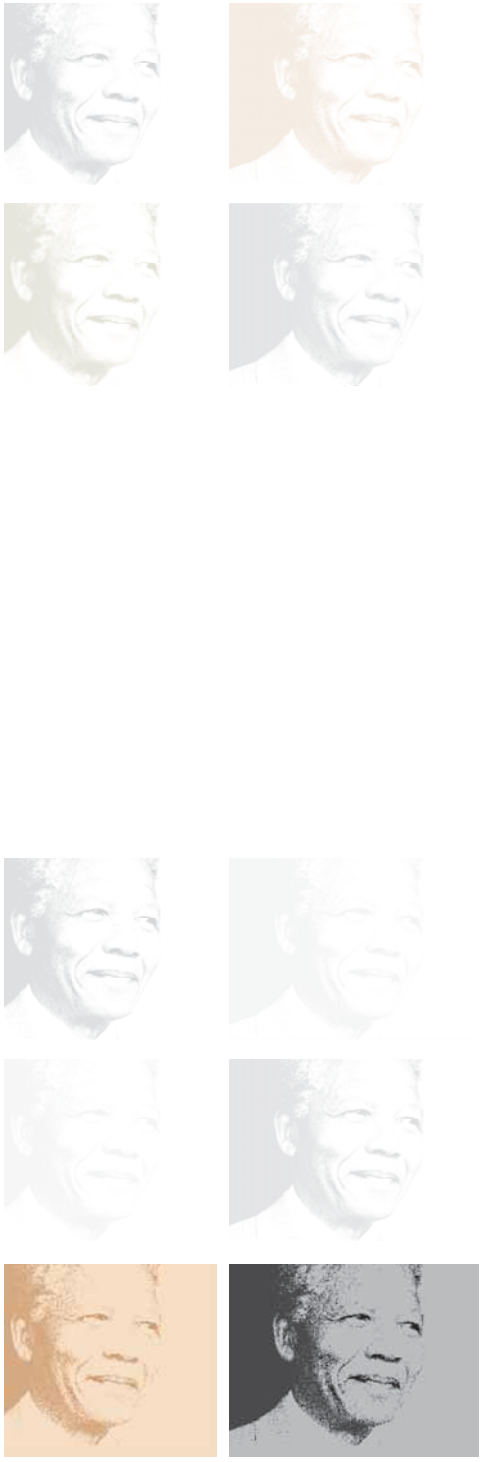
BUILDING A LASTING LEGACY

BUILDING A LASTING LEGACY

Over the last 125 years the Aveng Group has developed sound codes of practice, meaningful philosophies and signature styles that form the foundations of its professionalism. This book offers insight into the ethics and values that every Aveng entity at every stage of expansion has contributed. These structures, products and services have built nations and realised aspirations. This will be Aveng's lasting legacy.

AVENG GROUP
Leaders in infrastructure development
CELEBRATING 125 YEARS • 1889 – 2014



Nelson Mandela (1918-2013)

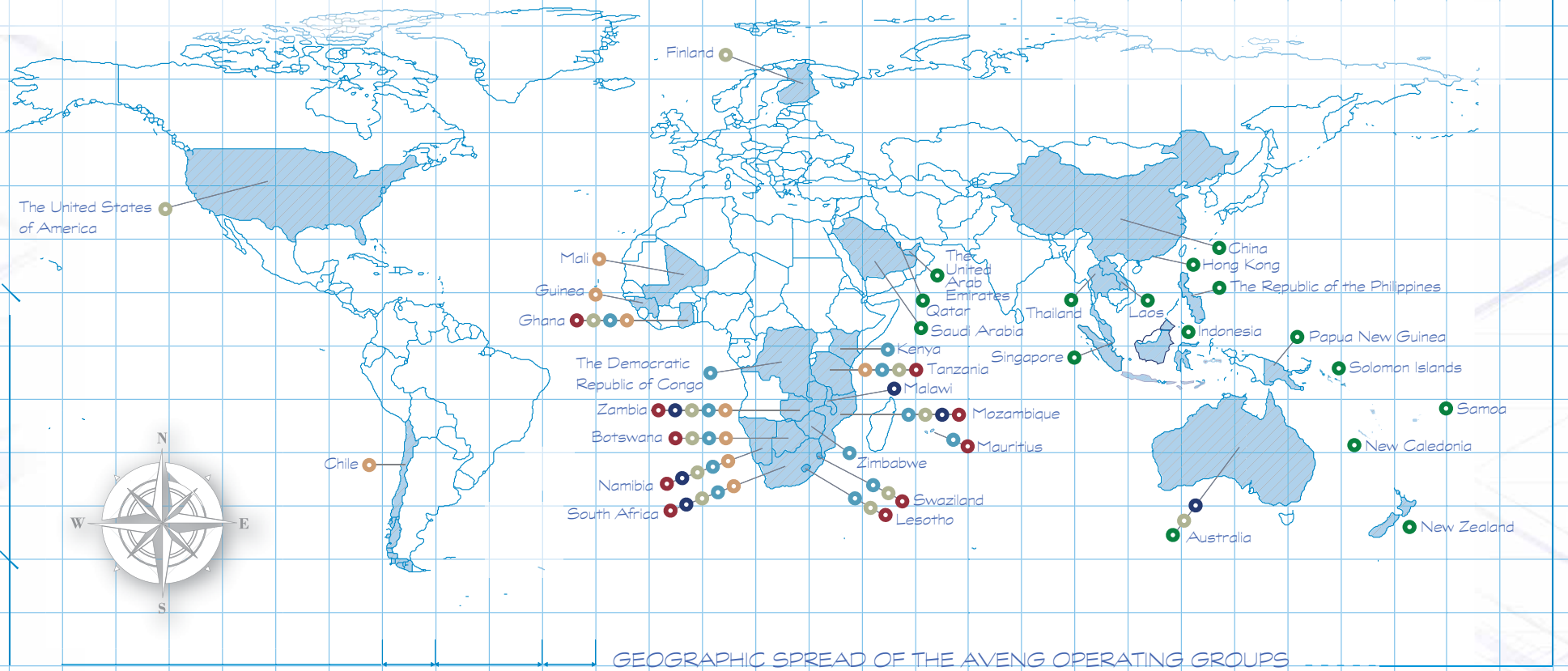
This book is dedicated to former President **Nelson Rolihlahla Mandela**, who guided a nation through an uncertain period of political and social transformation into a new paradigm of hope and opportunity for all South Africans. His capacity for humility, impartiality and care for others remains an inspiration to every person wanting to contribute to change.

Mandela's legacy is a tangible component of our lives. It is embodied by the courage and conviction with which we defend our values. It is embraced when we look past our superficial differences and acknowledge the true spirit of humanity known as *Ubuntu*.

Although few could match his achievements, at Aveng we aspire to Mandela's ideals and principles, both interpersonally and as a group. Our story is also one of resolve, optimism and commitment to building a better future. The determination to remain true to our core values forms the foundation of the Aveng code of ethics.

At his 90th birthday celebrations in 2008, Mandela officially presented the challenge to all of us when he said: "It's in your hands". We have accepted this challenge, proudly walking in his footsteps with direction and purpose.

Nelson Mandela Portrait from Vector.me (by Babibhu13)



GEOGRAPHIC SPREAD OF THE AVENG OPERATING GROUPS

Accurate as of March 2014

GLOBAL PRESENCE

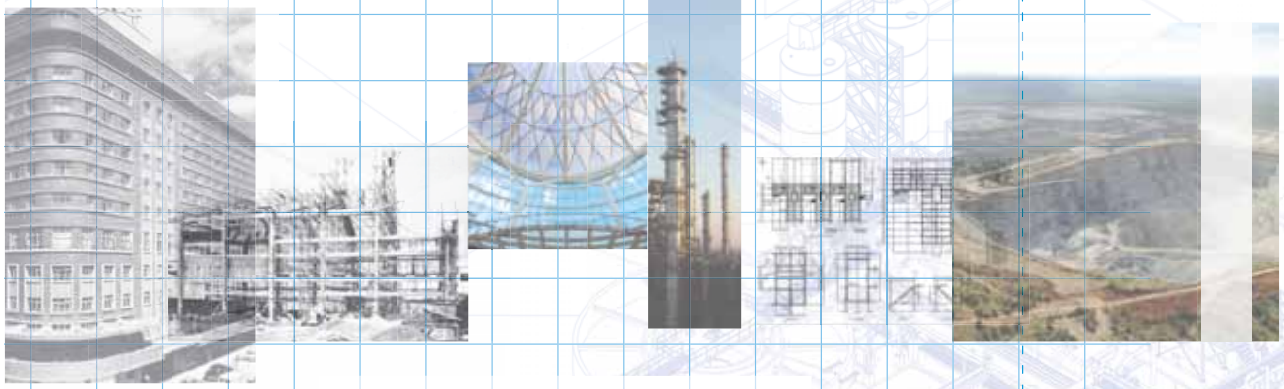
The Aveng Group is one of the largest infrastructure development companies in Africa, with a proven track record and a presence in key target geographies across the globe. Its broad exposure across the infrastructure value chain provides the Aveng Group with the capacity to deliver multi-disciplinary projects in the construction, engineering, mining, water, transportation, rail, steel and manufacturing sectors.

Celebrating 125 years

KEY

AVENG GRINAKER-LTA | McCONNELL DOWELL CREATIVE CONSTRUCTION | AVENG MINING | AVENG STEEL | AVENG MANUFACTURING | AVENG ENGINEERING

Contents



Foreword

During the Second World War, Winston Churchill was faced with the possibility of rebuilding the House of Commons. He insisted from the outset that the "old form, convenience and dignity" of Westminster be reproduced. Having served there for more than 40 years, Churchill knew that it was more than just a physical home to the British Parliament. "We shape our buildings, and afterwards our buildings shape us," he said.

Infrastructure defines societies and shapes cultures, and entrepreneurs and the companies they grow are at the heart of these developments. Aveng is no exception, we consider it a privilege to have a heritage so rich and intimately tied with the development of both South Africa and the many other countries in which we operate.

The Aveng story is a humbling one, shaped by ordinary people with extraordinary vision. The roots were laid down by family men — entrepreneurs who understood the importance of investing in relationships. Aveng has endured world wars and global financial crises to emerge as a leader in infrastructure development with a presence across the globe.

