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Dr. Devdas Menon is presently Professor and PC Varghese Institute Chair in the Department of Civil Engineering at IIT Madras, engaged in teaching, research, and consultancy in structural engineering, and in developing a holistic approach in education, with emphasis on inner development and transformation.

Devdas Menon had his schooling at St. Xavier's, Kolkata, and his engineering education in civil engineering at IIT Madras (1975-1980). He worked in the industry, in structural design consultancy, in New Delhi (1980-'85), and during this time, did a (part-time) post-graduation course in structural engineering at IIT Delhi. He subsequently opted for an academic career, initially with REC Calicut (1985-'98), and later with IIT Madras (1998 onwards). During this time, he continued his education in structural engineering, receiving degrees of M.Sc. (by research) from the University of Calicut in 1989 and Ph.D. from IIT Madras in 1995. He also ventured to do a post-graduate course in English Literature at the University of Mysore. His academic performance had been consistently top-ranking.

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In engineering, his primary research interests are in the area of structural concrete design, and the analysis and design of buildings, bridges, towers, and chimneys. He has also carried out innovative research and development in affordable and sustainable building systems and biomechanical orthopedic devices. He has published a large number of technical papers and received patents and awards. He has a special interest in

developing codes of practice and has served as the Chairman of the Bureau of Indian Standards CED 38 Committee on "Special Structures" since 2006.

He has a deep interest in teaching and continuing education, and has authored / co-authored several textbooks, titled "Reinforced Concrete Design", "Structural Analysis", "Advanced Structural Analysis" and "Handbook on Seismic Retrofit of Buildings".

Devdas Menon has also authored three popular books on holistic living, "Stop sleepwalking through life!" (2004), "Spirituality at work" (2016), and "The awakening of Nachiketa" (2022). He has been conducting numerous lectures and workshops for students, teachers, and corporate organizations, on finding meaning and fulfillment in life through self-awareness and inner transformation. He teaches two uniquely designed 'free elective' courses at IIT Madras, GN5001: Self Awareness and GN6001: Integral Karmayoga, which are open to all interested students and faculty.

He has been conferred several awards, notably the "Distinguished Service to the Institute (2013)", "Srimathi Marti Annapurna Award for Excellence in Teaching (2014)", "Institute Chair Professor" (2019), and P C Varghese Institute Chair (2021) by IIT Madras, as well as the "Ultra-Tech Award for the Outstanding Concrete Engineer (2014)" by the Indian Concrete Institute and the "Guru Shreshta" award (2015) by Rotary Club, for distinguished service in education, research, and technology development.



What were the driving forces that helped you to choose a career path in civil engineering?

I was attracted to mechanics all along and looked forward to studying mechanical engineering at an IIT. Although I did get an opportunity to switch to any branch after completing my first year at IIT Madras, I chose to stay back in civil engineering – the branch that fate had assigned to me when I joined in 1975. I discovered that mechanics could be pursued equally well in structural engineering – a career that opened up for me subsequently. I enjoyed dwelling on the mechanics underlying the analysis and design of various kinds of structures – ranging from small buildings and industrial sheds to tall buildings and towers and long-span bridges. When I first started working (in 1980) as a structural designer, I particularly liked the motto of our company – to design structures that were most efficient, economical, and aesthetic in appearance. Later, when I joined academics, I enjoyed teaching, research, and development, as well as consultancy related to various challenges in structural engineering. The challenge for me was to look for simple and elegant solutions based on intuition and simple manual calculations, rather than computationally intensive analysis. This is the approach I advocate for my students and research scholars. It is thoroughly enjoyable.

Could you share some views on sustainability in construction?

Sustainability is a keyword that has gained much-needed popularity in present times. It is fashionable to talk about it, but in my view, it is more important to have it as a basic attitude in life, founded on simple care and concern for fellow humans and other living beings, and the environment. This is not sufficiently emphasized in our education and way of living. The purpose of technological development should not be to encourage unbridled materialism and

consumption; this has to be constrained and balanced by a clear understanding of the costs involved – not only in terms of depleting natural resources but also the tremendous pollution, waste, and damage done to the environment. As Mahatma Gandhi put it, “Earth provides enough to satisfy every man’s need, but not every man’s greed”.

