Located behind the South West Engineering building and adjacent to Central Block, the Hillman Engineering building is worth more than a passing glance. In fact, it demands a visit because it is a building that truly lives its past, its present and its future.

The Hillman Building
A living treasure

By Professor Katherine Munro

Photos by Peter Maher
The Hillman Engineering building was built in the 1930s and completed in 1941. The principal designer was W Duncan Howie, who later became a professor of architecture at Wits. It was a university building ahead of its time, and in its 70-plus years of existence it has become an architectural treasure.

At the time of its conception the building was expressive of the “modern movement” and represented a radically new international architectural style, breaking with the classical style of the original five academic buildings of the grand campus design of the 1920s. Although constructed only a few years after the William Cullen library, it belongs to a different era and makes a modern statement about purpose and design.

Perhaps Wits’ most original international building of the interwar period, it anticipated the architectural design on campus of the 1960s and 1970s. “Form follows function” as the design responds to the challenge of the University’s brief with the complex mix of heavy-duty engineering laboratories, drawing halls, lecture theatres and academic offices. The building expressed in first principles “a fitness for purpose”.

The Hillman building (named for the donors, brothers Wolf and Hirsch Hillman) was designed to house the Department of Civil Engineering along with the departments of Mining and Surveying. Today, it is home to the School of Civil and Environmental Engineering. Photographs of the Hillman brothers grace the ground floor entrance hall.
I have always loved the timelessness of the building and its obvious Art Deco feel, but it was only when I visited the Bauhaus in Dessau, Germany, last year, that I realised the connection between the extraordinary innovations of Walter Gropius and his school of design of the 1920s, and the European influence on the heritage of Wits of the 1930s.

The connection came through a remarkable flowering of architectural inventiveness in the Wits Department of Architecture of the 1930s when, under the leadership of Professor GE Pearce, a talented group of Johannesburg architects enthusiastically responded to the new styles and experiments in materials and design. Men such as Rex Martienssen, Gordon MacIntosh, Bernard Cooke, W Duncan Howie and Norman Hanson became apostles and leaders in the new idiom. The new modernist architecture was firmly established in South Africa by 1939, and the Hillman building is the most important example of the new spirit and architectural idiom of the era.

What is so special about this masterpiece? Elegant, simple, clean-cut lines, geometric rectangular shapes, and materials chosen for their colour, texture and durability. Precast concrete blocks, steel window frames and the “egg crate” glass panels, natural teak, local terracotta tiles, local Witwatersrand quartz, and simple columns decorated with understated mosaics were combined into a seamless whole with elegance and confident flair. The building is three storeys high and through the brilliance of its design, overcomes the limitations of an awkwardly shaped hillside site with a drop of more than 3m from west to east.

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Howie treated the technical difficulties as a challenge to overcome through, as he put it, “the functional organisation of the components”, with different wings of the building being zoned for specific purposes. The laboratories are in a north wing, the lecture theatres and drawing halls (today’s computer laboratories) in the south wing, and the staff offices in the east wing. Howie designed the wings to articulate with one another via the vertical stair window. The inclusion of a parking garage for staff at basement level cut into the hill on the northern side was an unusual innovation at the time. The site of the Hillman was a difficult one as the space available was dictated by the surrounding buildings. Close attention was paid to steps and terraces to link the then new building with the adjoining buildings, such as the South West Engineering building and the Bernard Price Institute.

Many consider the Hillman building to be not a particularly beautiful building. Gilbert Herbert describes it as “severe, but with smooth lightly modelled façades in precast concrete”. Today it is a building much loved by its occupants – the staff and students of Civil Engineering. Its design epitomises a building that is still functional and modern, where form remains relevant to function. It is an edifice that grows on one and it is quintessentially Wits, with its mining and engineering roots.

The construction of the Hillman building coincided with the rebuilding and completion of the Central Block after the 1931 fire. Although the style of the Central Block is classical, if one looks beyond the exterior of the Central Block, the interior is modernist and speaks to many of the features of the Hillman building.

The original Hillman building was opened in June 1941 by the Prime Minister, General JC Smuts. Smuts’ address focused on the contribution of science and engineering in the development of radar (he referred specifically to the work of Dr Basil Schonland of the Wits Institute of Geophysics), in the successful prosecution of the Second World War.

The architects were Messrs F Williamson and NT Cowin, working in collaboration with Professor GE Pearse and W Duncan Howie of the Faculty of Architecture. Professor WG Sutton and staff of the Departments of Civil Engineering and Chemistry collaborated in the layout and equipment of the laboratories. The contractor for the building was the long-time construction partner of the University,
Messrs John Barrow (Pty) Ltd - a firm still flourishing today.

In the early 1970s, Doreen Greig described the building as a “capable building which exemplifies the virtue of a new approach to the planning of such buildings on campus”. It was an important building in that it set “a standard of achievement against which it is still possible to judge more recent work” (Greig 1971). One is still struck by the quality of the craftsmanship and the attention to detail in the lecture theatres and laboratories.