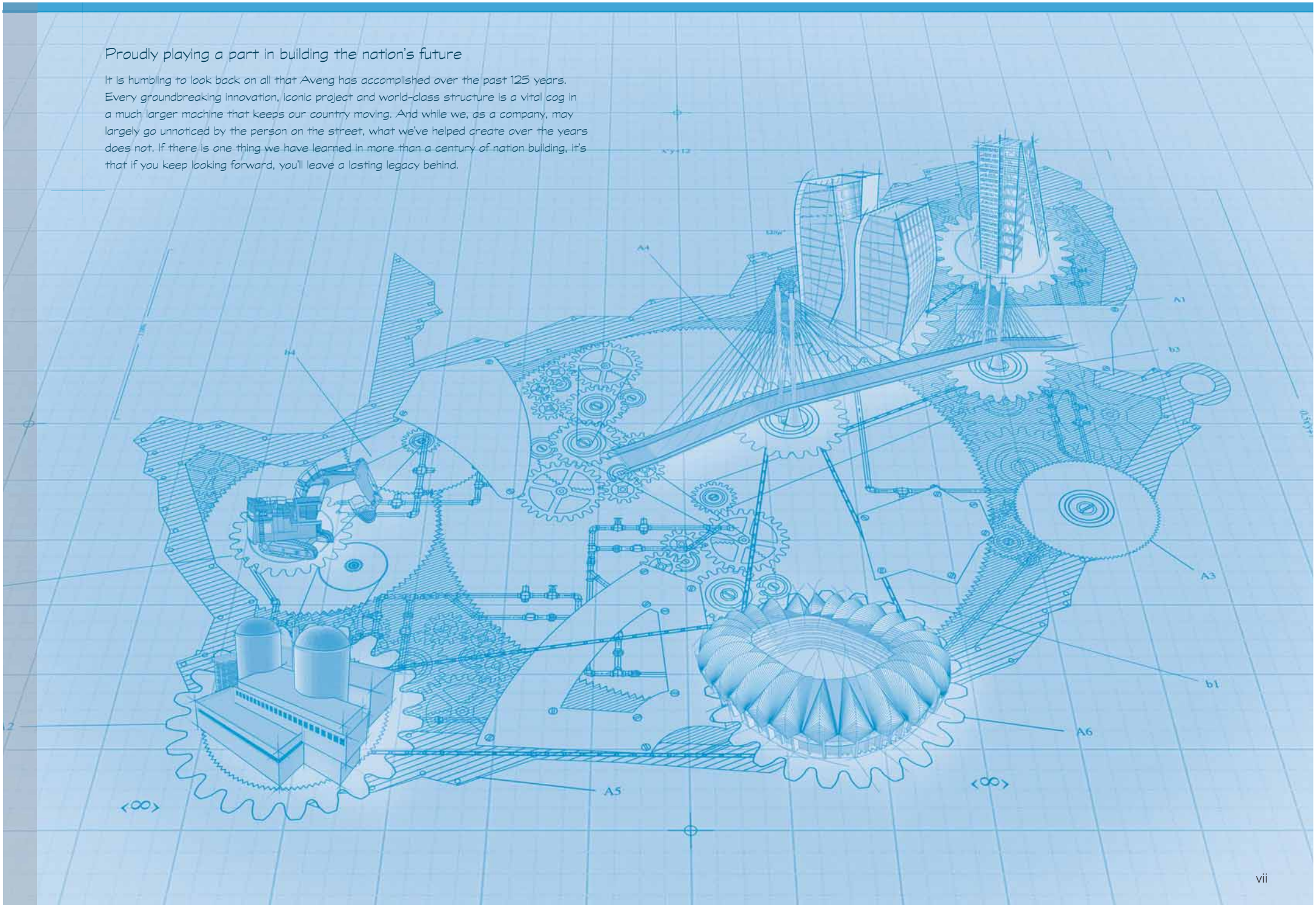
The publication of this 125th anniversary book showcases the full extent of Aveng's operations. Clients, employees and communities create the foundation for success, and the Aveng philosophies have proved to be the group's defining framework.

The experience gained over the past 125 years, together with the strong leadership qualities we have entrenched, will continue to drive Aveng, ensuring that we leave a proud and lasting legacy.

Angus Band
Aveng Group Chairman

Proudly playing a part in building the nation's future

It is humbling to look back on all that Aveng has accomplished over the past 125 years. Every groundbreaking innovation, iconic project and world-class structure is a vital cog in a much larger machine that keeps our country moving. And while we, as a company, may largely go unnoticed by the person on the street, what we've helped create over the years does not. If there is one thing we have learned in more than a century of nation building, it's that if you keep looking forward, you'll leave a lasting legacy behind.



Origins & role models

Construction and infrastructure projects often constitute large-scale developments and imposing monuments. However, as Aveng's 125-year history proves, many stories of origins have humble beginnings, their protagonists equally modest. The tales woven throughout South Africa's rich history are not always grandiose in nature.

Tim Couzens is an acclaimed social historian who has travelled the world. He has an affinity for personal histories and tales of origins. A literary scholar, travel writer and biographer of both the legendary and obscure, Couzens received the Sunday Times Alan Paton Award in 1993. He is a former professor of literary history at the University of the Witwatersrand, now retired.

In the following piece, Couzens revisits four places and four people, reminding us that understanding our places of origin is necessary when building for the future.

TD Mweli Skota and family.

The famous writer and academic Ezekiel Mphahlele and Tom Lodge, former professor of politics at the University of the Witwatersrand, on the hillock Thaba Bosiu in 1979.

In southern Lesotho, at Masitise, there is a cave with a house built into it (by the Paris Evangelical Mission Society in the mid-19th century). During a war between the Boers and the Basotho, the mission's printing press was moved to Masitise, but in the haste the wagon overturned and the type spilled out onto the ground. The Basotho promptly grabbed some and melted them down. Those components, which had printed the New Testament, were used as bullets. The word made lead. The missionary Ellenberger painstakingly reconstituted the type and printed the book of Genesis and Psalms in the cave house before the press was moved to headquarters at Morija where the publication of the Old Testament was completed by 1878. The overseeing of that revision and its proofreading had been given to the veteran missionary Samuel Rolland, whose sight had begun to fail to the extent that he had to use three layers of spectacles, often augmented by a heavy magnifying glass. The last translations were done out of the corner of one eye (including, fittingly, the book of Job), where the last flicker of light could enter. But that sliver of light led, in effect, to the enlightenment of millions of future readers of the Sesotho Bible.

The second site is in the old Baralong Stadt in Mahikeng, North West province, South Africa. There are the grass-covered foundations of the house that newly married Solomon Plaatje built just before the Anglo-Boer War. Famous for the robust diary he kept during the siege of Mafeking, Plaatje went on to become a pioneering newspaperman, novelist and linguist, and one of the founders of the African National Congress (ANC) in 1912. As its first Secretary-General he held the organisation together when it threatened to disintegrate early on. With his breadth of vision and depth of humanity, Plaatje is one of the greatest of all South Africans. In recent years he has had streets, schools, a municipality, the Ministry of Education's building and now a university named after him. But the most moving reminder of him is a row of pepper trees which he planted alongside those early foundations at the same time as he was building them. They are a living link to the man himself.

The third site is a koppie in Pimville, Soweto, not much different from any rocky outcrop on the Highveld. But in the early 1970s an old man, a repository of memories, would point it out as being the place where the ANC met before there was ever a community hall in Soweto. They called it Thaba Bosiu, after the great unconquered fortress hill in Lesotho, because that is where the "struggle would begin again". The old man's name was TD Mweli Skota. He was a founder of the ANC's first newspaper in 1913 and one of its early Secretary-Generals. He was an early pan-Africanist and an advocate of small enterprise. In 1930 he published the very first "Who's Who" of black South Africans and Africans. In his final years he was still trying to persuade a young and penniless university lecturer to start a joint business with him, printing school exercise books. His name is not well known today (though Skotaville does preserve it), but he leaves a silent legacy. In the 1920s he persuaded the organisation to change its cumbersome original name from the South African Native National Congress to the African National Congress.

The final site is a rough shed at St Faith's Mission near Rusape in Zimbabwe. It was the humble workshop of South African-born woodcarver Job Kekana. The pulpit cross in the Anglican cathedral in Harare is his work; so was the mace for the Parliament of the old Federation of the Rhodesias and Nyasaland; so too is the crosier of Archbishop Desmond Tutu – fine pieces among many of his. Curiously, he had only one eye and a nerve disease had paralysed his legs. Job Kekana was the epitome of a gentleman.

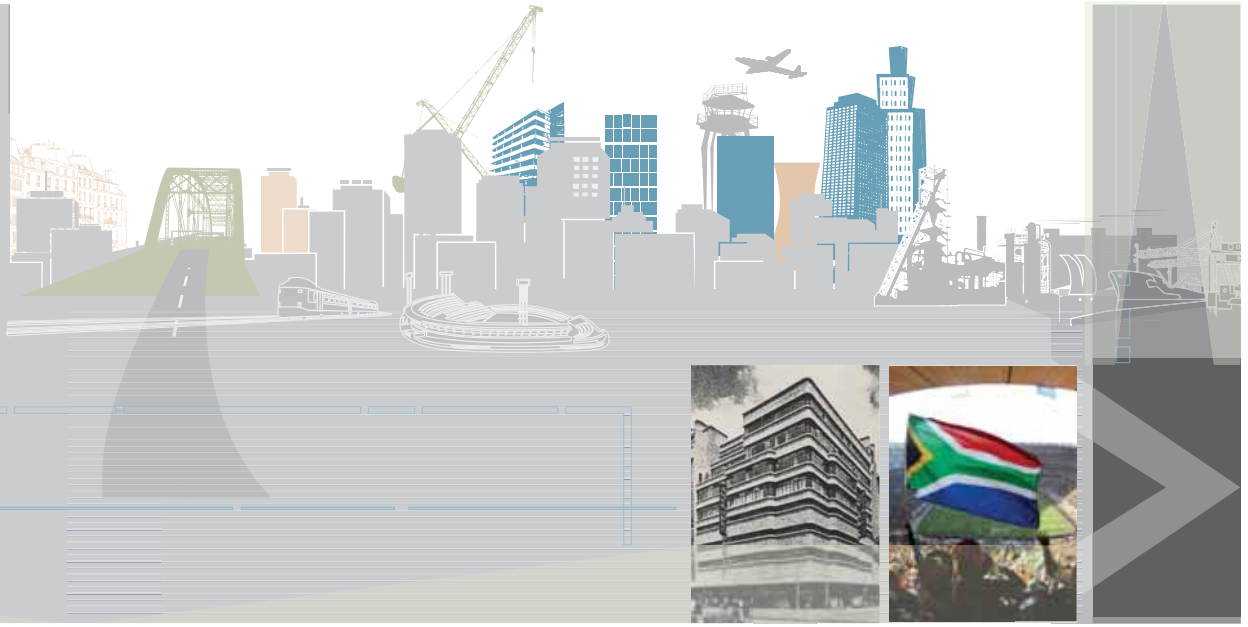
A visit to any of these places is sobering. The people associated with them all shared the same virtues of honesty and integrity, like ancient Roman republicans.

Tim Couzens

There is clarity in hindsight, but year after year a company's development is tied to uncertainty about the context in which it operates. The only constants are the values that underpin the business, ensuring best practice and building lasting relationships.

Laying foundations.

1



Aveng's signature and philosophies

Aveng has shown that maintaining excellence is only possible through establishing, and then refining, a code of ethical business practices. Employees, clients and communities alike form the foundation of success, and the Aveng philosophies have proved to be the group's defining influences over its 125-year history.

Recognising ethics and defining values

Morals define a personal outlook, whereas ethics are principles that underpin the conduct of a group. Whether relating to internal growth, collaboration or relationships with the communities in which a group operates, a refined ethical framework is the foundation of honourable action.

Cultivating leadership and effecting change

There are no constraints on the characterisation of a leader. Instead, as environments change and circumstances evolve, the vision to influence and ultimately unite the ambitions of a group can either be nurtured or ignored. Leadership is, therefore, defined by the group, not dictated by the individual.