Much can be said on this topic, but I will limit my views to the R&D work that we have done at IIT Madras in sustainable housing using glass fiber-reinforced gypsum (GFRG). GFRG panels are made from recycled industrial waste gypsum, and when used in building construction for walls and floors, consume far less cement, sand, steel, and water (all becoming increasingly scarce) than conventional construction. Six Ph.D. students have worked on this product, and two BIS codes have been developed. This is particularly suitable for multi-storeyed mass housing, where the same plan can be replicated at all floor levels – as demonstrated in the four-storeyed hostel buildings constructed at the IIT Tirupati campus.

The way forward in sustainable construction is to minimize the use of building materials involving high embodied energy, and to use recycled waste material (“from waste to wealth”) in innovative ways – such as reusing concrete waste as aggregate. The concept of “zero energy building”, where the total amount of energy used by the building on an annual basis is rendered equal to the amount of renewable energy created at the site, is now gaining ground – and many awards have been instituted for this. But, the term “greenhouse” (with a platinum rating) must not be confused with “green home”. A greenhouse could well end up as a broken home (increasingly common in modern times) if the inhabitants lack sustainability as a fundamental attitude in life: care and love.



Take a look at a truly green classroom under the shade of a banyan tree in the forest setting of IIT Madras (this would probably not get any green rating under current standards). But this is how sustainability was practiced naturally and effortlessly by our forefathers.



Could you share some details about the research projects you are currently focussing on?

I am presently winding up my research projects– given my forthcoming retirement from service at IIT Madras. One of the projects is related to the pending work on GFRG housing (mentioned earlier). In urban construction, there is a demand for stilted construction to accommodate vehicle parking at the ground floor level. This is not possible with the load-bearing GFRG construction, where the walls need to go down to the foundation. We have now developed a system where the multi-storeyed GFRG construction (with no RC slabs, beams, and columns) can be raised on a system of RC columns and beams at the lowermost floor – satisfying all the requirements for lateral load resistance (especially earthquake loads). Another project is related to understanding the behavior of creep and shrinkage in prestressed concrete beams – a topic not yet well understood and adequately researched. Yet another project relates to the efficient and economical design of RC beam-slab systems. All these projects are nearing completion.

Could you share some interesting incidents in your professional life?

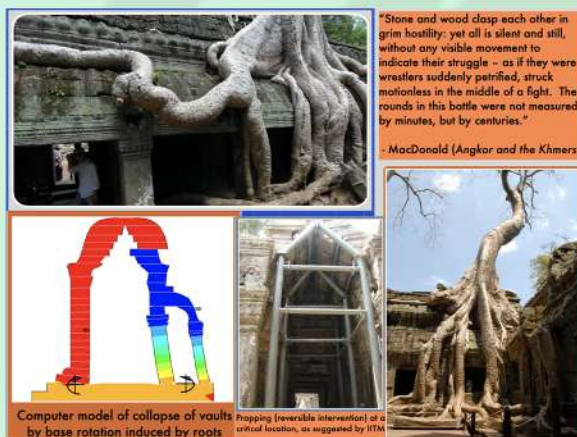
Around 1983, while working in Delhi, I decided to set up a company (a ‘start-up’) along with two architect friends. One of our first projects involved designing a township for a public sector company in Uttar Pradesh. We worked hard – some sixteen hours a day – to complete the project on time. However, we found it difficult to get our consultancy fees on time and realized that the engineers and other officers were looking for a bribe to pass our bills. This one incident changed my life (it even made me spend some time in the Himalayas). I began questioning the very purpose of life and knew something was radically wrong if one had to be corrupt to ‘succeed’ in one’s career. Today, looking back, I am grateful for this one incident, for it compelled me to go inwards and explore fundamental questions in life...

