and predictably came off second-best, with scores of 61 and 57 percent.

The bridge that scored 100%, of HTS Middelburg, had a mass of 271,8 g and carried a whopping load of 1 395 Newton. This translates into the bridge carrying about 513 times its own weight!

Out of 23 competing teams, the Namibian team from Etosha High School finished 17th, with a score of 45%. Their bridge carried 236 times its own weight, still a dramatic improvement on their Namibian winning bridge, which had carried "only" 84 times its own weight.



This first international bridge building competition in which a Namibian school was privileged to participate, was indeed an eye opener, not least for the organisers of the Namibian competition. Indeed, it places EPA into some dilemma. Surely, if we want to compete internationally, we would wish to do so on an equal footing. We would wish to be able to learn from such competition and improve to the point where others could even learn from us. However, on the other hand, EPA also wishes to maintain the enthusiasm of lesser privileged schools and pupils in Namibia, who would not be able to hone their skills into the realm of high-tech.

In closing, EPA wishes to cordially thank our hosts, SAICE, and our generous sponsors. The following firms and institutions, in alphabetical order, made it possible for EPA to present the Namibian Bridge Building Competition, by collectively providing the cash and kind required for materials, tools, catering and venue:

Africon Namibia Consulting Engineers • Ark Trading • Bicon Namibia Consulting Engineers • Bührmann & Partners Consulting Engineers • Group Five • Kiihler Kutz • Lund Consulting Engineers • M&Z Hardware • Namibia Beverages • Namibia Breweries • PG Bison • Precast Concrete Industries • Pupkewitz Megabuild • Rocla Pipes • Stewart Scott Namibia Consulting Engineers • VKE Namibia Consulting Engineers • Weder, Meyer & Louw Consulting Engineers • Windhoek Consulting Engineers • Windhoek High School, for providing an ideal venue and "tuck shop" facilities • the Ministry of Basic Education and Culture, and our guest speaker, Mr Esslinger.

The tremendous support given by Namibian consulting firms and the Namibian industry have made it possible for school pupils from almost all over the country to gain first-hand experience of the challenges and tribulations of engineering in a playful, though highly competitive manner.

Burmeister and Partners Consulting Engineers and TransNamib Limited have made it possible for the first time for a Namibian school to compete with other schools internationally in a bridge building competition, and gain the kind of experience that can only come from such international competition.

EPA also gratefully acknowledges the contribution made by the following individuals (in alphabetical order) to turn the Namibian Bridge Building Competition into a success, by organising, canvassing sponsors, competing and adjudicating:

All the pupils and their teachers taking part in the competition • Mr Robert Camby • Mr Etienne Kirsten • Ms Chantel Kutz • Mr Dirk Reed • Mr Günter Seydack • Mr Rolf Trossbach.

In all, the above sponsors and individuals contributed the N\$25 000 and the considerable effort that it cost to organise and participate in the Namibian and International Bridge Building Competitions. Compared to many other organised events and sponsorships in Namibia, this is a truly magnificent achievement.

If nothing else, it shows:

WE CARE