From a landmark that can be viewed from afar to community-based development limited to a certain region, it is only by embracing excellence that infrastructure can be successfully incorporated into daily life. When "world class" becomes the standard, you are on the path to greatness.

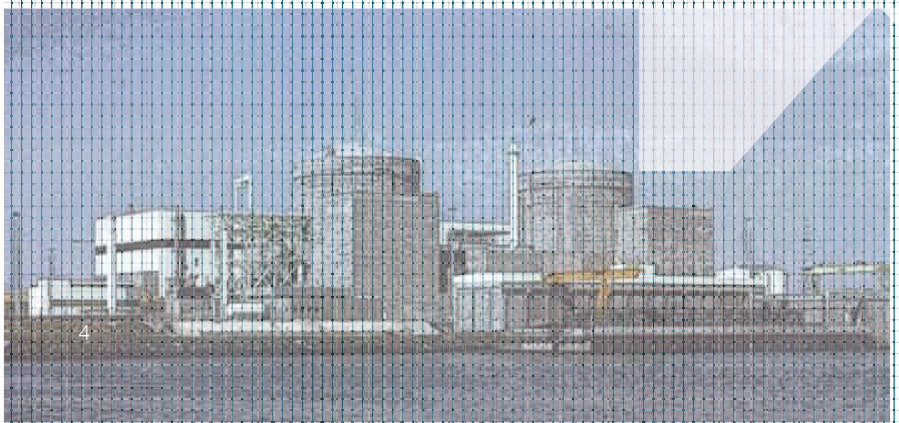
Creating value through excellence

Ensuring the protection of our resources through holistic design

Caring for communities is necessarily tied to understanding and cooperating with the immediate environment. A holistic approach to construction strikes a balance between purpose, aesthetics and environmental impact.

Setting benchmarks through innovation

A creative approach to infrastructure and development must pervade all aspects of the process. By refining methodologies and perfecting implementation a project can have a positive influence for as long as it is needed.



Expanding into new territories and stimulating the economy

Growth of the construction industry has always been an indication of a strong economy. The ambition to move beyond established boundaries and embrace the challenges presented by new business ventures ensures a stable and secure future for all.

Empowering communities from the ground up

Understanding the complexities around local and national infrastructure requires insight into how and why people need to connect. The outcome is not merely the empowerment of individuals, but the integration of their communities.

Embracing diversity and nurturing talent

A proud history can encourage excellence, but development and training provide focus and direction. Engaging with projects that span the wide spectrum of national infrastructure and development initiatives requires an equally diverse and capable workforce.

Training and protocol form the basis of a safe and secure environment, but only true leadership can precipitate their successful integration into daily life. Instilling a sense of pride and encouraging collective responsibility are central components to meeting safety targets.

Prioritising safety and promoting wellbeing

Shaping dreams and realising aspirations

Sometimes communities inspire and define developments. In other cases, new infrastructure shapes the community, offering the opportunity to establish new identities and formulate new ambitions.

The early years

Aveng enjoys a rich history rooted in the development of the South African economy. It is a story of converging disciplines and personalities, and it is one that is proudly recounted. Each chapter in the company's history captures the values to which the group aspires and articulates the strengths that will be drawn upon in future endeavours. The formation of Aveng reveals the uniting of strong principles, innovation and determination.

The pioneers of success

James Thompson became an apprentice carpenter in Durban at the age of 12, eager to learn as much about the trade as he could in his formative years. He eventually found his way to Johannesburg where he began working for Kemp and Wishard. In 1889 he set up his own building and carpentry business: J Thompson, Carpenter and Builder. Thompson offered his clients the strong values that were to define his legacy: honesty, reliability and excellence.

From modest beginnings he developed a network of loyal and trusting customers, and his talents earned plaudits from the likes of Sir Herbert Baker, who declared Thompson "the best builder in South Africa".

Barely 50 years later, James Thompson Limited had grown substantially and was listed on the Johannesburg Stock Exchange (JSE), bringing public interest to a family business with an established set of principles. By this point, Thompson had ensured that his business philosophy had been passed down to his sons, Mark and James.

Operations extended into Zimbabwe, Zambia and then Botswana. But the company had not only grown in size. Its capacity for diverse contracts now included civil engineering projects and the manufacture of unconventional products such as fibreglass and Perspex.

Thompson's story is paralleled by that of Ole Grinaker, a Norwegian engineer who arrived in South Africa in 1911 and would eventually establish one of the most successful construction companies in the country. Grinaker was to become an influential figure in local construction.

The stories of both men illustrate the virtues of perseverance over time. The construction sector is particularly bound to the ebb and flow of the global economy, and tends to capitalise on financial booms and contract in the wake of recession. By facing adversity head on, both Thompson and Grinaker would lay the foundations for what would become the Aveng Group.

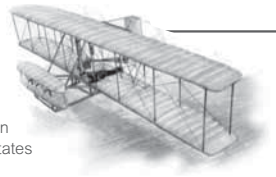
"Northwards" (above left) was built for Dale Lace and became the home of the Albu family. Designed by Sir Herbert Baker and built by James Thompson in 1905, it is today a national monument. James Thompson (pictured left) represented trustworthiness and reliability, and his company had many loyal investors. One such investor was Anglo American, and James Thompson Limited was awarded the contract to build their headquarters at 44 Main Street (above right).

1889
James Thompson sets up a building and carpentry business in Johannesburg

1892
First solid rubber tyres for petrol-powered cars manufactured

1895
Alfred Nobel's will establishes the Nobel Prizes in recognition of cultural and scientific advances

1903
The Wright Brothers' first successful flights made in North Carolina, United States



1914
The First World War begins

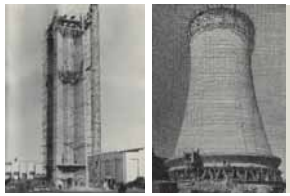
1920
The League of Nations established following the end of the First World War

By the start of the Second World War, another entrepreneur was making a name for himself in the gold capital of the world. Harold "Blue" Schwarer founded his own company, Lewis Construction. While Thompson's values reflected the duties of the provider, Schwarer focused more on customer satisfaction and delivery, which proved to be his own winning formula.

As director of Lewis Construction, Schwarer instilled solid business principles in all his employees. At a point in history when oversight measures and best practice methodologies were unheard of, his approach was to implement time-management processes and monitor project development as strictly as possibly. He insisted that all projects be delivered on time and that every client be left satisfied. He knew that offering fair prices for even the largest contracts was an important part of a successful business.

Schwarer also took time to review and correct the methods his employees were using on site, encouraging innovation at every opportunity. Lewis Construction pioneered the use of tower cranes on buildings sites, as well as suspended scaffolding. He also placed an emphasis on skills development and training, believing that everyone had the capacity to contribute if they were given the right guidance.

After only a few years at the helm, Schwarer was bringing in some of the largest building contracts in the country. Lewis Construction would later form part of LTA.



By embracing the need for customer satisfaction and respecting the value his company offered, Harold "Blue" Schwarer built a reputation as an achiever. The contracts he won reflected this. At the time, Lewis Construction's "Escom House" (above right) in the Johannesburg CBD was the tallest building in the city. It was imploded in 1983.

1928
Sliced bread first sold. A loaf cost about 10 US cents

1937
Golden Gate Bridge opened in San Fransisco, United States

1939
The Second World War begins

1941
The Japanese military attacks Pearl Harbour, Hawaii

1943
Synthetic rubber invented

1944
Ballpoint pens first sold

From strength to strength

Success in the construction industry is always dependent on market awareness and the ability to capitalise on opportunities. After the Second World War, Harold Schwarer identified a shortage of reinforcing steel and the services associated with it. By acting swiftly, he was not only able to gain an advantage over his competitors, but also secure a new enterprise in the local construction industry.

The 1950s marked renewed interest in the steel industry, which had yet to prosper since the first factories and workshops – smelting iron, reworking scrap metal and other related processes – were established at the turn of the century. Once cheaper methods of making steel became available, business surged and several major players in the steel trade emerged.

Steel lies at the heart of industrial development. The production of crude steel in the 20th century rose at an impressive rate. As governments invested more and more money into infrastructure, industry and transport, so the demand for steel rose. In particular, government investment in the national railway network heavily influenced steel development and motivated the establishment of companies such as Lennings Rail Services, which is now Aveng Manufacturing Lennings Rail Services.

Schwarer established the Steeledale Reinforcing and Trading Company in 1951 in response to the demand placed on the construction industry by the post-war shortage. The company served as a steel merchant and offered the cutting and bending of reinforcing steel, under Schwarer's stewardship it diversified and grew substantially. Multiple takeovers ultimately saw the formation of the Steeledale Reinforcing and Engineering Industries group, which eventually totalled 30 companies. Steeledale would later form part of LTA.

1945
The Second World War ends

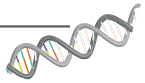
1946
French engineer Louis Réard introduces the bikini

1947
The International Monetary Fund begins operations

1950
The Group Areas Act passed, formally segregating races in South Africa

1951
CBS broadcasts the first commercial colour television programme

1952
The first effective polio vaccine developed by Jonas Salk at the University of Pittsburgh



1953
The structure of DNA discovered by James Watson and Francis Crick

The Grand Hotel opened in Cape Town in 1952.

The pursuit of excellence in one area encourages success in others. This is what motivated the establishment of the Amalgamated Construction and Contracting Company (Amco). Formed in 1963, it began life as a group of about 50 subsidiaries and affiliates, which ultimately united into one entity. Amco shifted its focus to civil engineering work within the mining sector and before too long was awarded prestigious contracts throughout South Africa, and eventually north of the border.

In 1965, James Thompson Limited merged with Lewis Construction, Steeledale Reinforcing and Amco to form LTA. The company was listed on the JSE and expanded rapidly, winning prominent contracts nationwide. LTA acquired a more diverse portfolio, including the establishment of an electrical and process engineering division and the acquisition of a mechanical engineering and piping business.

By 1972 the company that would become Aveng Manufacturing Steeledale, and the merchandising operation Trident Steel, had both been established. Although at the time they were operating independently, these companies had a vision to play central roles in the developing economy. Trident Steel was among the first traders in South Africa to acknowledge the wider benefits of a diversified range of alloy products.

Grinaker too had begun to cement its place as a leader in infrastructure development. Within a few years it had acquired Cramond Earthmovers and expanded its profile to include a specialised electronic division. By the late 1970s it had also become a listed company on the JSE under the name Grinaker Holdings.

1956
Velcro introduced by Swiss electrical engineer George de Mestral

1957

Ghana becomes the first country in Africa to gain independence

1958
The "peace" symbol created

1961
The Berlin Wall erected

1963
United States President John F Kennedy assassinated

1964

Nelson Mandela sentenced to life in prison

1967
The world's first heart transplant completed by South African cardiac surgeon Dr Christiaan Barnard

Extracting the elements

After the diamond and gold rushes of the late 19th century, the true extent of South Africa's mineral wealth was gradually uncovered into the mid-1900s. It was only then that a truly diverse mining industry began to flourish. Mike and Cedric Moolman, who founded the company that was to become Aveng Moolmans, would have appreciated that mining was to have a profound impact on the very structure of society.

