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A MIND OF HIS OWN

Mike Symons holds several international patents with a few pending. Many of these are in the built environment and have advantageous environmental attributes. Some may say that this suggests his genius. Symons shrugs it off and simply says that he enjoys "creating developments that lead to solutions".



ABOVE: Mike Symons (in background with daughter, Joanna in front.)

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Mike Symons

The paper house Mike Symons built in 1994 on a koppie on the premises of the Council for Scientific and Industrial Research (CSIR) in Pretoria, stood for 16 years before being dismantled - not because it was weathered or broken, but because it had by then served its research purpose. It had been built entirely from phenolic resin-impregnated paper - walls, tiles, roof, doors, trim and all. "Not only did it have good thermal properties," says Symons, "it couldn't be eaten by insects because phenolic prohibits it. It was weather resistant, completely maintenance free and strong." The system used resin impregnated fibre technology developed as a joint venture with the CSIR.

This was not the first time Symons had built a non-traditional house, nor the first time he had experimented with chemically-treated building materials. In the sixties and seventies he built a number of chromated copper arsenate treated timber houses on two Zambian game reserves. These houses were completely resistant to termite and fungi damage.

Then came the development of structures for use as temporary accommodation for the construction

industry in Zambia. Symons designed panels of hardboard filled with polystyrene, making them not only very light but also slender at 25 mm thick.

Symons holds international qualifications in science, engineering and agriculture. The latter, he says, has been the most useful, particularly in the earlier years of what was to become his most empowering venture, Tower Technologies - a joint venture with Plascon Technologies established in 1989 to develop new products based on resins. Working with soft woods, Tower successfully imposed hard wood properties on woods like pine.

After the buyout of the Plascon share of Tower, Symons moved its facilities to the CSIR, which provided an innovative and fitting home for the conceptualiser. Over the next few years Symons worked with Anglo American to develop applications that could utilise its mining waste streams to good effect.

"In the case of Anglo Coal, we made structures out of gypsum that we had processed from the water desalination of acid mine water drainage. From slag, we made wear-resistant paving and we improved the fire-process of clay that ultimately produced roof tiles unaffected by firing shrinkage.



We also manufactured sprayable foams and an alternative stone dust," says Symons.

Gypsum proved to be the most prolific ingredient, and together with foam and cement, culminated in 30 new products. Ultimately the use of such products would be directed at the building of roads and houses.

The first house built from gypsum foam was 63 m² in size and saved 30 tons of bricks and mortar, making it exceptionally green and fire resistant. "Testing proves that these walls can withstand two hours of a fully developed 1 000 °C fire," explains Symons. "The houses we built from platinum slag waste streams in Polokwane were also 'green' and they are very good houses."

Sasol approached Tower, seeking a way in which to recycle fly ash into home building. In a similar manner used for the Zambian construction houses, Tower bonded foamed fly ash or gypsum waste with polymerics encased in a steel frame to create a panel. All electrical and plumbing requirements are contained within the panels and when mounted as a wall, the structure is so straight that it requires minimal plastering.

"One house was built from gypsum, two from fly ash. Every time you build you learn and improve, so by the time we got to build a school in Secunda for Sasol, we had economised down to 390 panels for two blocks comprising eight classrooms. It took just two-and-a-half days to build a block with no breakage and no cracking, exceeding all expectations."

What Tower had achieved was not just remarkable but was on course to revolutionise the way low-cost housing structures are built. Tweaking a little further by reducing the thickness of the walls from 90 mm to 63 mm, the panels became lighter. The need for plastering was completely eliminated by encasing the structure in fibreglass with a cementitious coating that is completely water-resistant, as proven by SABS testing.

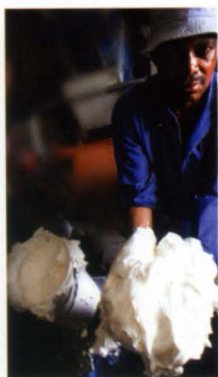
The newly improved design was used in the erection of a low-cost house in Silver Lakes, Pretoria. And low cost it was at only R1 850 to R2 100 per m² for entry level and from R 2 500 to R3 500 per m² for a more substantial home.

You'd think that savings like these would come from the reduction in materials. "Not so," says Symons, "although that is part of it. The greatest advantage is that the house can be erected, together with the roof, in just three days."