Around 1988, while working at REC Calicut (now NIT Calicut), we had an interesting project of designing a beautiful ship-shaped indoor stadium (the GCDA stadium) at Kochi for the National Games. The architect had prepared some drawings and a 3D model of the building – involving inclined galleries and walls, helical stairs, and a stadium roof supported on just four columns – and it was our task to convert the structural design to 2D drawings that could be used for construction. It was truly a learning and collaborative experience. All the calculations were done by hand, and I still preserve these, to show to our students. The picture of the completed stadium appeared on the cover page of the first edition of our book titled ‘Reinforced Concrete Design’ (published by McGraw Hill in 1998); the photo is attached.

During 2008-2014, we had an interesting assignment from the Archaeological Society of India (ASI) – to help restore the



Ta Prohm temple at the Angkor Wat complex in Cambodia. This is a thousand-year-old temple, whose structure had been covered and damaged by large trees. But the trees were also a major tourist attraction, and we had to find a solution to prop up both the structure and the trees so that tourists could walk through safely. It was a very challenging problem of tree-structure interaction on which we worked for several years, involving many trips to the site to study and oversee the execution (see the photo attached).



Following the great earthquake and tsunami in the Indian Ocean in 2004, we were called upon by the Department of Lighthouses and Lightships to restore a lighthouse at Little Andaman. Other institutions had visited the site earlier and declared that the best option would be to build a new lighthouse. But the Department found this to be an expensive option (costing more than a crore rupees) and wondered if a cheaper alternative was possible. On inspecting the 45m tall lighthouse at the site, we found that although it was severely damaged at the base, the good foundation as well as the portions of the tower above 5m height were intact, although the entire structure had undergone a slight rigid body rotation. The tsunami wave had struck the tower in the direction of the tilt, causing the crushing of concrete on one side and yielding / rupturing of reinforcement on the other side in the base region – features

crushing of concrete on one side and yielding / rupturing of reinforcement on the other side in the base region – features of a classic ‘plastic hinge’ forming at the base of a vertical cantilever. We suggested a simple repair strategy of correcting the tilt by suitably increasing the wall thickness (and diameter), demolishing the crushed concrete, introducing new wall reinforcement, and pouring fresh concrete with an epoxy mix to bond with the old concrete. The retrofit work was executed successfully at a nominal cost of Rs 10 lakhs, and thus a damaged lighthouse was retrieved economically and made functional.

There are several other interesting incidents and learning experiences, which are available in a video-recorded lecture at: <https://www.youtube.com/watch?v=CX15eROTho8&feature=youtu.be>

What would you like to share with aspiring engineering students looking for progress in their careers ahead?

What do most people want in life? Many different answers are possible, but they all point to one desire: fulfillment. We are all driven by a sense of lack (in some sense or other) and seek to satisfy this in promising ways suggested by society. That is how we got into engineering in the first place! In the process of living and learning, we discover many domains for which we have the aptitude, in which we are good. And among these domains, we can find at least one or two where we can be truly creatively engaged, which we love doing, especially when we don't feel the passage of time. It is important to have these two features in the career we opt for. In the process of working, we will have to face many challenges, including issues related to harmonious human interaction, where our humanity, leadership, and creative intelligence will be put to test. As we succeed and progress, we reach a stage in

life, where we either outgrow, or see-through, the falsehood in popular notions of success, and we search within ourselves for our true calling in life. Very few individuals can discover this, but those who do will go on to find true and enduring fulfillment. This leads to creative engagement in areas that are truly meaningful and beneficial to society. Success will follow on its own, and we no longer chase it. In engineering, there are so many areas where this is possible. We simply need to explore and find within ourselves the inner resources waiting to be realized, and external resources will mysteriously become available. This is sometimes called self-actualization. Happiness then is experienced not from fulfilling a sense of lack and struggling hard to find success and find happiness (that is invariably short-lived). One discovers a perennial reservoir of enduring happiness within oneself and then expresses it creatively and spontaneously in thought, word and deed. May you all find your unique ways to such fulfillment!