The ability to shape raw materials into useful tools and structures not only defined human history, it continues to shape our experience of the world today. The extraction of minerals and their use in everyday life has proved to be the most significant advancement since the development of agriculture.

The early work of the Moolman brothers – building roads, railways and runways that connected nations – paved the way for a bold new era. They facilitated the logistical challenges that lay between mining and development, such as the transportation of enormous quantities of coal and rocks.

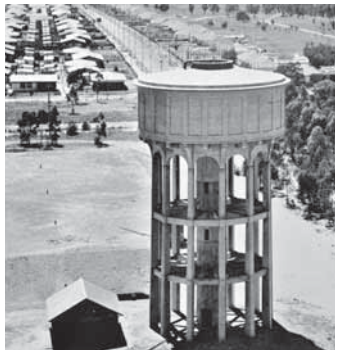
Building infrastructure not only meant exposure to the heart of an expanding economy, it also entailed a growing knowledge base regarding mining practices. Throughout the 1960s and 1970s, processes were refined and capacity was increased. The company was soon able to offer comprehensive on-site operations on open cut mines.

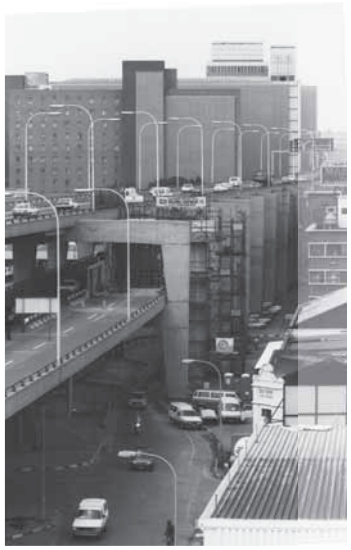
Underground mining, which presented different challenges and required distinct techniques, was also taking root at the time through a small group within Grinaker.

The likes of Grinaker and LTA capitalised on the economic boom of the 1970s, providing an expanding market to which the mining sector contributed immensely. With new infrastructure came new buildings, monuments and public facilities. Drawing on the might of millions of years of geological processes, the potential for robust and durable structures built from mined elements allowed societies to be constantly reshaped and recalibrated.

The Moolman brothers were entrepreneurial and daring, but they also offered insight into the nature of business growth and development. They inspired a culture that sought out and maintained strong relationships with clients, employees and institutions alike.

The forging of long-term connections with employees was aided by institutional developments that the brothers valued, such as the training school that opened in Utrecht in 1978. The school offered accommodation and skills development, both benefitting employees and optimising the application of the heavy earth-moving equipment available to the company at the time.





1970
The Tanzanian railway network established

1971
Debut of the Nasdaq stock market index

1976
The Soweto Uprising profoundly changes the socio-political landscape in South Africa

1979
Margaret Thatcher becomes Britain's first female Prime Minister

1981
The first high-speed train service established in Europe (from Paris to Lyon)

1985
Windows software developed by Microsoft

1986
The Challenger space shuttle explodes

The growing global market

For many historians, the rebuilding of the world economy was heavily influenced by the emergence of multinational corporations. As exchange controls became more varied, trade barriers were lifted and attitudes to foreign investment slowly shifted, a growing market for multi-disciplinary business models developed.

Capitalising on the new wave of infrastructure development, two New Zealand entrepreneurs – Malcolm McConnell and Jim Dowell – had already established a multinational engineering and construction business by 1975, boasting operations not only in their homeland but also in Australia, Indonesia and Hong Kong. McConnell Dowell, as it was called, would soon establish ties within other specialised industries, increasing their geographical presence year by year.

In South Africa, the need for reliable suppliers of manufactured goods became evident as companies such as LTA and Grinaker were awarded a number of prestigious contracts both around the country and north of the border.

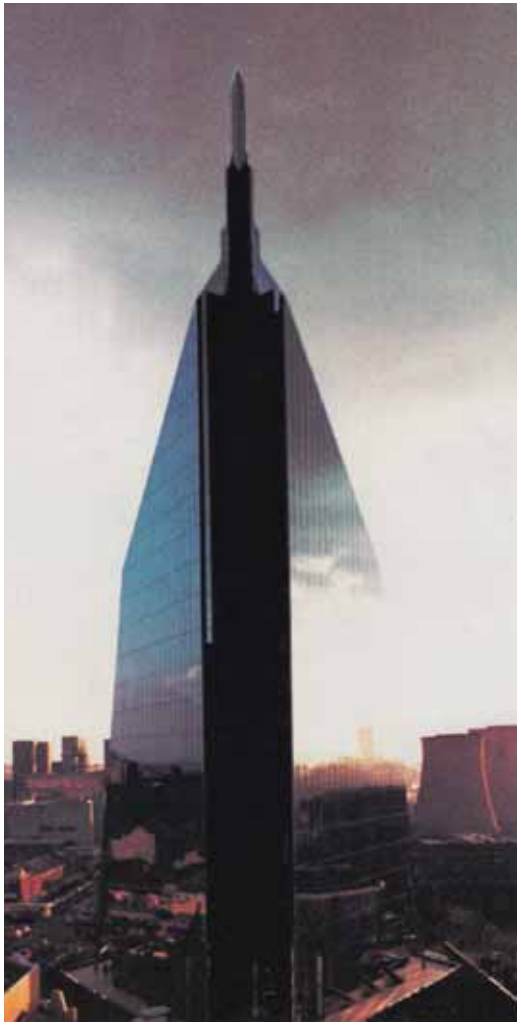
New factories appeared in areas such as Germiston and Vanderbijlpark, just outside Johannesburg, which became the industrial hubs supporting national infrastructure development. The production of steel and specialised products associated with the railway, construction and automotive industries laid the foundations for the companies that would eventually form part of Aveng Manufacturing.

As the 1980s approached, LTA began to diversify, forming a new mechanical, process and electrical engineering division. The client base grew to include the chemical, mineral process and petrochemical industries. The decision to incorporate these new skills served as the point of departure for the future Aveng Engineering.

South Africa's growing economy and ambitious government infrastructure development programmes also required investment in new energy projects. To lessen the reliance on coal-fired power, work began on the construction of the country's first nuclear power station. Numerous coal-fired power stations and the Koeberg Nuclear Power Station project would serve as a base from which future Aveng Power projects could develop, including extensive coal and renewable energy projects.

In the mining sector, Moolmans began to diversify by tackling projects throughout the African continent during the 1980s and 1990s. Their strong network provided a solid base from which to expand. At the heart of this was the decision to invest in skills training, the methodologies used in the Moolmans training schools actively replicated in every local community in which the company worked. This proved to be the most effective way to secure mutually beneficial and long-lasting projects.

Building on the traditions of the founding brothers, the entities that eventually became Aveng Moolmans and Aveng Mining Shafts & Underground continued to exceed expectations – regardless of project constraints or challenging circumstances. By routinely demonstrating success, firm bonds of trust grew with every client, paving the way for a bright future.



Commissioned by Anglo American in 1981, the building at 11 Diagonal Street was designed to look like a diamond, reflecting different views of central Johannesburg from every angle of its exterior.

1990

Nelson Mandela released from prison after 27 years

1994

South Africa's first democratic elections

1995

The Springboks win the Rugby World Cup for the first time

1996
Bafana Bafana wins the Africa Cup of Nations


2010
South Africa hosts the first FIFA World Cup held in Africa

2013
Nelson Mandela dies at his home in Johannesburg at the age of 95

2014
The Aveng Group celebrates its 125th anniversary

AVENG GROUP
Leaders in infrastructure development
CELEBRATING 125 YEARS • 1889 – 2014

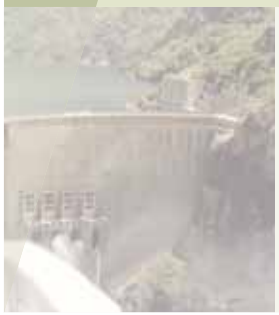
Marks of success

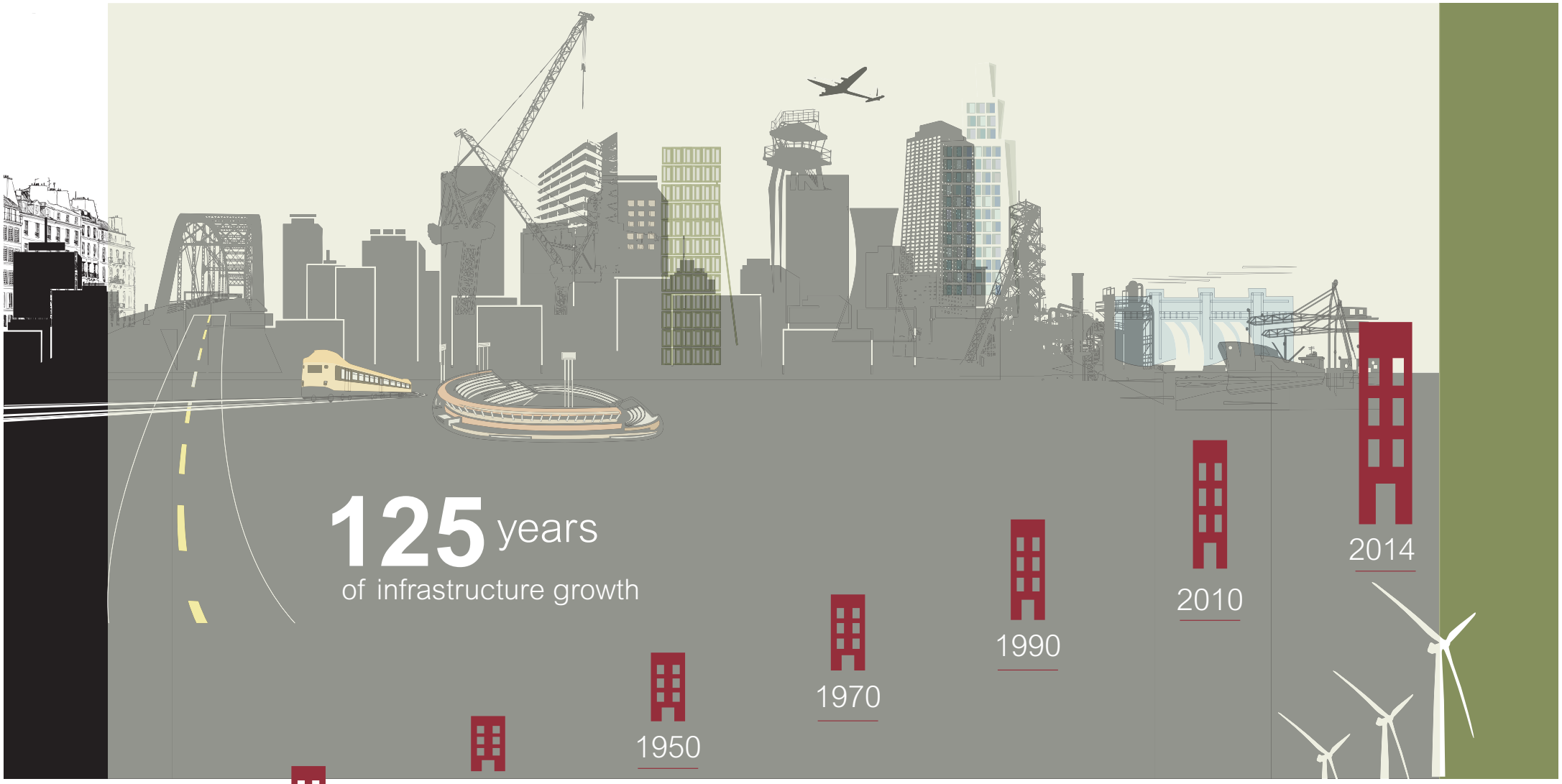
"At the heart of our work lies a passion for the infrastructure that shapes our society. Our intention is to make a real difference to the world in which we live. Our mark is made in part through world-class infrastructure, but equally through the communities we have supported, the opportunities for employment and skills development we have created, and the expertise we have fostered over our 125-year history" — Angus Band, Aveng Group Chairman

Monuments of brick and mortar, landmarks that give shape and form to future progress, roads that connect, bridges that merge, airports that unite, dams that preserve and ports that welcome. Aveng has made its mark through these structures both within South Africa and abroad, harnessing the power of some 30 000 employees across more than 30 operations worldwide.