He says you also save by avoiding plastering wherever possible, and on the installation of electrics and plumbing, supervisory and specialist skills on site, and the costs of proofing against water and weather. "Speed and logistics are where we see the best economising. The further you are from infrastructure, the more competitive alternative structures become."

What Symons also achieved in the development of the fly ash/gypsum low-cost housing units, is

The mixture of Symon's sprayable foam and cement has resulted in 30 new products.



an aesthetically pleasing result for South Africans who have a perception that brick and mortar homes are the most desirable and strong. It is hoped that the panels will eventually be available in builders' merchant outlets for sale to DIY-ers, because there is nothing particularly complicated about using these panels if a homeowner wishes to extend his fly ash home. Obviously efforts have to be made to follow the necessary instructions and have the completed structure checked by relevant experts.

When FNB stepped into the picture alongside Sasol, northern Gauteng's Cosmo City housing development was identified as an area that would most benefit from building Tower's affordable homes. Using the developed formula, three homes were erected in Cosmo City, and four at ChemCity in Sasolburg. So positive were the results, that Tower Technologies is now in the process of licensing the technology that will be required to handle large production volumes.

Once the licences are granted and factories are ready for production, Tower will be responsible for the training of the licensees in every aspect. This includes raw materials handling and the relevant protocol adoption of manufacturing, quality assurance during manufacture, onsite



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assembly, decorating and sealing, and finally home maintenance. On-going product development will be reciprocal between Tower and its licensees because, Symons says, "technology can always be advanced".

There are many opportunities for licensees. This includes three projects in Botswana, with as many as 700 houses per project, and similar projects in the Northern Cape. KwaZulu Natal has a desperate need for 30 000 houses and the Eastern Cape more than 65 000. Symons estimates that the backlog for affordable housing is higher than three and a half million.

The hook that's going to really attract developers is that FNB and ABSA are providing 100% bonds on the Towers' fly ash/gypsum structures.

In terms of multi-storey buildings, Symons says that the base panels are completely satisfactory, but engineering certification is derived from the basic steel structure itself. "What we do, is to put foams into the core of the building which is gripped by the steel to add further bracing, but it shouldn't be taken into account as part of the structural engineering."

For multi-storey buildings there are, however, two important considerations: flammability and acoustics. "The most crucial is flammability. Our panels and the flooring have a fire rating that is outstanding, as tested by the SABS."

For decorative purposes, and to enhance the aesthetics of the low-cost housing, Symons has also developed a special range of products: cladding, stone, brick, tiles, and wooden features, none of which are made from traditional materials and much of it the result of recycling. Doors, windows and dado rails for example, have been manufactured from fibreglass to look like wood. "We can copy any material perfectly," states Symons.

ABOVE AND
BOTTOM
LEFT: Houses
in Cosmo
City and
Polokwane.



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ABOVE:
Symon's office
is littered with
the result of
someone or
some company
asking him
what he could
do with their
waste.

His own office is "greenly" littered with products that belie their looks. Gypsum dry wall partitioning, plastic shopping bags that have been converted into boards, PVC supports morphed into pallets, coal slime compressed into briquettes - the list is virtually endless, and the result of someone or some company asking Symons what he could do with their waste.

The true motivation behind Tower Technologies is the core principle of making available alternative building systems that can be aspirational - as evidenced by his own family. His wife Juliet, an expert in finishes and ideas, has been involved with Tower since its inception and helped Symons with his first international patent on structures in 1972.

His daughter Joanna is responsible for managing the fly ash/gypsum projects. "It is a very hard task," Symons says admiringly, "requiring her to deal with some very difficult people." She has also project-managed the production and building of the houses.

Symons' son Timothy ("far more gifted than myself"), worked with his father for 20 years, and is now an innovator in his own right, working in computer management of high quality, powerful engines.

With EnviroServe Waste Management recently acquiring 50% of Tower, new product developments include the use of granulated chicken litter as a source of fuel and fertiliser; converting waste bitumen into a roofing product, and materials for creating roof gardens. Finally, in true Symon's style, he has again partnered with Sasol, FNB and other interested parties to create a built environment that is not only off the grid, but also has intelligent reuse of water systems, solar power and sustainable waste management. "We want to create a green footprint that is just about as good as you can get," says Symons. ◉

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