

## THE STRUCTURAL ENGINEER FRAME WORKS AND CIVILIZATION

*(The President's address on the October edition of the journal of the Nigerian institution of structural engineers 2002)*

When God created man, He gave him authority over the Earth, to subdue it and make it a worthy garden, and man obeyed. Man had to subdue the weather, grow food and create new ways of doing things.

One of the primary concepts of man's creativity was the concept of spatial three dimensional forms, whose co-ordinates in space must be relative to each other, for particular assignments, because each task was different.

And as man developed the concept of primordial spatial forms called frames he could with every new attempt and works define and implement tasks better.

The definition meant that man must by means of mathematics be able to locate the points in any arbitrary space. Thus Geometry and other mathematical formulations became a primary tool for understanding and articulation of work. Man also had to realize these forms with the materials available to him and optimization and resource control became part of him. Thus the study of the science of materials became a major time occupation for man. These spatial forms where to define his house, the cart drawn by the horse, the farm house, the frame of his first car, and to modern times; any physical shape, from the frame of the computers, bicycle, car, airplane, ship, house, World trade center, stadium, churches etc.

The concept of frames as an integral part of human development is therefore as old as man. Man was shaped by God, around a frame called the skeleton and there is nothing that exists today especially in the inanimate world that is without a frame.

The frame of an aircraft for instance must be light and rigid, and produce the desired performance when subjected to various types of loads such dynamic loads, passenger loads, turbulence loads, take off and landing loads, without suffering severe distress.

If therefore the concept of spatial three dimensional forms has been in existence from the creation of man, then the science and art of Structural Engineering is as old as man.

Some of the spatial forms have been articulated and have become so common in use and practice that it does not require definition. For example, the furniture maker makes use of dimensions which over the years are like creeds in his making of chairs, desks, cupboards etc. The timber roof carpenter employs standardized size of timbers and forms for the construction of the roof trusses, be it Pratt, Howe or Fink trusses, with the spacing of the trusses and purlins known without recourse to mathematics. There are foundation solutions, which are implemented even without the thought of a

second opinion, because they proved standard solutions. The solutions which are now standards were the original works of people, and of course Structural Engineers.

**Structural Engineering has been defined times without number as the art of using materials to build real structures with elegance and economy, to withstand forces (gravity, wind, earthquake, bomb, fire, accidental impacts) so that our responsibilities with respect to public safety is satisfied.** This definition is as true as ever.

In a society like ours where achievements are taken for granted especially when it is seen as traditional or normal, the works and achievements of the structural engineer need to be trumpeted. The Structural Engineer has provided the throbbing heart in all areas of man's development, from the times of Adam, to man walking on the moon. Unfortunately the Structural Engineers have believed that his achievements must be celebrated for him by others, history has proved that you have to celebrate your achievements, and shout it on the roof top in order to be relevant. If Structural Engineers did not design the space shuttle and rocket delivery system, to withstand enormous stress; and loads man's attempt to conquer space would have been zero.

Structural Engineers have bridged natural barriers and made it possible for people to shake hands across such impossible divides and build a better and happier world. Structural Engineers have dammed rivers, and helped in the harnessing of its power to serve man. We have provided the ultimate solution to mankind in solving the problem of a fixed land mass area, vis-à-vis a growing human population of the Earth, by the concept of vertical colonization of space, buildings with several floors for human activity and occupation.

The World Trade Centre(late) was a magnificent architectural masterpiece until it came down, and the questions were not asked why architecturally it failed, but structurally why, and suddenly people were asking question did the Structural Engineer do enough for the late "World Trade Center", and other buildings and monuments all over the world. When buildings collapse in our neighborhood the question asked is who are the Engineers, did they do their work, were the materials right, was it supervised by Engineers, was the contractor an Engineer etc.

We should be proud of our profession, we should celebrate our profession and we should therefore stand up together and demand our dues, our recognition denied and our proper position in the economic and strategic decisions making organs of Government, Institutions and Organizations.

The Nigerian Institutions of Structural Engineers as a body began the campaign to educate fellow Nigerians on the role, and importance of the Structural Engineers. In March this year 2002, we began a weekly paid advert in the Guardian, on the importance of the Structural Engineer to National Development. We also started a weekly TV programme on Channel 10, NTA, in which a prominent structural engineer is interviewed on a particular societal assignment, for the benefits of the listening public. It is my belief that structural engineers must not wait until buildings collapse or failures occur to educate the public on the very important role played by the structural engineer.

We must go beyond telling people what we do; we must implement measures to make sure that our responsibilities as Structural Engineers are not compromised by infiltrators. This we are doing through the use of professional **NIStructE** stamp. If we use the professional on all our works, it will serve as an additional check that makes it impossible for unregistered Engineers to authenticate Structural drawings and documents. It will in the long term reduce the incidence of the collapse of building, because one cause of failure, faulty designs would have been reduced drastically.

Staying relevant in the profession is an on-going thing. Advances in materials and technology have made it important for Structural Engineers to stay informed. The Institution has continued to run professional courses and refresher courses to update and inform Structural Engineers in all cadres of membership, on new materials, new technology and new methods of structural engineering practice. We must count ourselves lucky that we can devote a lot more time into doing real engineering than crunching of numbers. The advent of high speed computers and state of the art soft-wares has transformed the Structural Engineers to a very effective professional. We can work and produce documents at speeds comparable to structural engineering firms abroad, and slowed down only by the limitations of specialist knowledge in any particular area of structural engineering.

I encourage all of us to take advantage of the INTERNET technology available, tested structural engineering soft-wares on the shelves, to launch ourselves properly into the Global market, motivated by excellence and ever increasing opportunities. Never again shall we cry about marginalization. Let us branch out and face the reality of a Global market and take hold of the opportunities that exist in Nigeria, in West African Coast, Africa and indeed the World, for the structural Engineer.

**Engr. Ike. Chukwuneke. Oct. 2002**