The construction of Soccer City for the 2010 FIFA World Cup cemented a nation.

A country that isn't building isn't growing. As leaders in infrastructure and development, Aveng assumes responsibility for facilitating economic growth and cultural development in every country in which it operates, leaving its mark for future generations. From medical centres that promote healing and wellbeing to school buildings that house the ambitions of tomorrow's achievers, Aveng is building a lasting legacy.





Over 125 years Aveng has evolved in character, capability and reach. The group's origins lie in modest construction projects, but today it boasts expertise in **steel, engineering, manufacturing, mining, concessions, public infrastructure and water treatment.** This South African consortium continues to make its mark across the globe.

Brand evolution

As Aveng expanded, venturing into new territories and developing its capabilities, the need for cohesion became increasingly critical to the group's sustainability. The brand architecture was redeveloped to project the ideas of consolidation and unity, incorporating a history of growth and a future of possibility.

Without a sense of unity – a shared vision between all operating groups, employees and clients – the breathtaking achievements of the Aveng Group would have remained a mere aspiration: intangible and unfounded. Aveng recognises that the power of the group depends entirely on its collective strength.

Today the brand offers far more than a logo: it embraces the Aveng mentality, employee behaviour and attitudes, and the pledge to quality and delivery.

DNA is what defines us.

It is the blueprint of who we are, influencing our decisions and behaviour. Similarly within a company, we could call DNA the building blocks of a unified operation; the characteristics that define the group's culture throughout every operation and across borders.

EFFECTIVE LEADERSHIP	EMPOWERING OUR PEOPLE	PERFORMANCE AND RESULTS DRIVEN	ADAPTABLE AND OPEN TO CHANGE	
• Inspire • Maintain composure when under pressure • Make bold and courageous decisions • Be humble	• Acknowledge and appreciate • Respect • Reward • Develop	• Operational excellence • Driven employees • Governance • Growth	• Be nimble • Remain open to new and different approaches • Be flexible • Be receptive	

The Aveng formula for success

The success of Aveng has stemmed from the group's ability to remain agile and adaptable in the face of rapid growth. Underpinning this strategy is the capacity for innovation – the continuous search for a competitive advantage. Remaining focused on essential day-to-day operations and developments while maintaining an appreciation for large-scale growth can only be achieved with great leadership – another key building block of the Aveng DNA. That spirit of leadership has been infused into the organisation through active mentorship, leadership academies, focused brand development and awareness.

CUSTOMER FOCUSED	HONESTY, INTEGRITY AND TRUST	TEAMWORK	SAFETY MINDED
• Exceed expectations • Put the customer first • Know your customer	• Sound ethics • Transparency • Disclosure	• One vision • One goal • Empowering communities	• Home without harm, everyone, everyday

Leadership is getting the best out of a talented group. It's sharing knowledge and refining best practices. It's improving efficiency in everyday tasks. It's aligning yourself and your team with the overall objectives of a project.

Aveng has always maintained that leadership is not about senior management taking control over a team. True leadership can be found at every level of an operation, and should be considered a part of every employee's DNA.

Inspired by the examples set by iconic leaders throughout history, the Leading in Aveng (LIA) development programme aims to provide guidance for employees at various stages of their development, ensuring sustainability and continuity throughout the group.

"It is better to lead from behind and to put others in front"

— Former South African President Nelson Mandela

Aveng has made its mark across the globe. Its 125-year history boasts influential designs, historic landmarks, valuable infrastructure development and meaningful community engagement.

Aveng's contribution to excellence.

AVENG GRINAKER-LTA

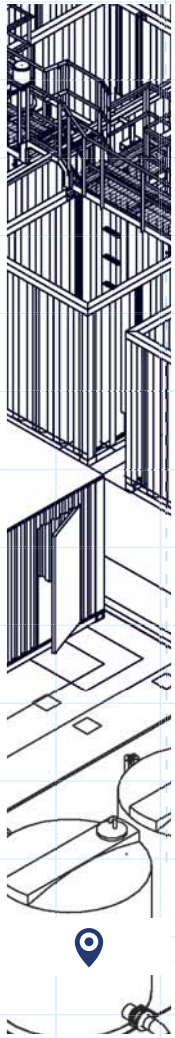
McCONNELL DOWELL

AVENG MINING

AVENG STEEL

AVENG MANUFACTURING

AVENG ENGINEERING



AVENG GRINAKER-LTA

For 125 years Aveng Grinaker-LTA has taken every opportunity to shape some of the most valued developments in South Africa and around the world. The company has remained at the forefront of local infrastructure growth, constantly adapting to changing market conditions and technological advances.

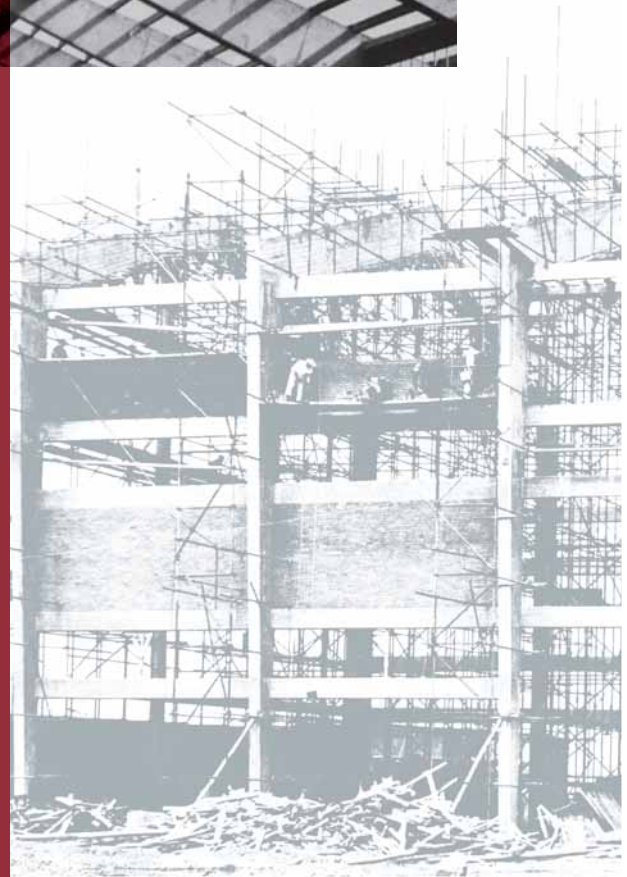
Aveng Grinaker-LTA's legacy is built on more than just a proud project history. The company's development since the days of James Thompson and Ole Grinaker has seen a maturation of values, a refinement of standards and the development of an integrated understanding of the many communities that have made its work possible.

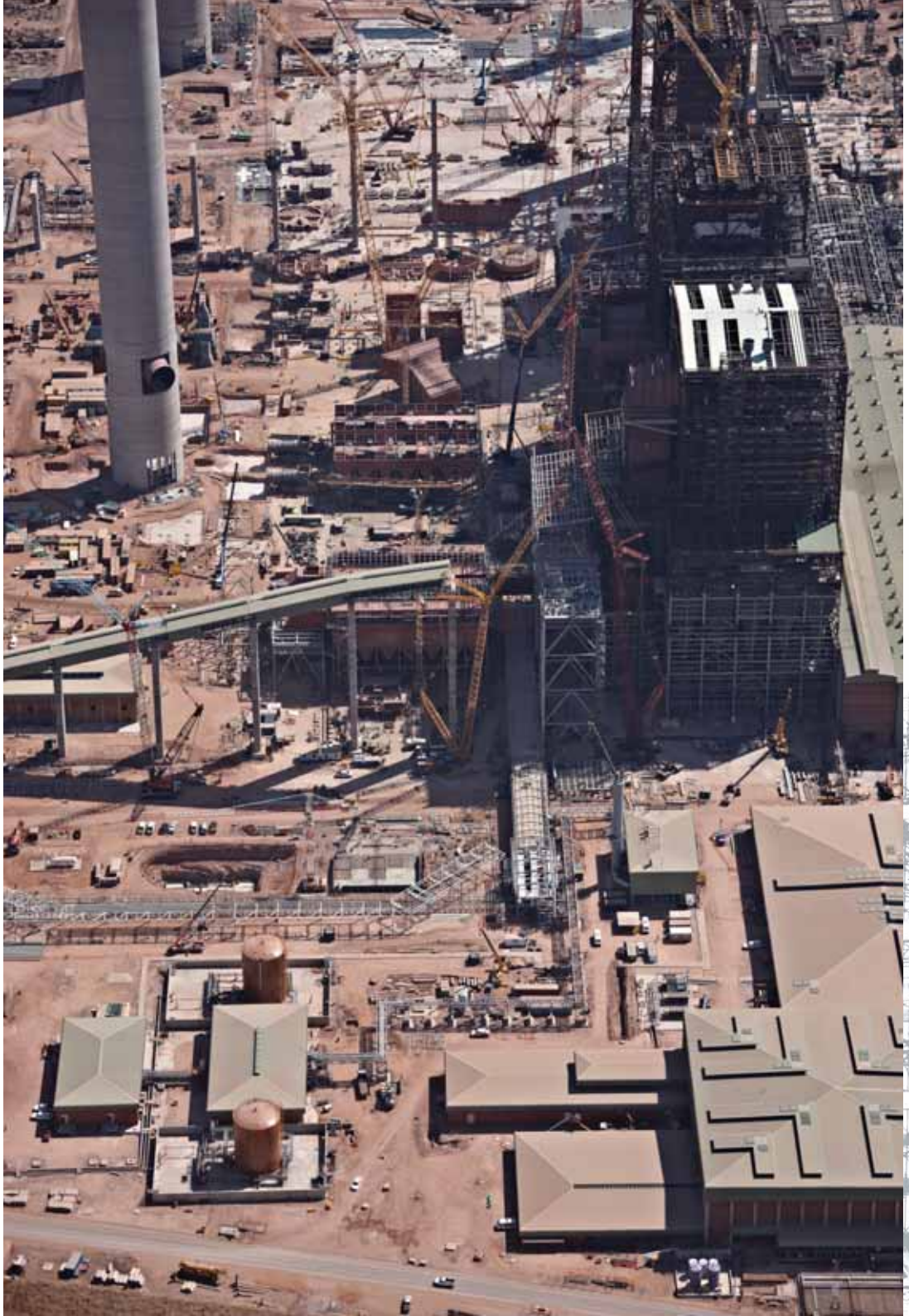
Characteristic of companies of the same era, the early years of Grinaker and LTA were dominated by individuals who could make their mark through assured philosophies and personal influence. Because their motivations were honourable and admirable, the companies developed trust with their clients and success followed.