Clive Chipkin, in his book Johannesburg Style, sees the Hillman building as representing the modernist architectural movement in its classic stage, through the influence of Duncan Howie as the principal designer. Howie successfully responded to the challenge of a difficult site and slope to create a unique building that adapts itself to the teaching and laboratory requirements. The attention to detail is reflected in the use of local quarry terracotta tiles, the exterior stone-work retaining walls, the sage green mosaics sheathing the columns on the south and east portico, the well-proportioned main staircase, the teak woodwork, and simple precast concrete blocks (Barrows’ specialty). Small square glass blocks form a panel to draw light onto the vertical stairwell, and the large square division steel windows emphasise the angularity of the design.

Chipkin hails Howie as the “Nicholas Hawksmoor” of the modern movement in Johannesburg, who worked with quiet efficiency and understood the relationship between the materials at his disposal, and innovative architectural design, to give us a fine building fit for purpose.
Heritage

Today’s engineers celebrate their building and showcase their research with pride. Professor Mitchell Gohnert, Head of the School of Civil and Environmental Engineering, says “we love the building”. As he shows me the laboratories, equipment, machinery and experiments, he comments “everything works”. Gohnert points out that this is the strongest building on campus as, despite the years of heavy use, the building, with its mix of lecture rooms, laboratories and staff offices, has stood the test of hardy experimentation in water, concrete and soils. “There are no cracks. To build the Hillman building today would cost a multiple of the original investment”. The Hillman brothers’ gift was a generous 35 000 pounds.

This is a building that shows its age through tradition – the walls are lined with the photographs of the graduating classes through the years. The expressions of the professors show pride in the achievements of producing yet another year of qualified civil engineers. The graduands’ faces exhibit youthful anticipation of worthy careers to come.

There is a story behind the photograph of the class of 1948. This group celebrated their success to such excess that Professor Bill Sutton (later Vice-Chancellor at Wits) decreed that the group could graduate but their group photograph would not be hung. It was only in 2003 that the University forgave their youthful exuberance and positioned the class photo where it rightfully belonged. The 1948 year produced many distinguished engineers, among whom was Jack Zunz who made his mark as the chief structural engineer of Ove Arrup when they constructed the Sydney Opera House, called “the other Taj Mahal”, in the 1950s. Zunz was knighted for his achievements. The School continues to offer a BSc (Eng) in Civil and Environmental Engineering. At postgraduate level the MSc (Eng) and PhD are achieved via research.

Research-led teaching is a fundamental principle of the work of the School. A visit to the rooftop reveals the work in low-cost housing with the development of alternative materials. Dr Sola Illemobade researches “grey water” and the building’s sink and shower water is sent through a filtering system and then used in the toilets. In the Concrete laboratory Gohnert points to the highly polished floors that show none of the expected concrete dust.

The laboratories hum with the efficiency of a well-ordered environment. The properties and possibilities of different soil types are tested in the Soils laboratory. The flat roof is used to experiment with novel hydroform house-building materials. A three kilowatt wind turbine generates electricity.

The School is a keen proponent of green buildings, recycling and environmental enhancement, as is illustrated by the roof garden whose objective is to raise ambient temperatures of buildings through insulation and the cultivation of indigenous plants. Fourth-year students research low-cost housing using alternative materials, such as soil bricks, gypsum and plaster of Paris (all with rapid hardening properties) and shell designs under the guidance of Dr Anne Fitchett and Gohnert. The object is to create new housing structures which are “doable, strong and durable”. Solar panels, designed and assembled by the School, ensure that all hot water in the building is generated in-house, and the School has two patents and
a third pending in this field. The School is determined to turn dreams into reality with a crusading commitment to social responsibility.

The School has approximately 650 undergraduates and 150 postgraduate students and is able to select the best of the 2 500 applicants who wish to become civil engineers. There are 14 academic staff members, half of whom are NRF rated. Gohnert informs me that the 14 staff members represent every continent except Australia. Students research the problems and projects identified by the School. In its 87 years’ existence, the School has had only seven Heads. It proudly graduated its first woman civil engineer in 1948, and its first black civil engineer in 1960, 34 years before apartheid was abolished.

The Heavy Structures and Hydraulics laboratory houses a wide-channel flume made by the School, with Chris James researching rivers. School staff and technicians such as Norman Alexander have a “must-make-ourselves attitude”, knowing that specialist and experimental components cannot be bought off the shelf. Workshops are fully functioning and their highly competent staff produce everything from precision instruments to large structures. An example is a rare shaking table built 10 years ago to simulate earthquakes and other types of dynamic loading. Gohnert comments, “There are only half a dozen such large shaking tables in the world”, and explains that the complexity and expense of parts challenges the capacity to upgrade. The School, in conjunction with Hydrofoam, is currently testing structures for earthquake resistance in Algeria and India in order to establish how specific housing materials perform under earthquake conditions.

On the ground floor, a new Civil Engineering museum houses antique machines and measuring devices. It is the only museum of its kind in Africa and welcomes donations. A cylindrical slide rule made by WF Stanley of Hoborn, London, is on display, while a theodolite from the Trevor Atwell family can be viewed alongside Dr Lobban’s Strain gauge made by a member of staff. We then travel rapidly in time to view the Wifi PG computer laboratory and a 55-seater third- and fourth-year student computer lab.

Although additional offices were added on a mezzanine landing above the laboratory, the Hillman building remains one of Wits’ most treasured buildings. It is a masterpiece of architecture that is still in great condition, and it is the goal of the School to restore, repair and preserve the feel and architecture of the 1930s, while continuously adapting to new challenges.