Following substantial industrial growth in South Africa in the mid-20th century, many companies grew to a point where a family name was no longer appropriate. Other companies merged or were bought outright.

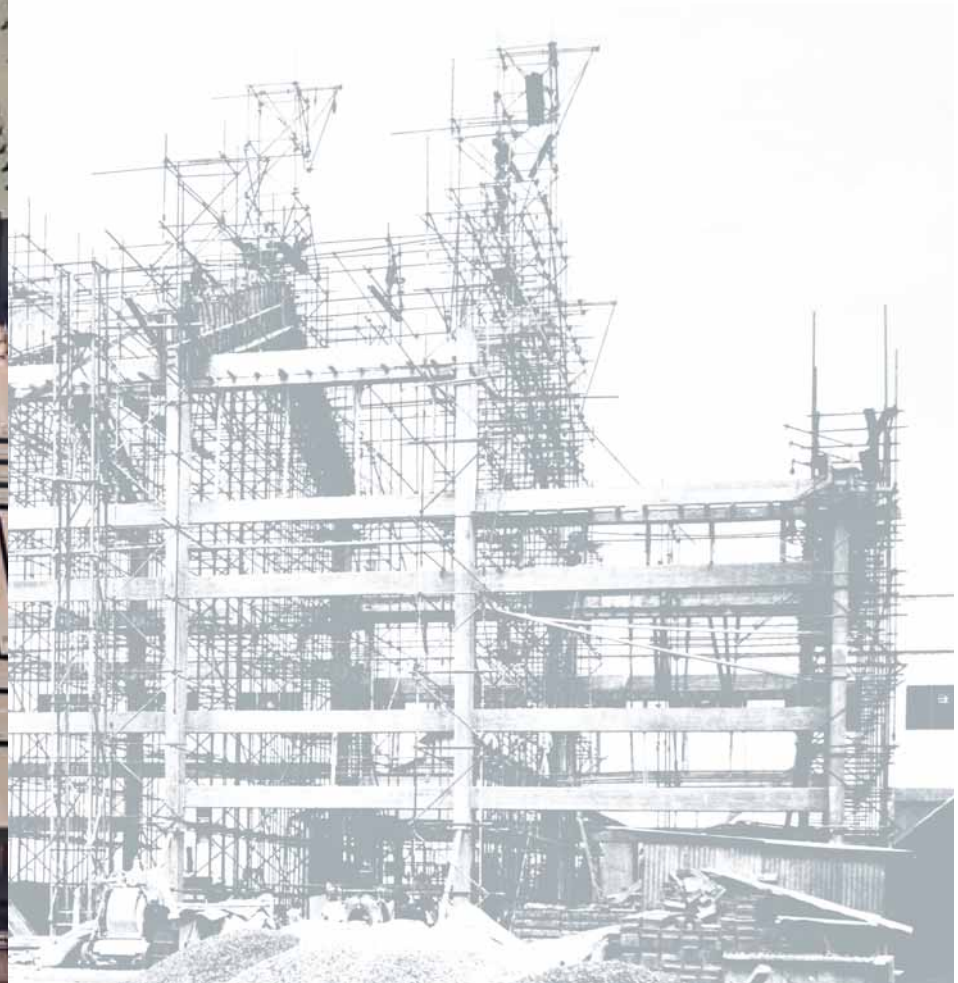
The new millennium revealed the African continent as an emerging market attracting investment in infrastructure development. When Grinaker-LTA Limited was formed in 2000, the company stood firm on the values that it had espoused at every stage for more than 100 years, and placed new emphasis on growth in Africa.

Today, as a leading multi-disciplinary construction and engineering firm, these values determine the why and how of every project undertaken. Passion, commitment and a sense of responsibility drive Aveng Grinaker-LTA's 7 000 employees stationed around the world – a legacy its founders could not have imagined.





AVENG GRINAKER-LTA



Cradlestone Mall, South Africa

A few kilometres north of Johannesburg lies the Cradle of Humankind World Heritage Site. The area was once home to ancient human ancestors but in the very recent past has attracted investment, including the construction of the two-tier Cradlestone Mall. Aveng Grinaker-LTA constructed the 75 000 square-metre shopping centre, including the supply of open-hole auger piles, multi-level parking facilities and further external site works.

"The Cradle of Humankind is itself a heritage site – a fitting place to build for the future"

— Reon Govender, Aveng Grinaker-LTA Building Contracts Manager

FNB Fairlands Building, South Africa

Wesbank and First National Bank's home loan division required new offices just north of Johannesburg, comprising two separate buildings of three floors each. In addition to the 64 000 square metres of office space, Aveng Grinaker-LTA constructed a shared facilities building, a massive basement that could house 1 600 cars, as well as external site works.

> "This building represents the future of energy-efficient and sustainable office developments"
>
> — Richard Amm, Aveng Grinaker-LTA Building Operational Executive

GREEN BUILDING COUNCIL SOUTH AFRICA

Malibamatso Bridge, Lesotho

The ambitious water project in the Lesotho Highlands incorporated investment into a number of new dams, rivers and bridges across two countries: Lesotho and South Africa. The three-phased development plan was to have a lasting impact on Lesotho's infrastructure, bringing with it new roads and water-generated electricity.

"It's a privilege to work on a unique project that will benefit countries on both sides of the border. This is the value of construction in the modern era"

— Chris Botha, Aveng Grinaker-LTA Managing Director

The first phase of the Lesotho Highlands Water Scheme required advanced access infrastructure. The construction of a 465 metre-long bridge over Malibamatso Gorge in the late 1980s was an early feature of the project.

Aveng Grinaker-LTA used 121 000 cubic metres of reinforced concrete and over 1 500 tonnes of steel to construct the piers, which were cast with slip-form shuttering.

A post-tensioned concrete box super–structure was launched across the valley using a steel launching girder, which had been designed to split into three sections for transportation. The cross-section of the pillars, special bearings and abutments, were further specialised aspects of an operation that spanned more than two years.

AWARDS

FULTON AWARDS FOR EXCELLENCE IN THE USE OF CONCRETE:

MALIBAMATSO RIVER BRIDGE (INCREMENTAL LAUNCHING) 1990

MALIBAMATSO RIVER BRIDGE PIERS (SLIP FORMING) 1990

MALIBAMATSO RIVER BRIDGE 1991

THE SOUTH AFRICAN INSTITUTION OF CIVIL ENGINEERS (SAICE) BRANCH AWARD:

EXCELLENCE IN CIVIL ENGINEERING 1991

Muela Dam and Muela Hydropower Project, Lesotho

In terms of population and geographic size, Lesotho is overshadowed by its only neighbour, South Africa. Yet the country's natural beauty attracts visitors from around the world. The famed mountain ranges are interspersed with flowing rivers, symptomatic of a region which largely lies at least 1 800 metres above sea level.

Construction of Africa's largest water transfer project began in 1984 with a series of development phases which included the building of dams and infrastructure. The project was designed to capture excess water from rainstorms in the Orange River catchment area and transfer it to the Vaal River system. The first constructed dam, Katse, began delivering water in 1998.

The next phase of the project undertook construction on the unpredictable Lesotho terrain. This included the completion of three mountain passes and 72 kilometres of tarred roads, in addition to 75 kilometres of power lines. An estimated 8 000 jobs were created for the local working population.

Other work involved construction of the Muela Powerhouse, which included the machine hall, transformer chamber, penstock valve chamber, steel-lined pressure shaft, concrete-lined lift and cable shaft, concrete-lined tailrace tunnel, steel-lined throttle upstream surge chamber, concrete-lined shaft and three 24 megawatt turbines.

"This multi-national project has seen unprecedented collaboration between South Africa and its land-locked neighbour. To provide a reliable water supply on both sides of the border is an honour, and the years of hard work have been incredibly rewarding"

— Brian Wilmot, Aveng Construction Managing Director

Montecasino, South Africa

Johannesburg city life offers the explorative and cultural as well as the lavish and spectacular. Its residents demand choice, and the City of Gold never disappoints. For locals and tourists alike Johannesburg offers an abundance of theatres, restaurants, music venues and shopping malls. As demand for entertainment grows year after year, so too does the nightlife – and the city itself seems to grow with it.

> "Johannesburg and entertainment go hand in hand. These are the developments that drive the biggest economy in Africa"
>
> — Esrom Phaka, Aveng Grinaker-LTA Operational Executive

Montecasino was built by Aveng Grinaker-LTA and first opened its doors in 2000. The popularity of the complex grew rapidly, and today it attracts nearly ten million visitors a year. As early as 2006 plans were developed to extend the complex at a cost of R260 million, including building additional hotel rooms and parking spaces.

The extension accommodated new restaurants, shops, a conference centre, a new parkade, a 1 900-seater theatre and an external entertainment centre. These developments were designed to serve the entertainment needs of an influx of guests, who would also find world-class accommodation in a new, four-storey, 179-room hotel.

Mossgas, South Africa

Two chemists working in western Germany in the 1920s discovered a process that converted carbon monoxide and hydrogen into liquid hydrocarbons. Named after its originators, the Fischer-Tropsch process allows for the production of synthetic fuel and synthetic lubrication oil from coal or natural gas resources.

There are few examples of the successful commercial application of the Fischer-Tropsch process, largely due to the sheer scale of the operation and the associated financial implications. However, South Africa's abundant supply of coal, and indeed its absence of oil reserves, left it perfectly placed to explore gas-to-liquid technology.

Mossel Bay, a port on South Africa's famous Garden Route, was selected as the location for the construction of a new oil refinery as part of the Mossgas project in the early 1990s. The refinery was to be fed by pipeline from two platforms 85 kilometres from the shore.

Aveng Grinaker-LTA led the design and construction of the sophisticated floatable concrete gravity structures, which had to be sunk in the water, never to be seen again. Work included construction of the base and walls in a dry dock, slip forming of the external and internal walls, and pre-casting of the roof panels.

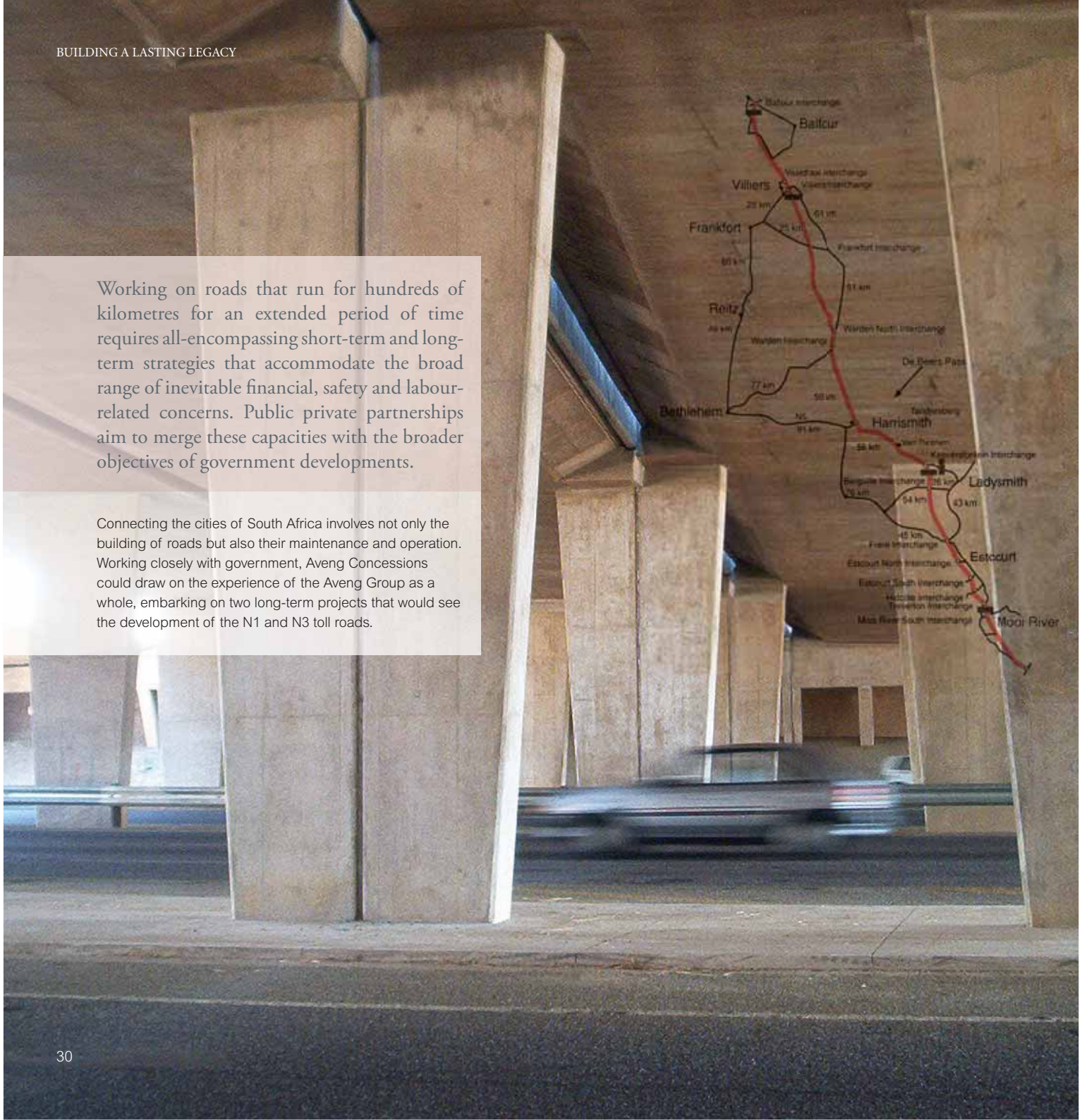
This civil engineering masterpiece required the float-out of the dry dock. The final construction of the roof and the installation of steelwork attachments took place while floating, moored along the quayside. On-shore pipeline services as well as export and effluent lines were also installed, some encased throughout the adjoining N2 road.

Aveng Grinaker-LTA undertook general civil works on its own and where appropriate in joint venture for the Synthol Plant (foundations, pipe racks, piping, paving and associated works), concrete paving in the reactor area, work on the refinery (earthworks, road works and storm water drainage), and the design and construction of foundations for the LNG Plant. In addition, work was undertaken on 9 500 cubic-metre cryogenic liquid gas storage tanks, refractory engineering (the design and material supply of primary reformers, and the supply and installation of refractory linings for gas boilers, steam super heater and gas connection pipes), as well as the design and construction of access roads, the fabrication yard and drilling terrace on the beach.

This novel and challenging project tells the tale of a floatable platform that had to disappear under water – a unique experience that demonstrated Aveng's capacity for creative problem-solving when it really mattered.

Working on roads that run for hundreds of kilometres for an extended period of time requires all-encompassing short-term and long-term strategies that accommodate the broad range of inevitable financial, safety and labour-related concerns. Public private partnerships aim to merge these capacities with the broader objectives of government developments.

Connecting the cities of South Africa involves not only the building of roads but also their maintenance and operation. Working closely with government, Aveng Concessions could draw on the experience of the Aveng Group as a whole, embarking on two long-term projects that would see the development of the N1 and N3 toll roads.



N1 Toll Concessions, South Africa

The N1 runs from Bela-Bela to Polokwane and comprises a 160 kilometre, four-laned divided highway with two-lane roads going north and south, separated by a median. Construction included 120 kilometres of new road, ancillary roads, two new toll plazas and six interchanges. Technologies and methodologies employed were constantly reviewed and adapted for efficiency. Furthermore, extensive safety measures have ensured that no disabling injuries occured during the eight-year project.

N3 Toll Concessions, South Africa

Stretching across 420 kilometres, the N3 toll road provided a different challenge when the company signed a 30-year concession contract for the design, construction, operation and routine maintenance of the highway. The road runs from Heidelberg in Gauteng to Cedara in KwaZulu-Natal, and the contract includes repairs and upgrades.

Nelson Mandela Bridge, South Africa

Nelson Mandela led a nation to reconciliation. His moral outlook, which emphasised the power of unity among all South Africans, bridged the historical divide between races. In recognition of this, the Nelson Mandela Bridge was constructed in 2003, establishing a proud landmark in the city in which he lived: Johannesburg.

2005 FULTON AWARD

"Few get the chance to oversee the construction of an iconic landmark. Not only can we be proud of putting our name to such an elegant structure, but we can also look back knowing we have created a symbol of gratitude celebrating Nelson Mandela's dedication to peace and unity"

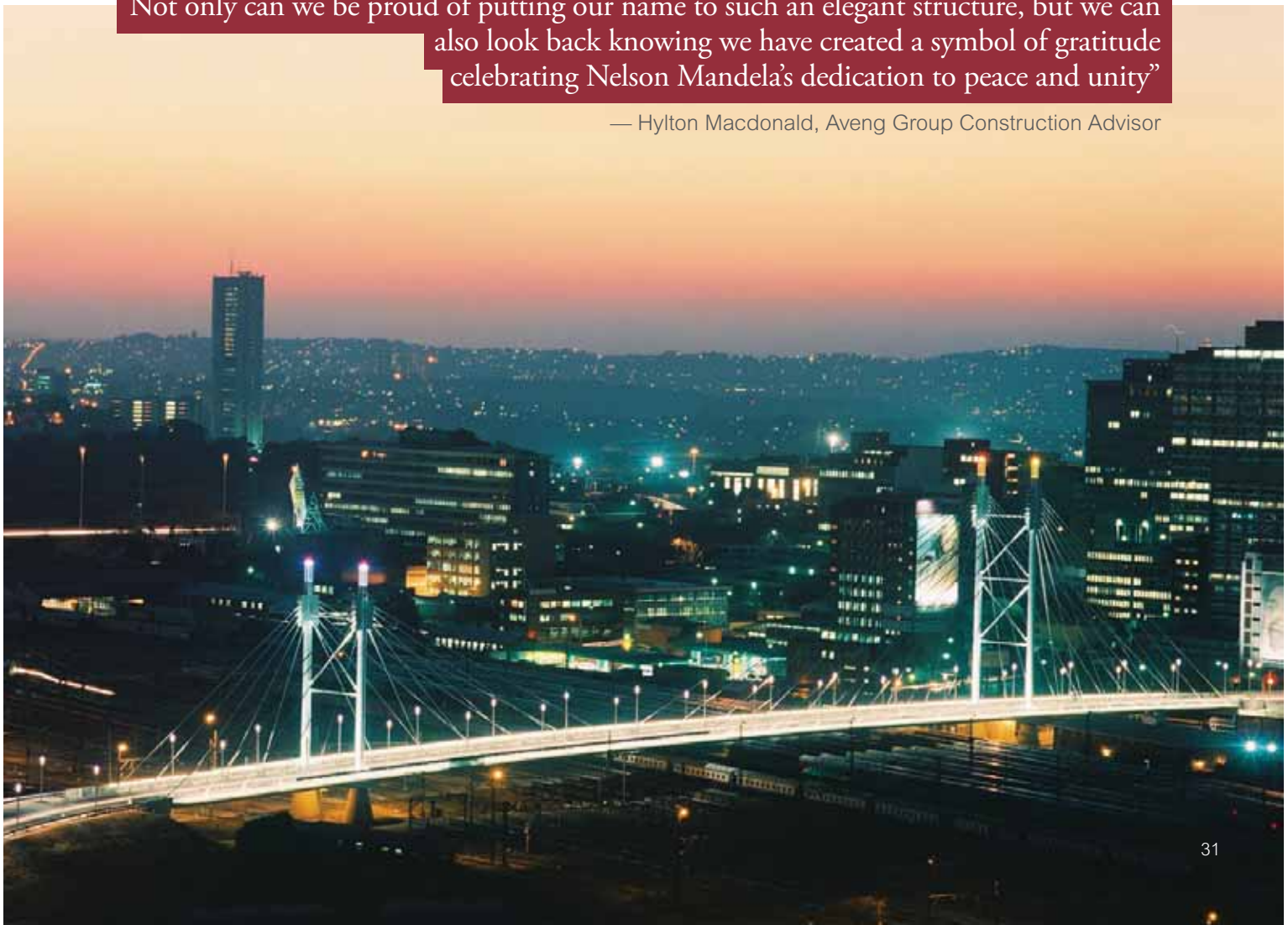
— Hylton Macdonald, Aveng Group Construction Advisor

The early 2000s saw plans to rejuvenate Johannesburg's inner city, beginning with the Newtown precinct that lies adjacent to the central business district (CBD). It was proposed that a bridge be constructed to link the CBD with Braamfontein – and thereby the rest of Johannesburg – as this would draw new interest to the historical centre of town. Bearing the name of an icon, the bridge itself would need to be an iconic addition to the city skyline.

With a prestigious name attached to the project, and given its prominent location, Aveng Grinaker-LTA began by ensuring that public interest in its implementation could be accommodated. Open press relations, public discourse and the documentation of each stage of development were encouraged from day one.

The Nelson Mandela Bridge was constructed over two years, using an estimated 1 000 tonnes of structural steel, 500 tonnes of reinforcing steel and 4 000 cubic metres of concrete. At a total length of 284 metres, it is the largest cable-stayed bridge in southern Africa. It carries two lanes of traffic with two pedestrian sidewalks.

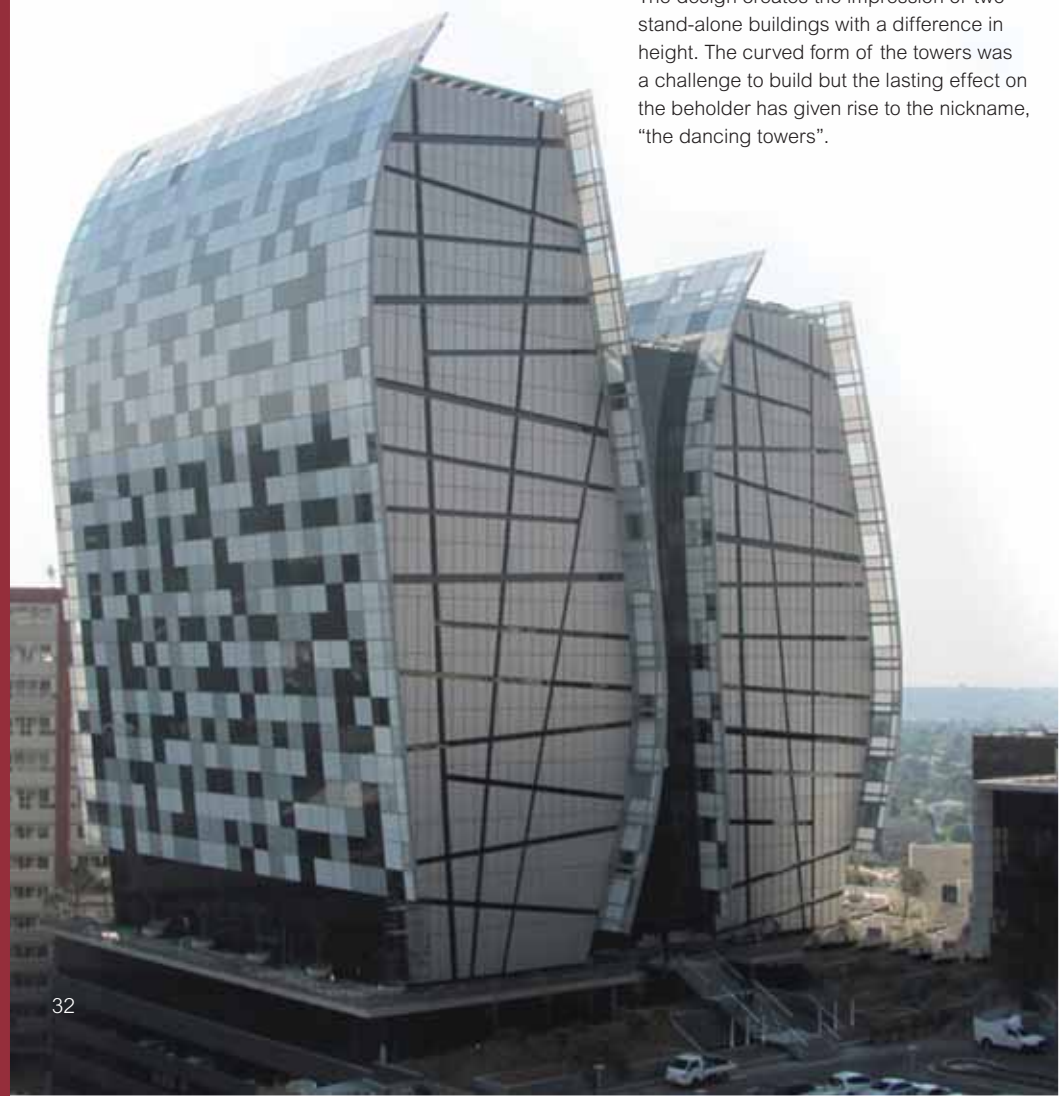
Today, the Johannesburg skyline would seem incomplete without this landmark structure. It has become a proud centrepiece, synonymous with the rejuvenated inner-city culture. Indeed, the bridge links some of Johannesburg's most well-known cultural attractions, such as Constitutional Court and the Civic Theatre, with Mary Fitzgerald Square and the Market Theatre.



Alice Lane Towers, South Africa

When viewing the Sandton skyline at night you might be fooled into thinking that two buildings are dancing to Johannesburg's beat. When the designers of the Alice Lane Towers took up the project they wanted to create a sculpture rather than a traditional building.

The construction of the towers broke the mould of corporate building design in South Africa, and Aveng Grinaker-LTA was a proud partner in creating this piece of history. The design creates the impression of two stand-alone buildings with a difference in height. The curved form of the towers was a challenge to build but the lasting effect on the beholder has given rise to the nickname, "the dancing towers".



Sandton City, South Africa

Sandton City is the crown jewel of Johannesburg's second central business district, Sandton.

Built in 1973, the complex quickly grew both in popularity and capacity for business and retail outlets. This led to the construction of a new nine-level parkade for RMB properties in 1995, for which Aveng Grinaker-LTA was contracted. The parkade was to be serviced by two lifts and three staircases.

Aveng Grinaker-LTA was called on again in 2008 to provide the foundations for a new apartment block, and the following year the company provided column structural strengthening for a separate project.

Further redevelopment in 2010 allowed Aveng Grinaker-LTA to invest further time and expertise into new retail space and parking facilities. This included two levels of retail and two levels of parking, the refurbishment of all existing shopping mall areas, as well as a striking rooflight 44 metres in diameter.

Installation of the rooflight was only made possible through the unique design of the complex structural steelwork frame. The main roof beams, up to 27 metres in length, are radiused, tapering plate girders that run at 30 degrees to one another and are supported by an internal concrete tower and an external latticed box girder. The rooflight is equipped with 170 translucent cushions that are permanently inflated with compressed air.

Nelson Mandela Bay Stadium, South Africa

Nelson Mandela Bay Stadium was one of three coastal stadiums built in anticipation of the 2010 FIFA World Cup. The roof was intended to mimic the petals of South Africa's national flower, the King Protea.

The stadium then became the home of the Southern Kings rugby team for the 2013 Super Rugby and Currie Cup campaigns. The Aveng Group was a proud sponsor of the team during this time, extending its community development programme into a region which for many years desperately needed investment to develop its talented young sportsmen and sportswomen.

FNB Stadium, South Africa

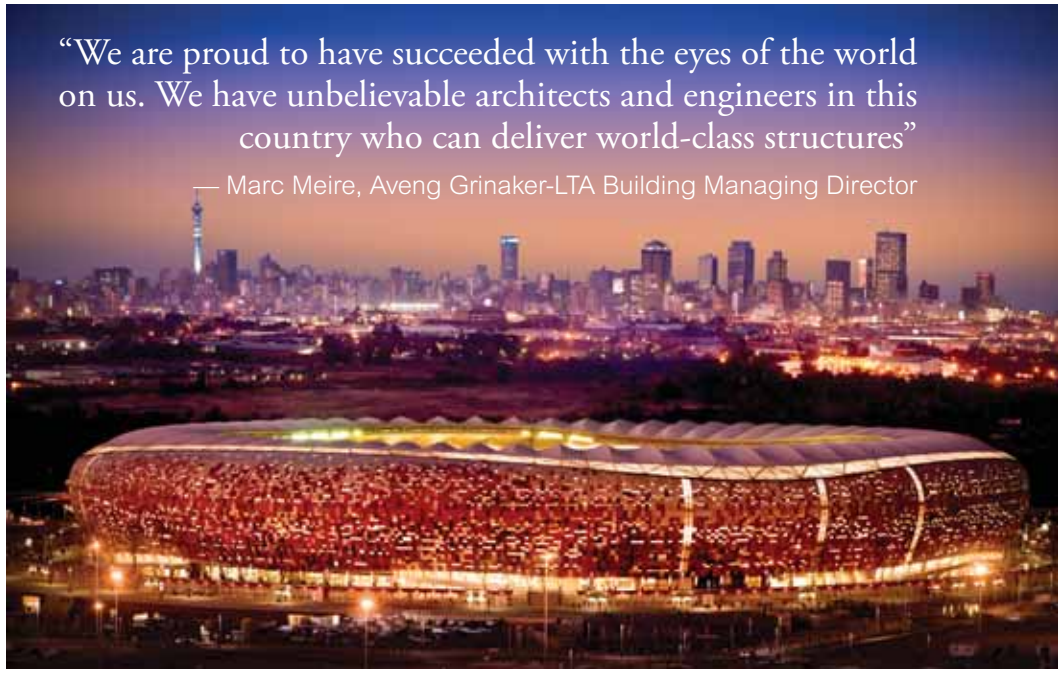
In one of Africa's most vibrant and cosmopolitan cities lies "Soccer City", a showcase of Aveng Grinaker-LTA's engineering prowess. With sports fanaticism a key ingredient to Johannesburg's frenetic atmosphere, the stadium is now considered the proud home of South African soccer. From hosting the hotly contested Soweto Derby spectacles to welcoming both the national team and its visitors, Soccer City has become the city's showpiece arena.

When South Africa was announced as the host of the 2010 FIFA World Cup, authorities decided that a new stadium befitting the prestigious tournament would be a necessary investment. The tournament imposed a precise and immovable deadline.

A comprehensive safety strategy was formulated before construction could begin. The focus on safety, made all the more crucial by exceptionally tight deadlines, proved invaluable as the project was completed with over one million disabling injury-free man hours – an unprecedented achievement under such challenging conditions.

"The jewel of Africa", as it is now known, is the biggest all-seater stadium ever built for any football World Cup event. Prioritising the experience offered to spectators, every seat guarantees an unrestricted view of the pitch.

The stadium required 90 000 cubic metres of concrete, 10 000 tonnes of reinforcing steel, nine million bricks and 13 000 tonnes of structural steel. Community upliftment was an integral part of the project, which provided just under 5 000 jobs for members of local communities.



AWARDS

WINNER "BEST PROJECT AWARD" FOR 2009 - BY CONSTRUCTION WORLD

WINNER "CONCRETE IN ARCHITECTURE" - FULTON AWARD 2009

WINNER "BUILDING PROJECT" - FULTON AWARD 2009

COMMENDATION FOR "UNIQUE DESIGN ASPECTS" - FULTON AWARD 2009

WINNER "BEST STADIUM ROOF" - SOUTH AFRICAN INSTITUTE OF STEEL 2009

TWO LEAF AWARDS FOR THE OVERALL WINNERS FOR THE BEST DESIGN 2010

SOUTH AFRICAN PROPERTY OWNERS ASSOCIATION (SAPOA) AWARD 2010

McCONNELL DOWELL

For more than 50 years McConnell Dowell has delivered dynamic engineering, construction, building and maintenance solutions that reflect the company's dedication to ingenuity and excellence.

Malcolm McConnell and Jim Dowell, two entrepreneurs from New Zealand, established McConnell Dowell in 1961. Their admiration for creative problem solving and innovative solutions served as the backbone of a business that steadily grew in reputation for its work in and around Australasia, Southeast Asia and further operations across the globe.

The company's breakthrough project ensured a world first in marine technology. An offshore water circulatory cooling system was designed for what was then the largest submarine pipeline in New Zealand. This was to be the first of many operations in the country, providing a firm foothold from which to grow.

By 1975 McConnell Dowell had expanded operations to Australia, Indonesia and Hong Kong. The company's influence was reinforced by the original vision of the founders, with the dedication to inspired solutions communicated through specialised training and skills development.

The focus on water, gas and oil pipeline projects was broadened as the business grew. During the 1980s, the expansion into oil refinery projects and the acquisition of electrical installation and maintenance company Electrix allowed McConnell Dowell to move forward as a multi-discipline contractor.

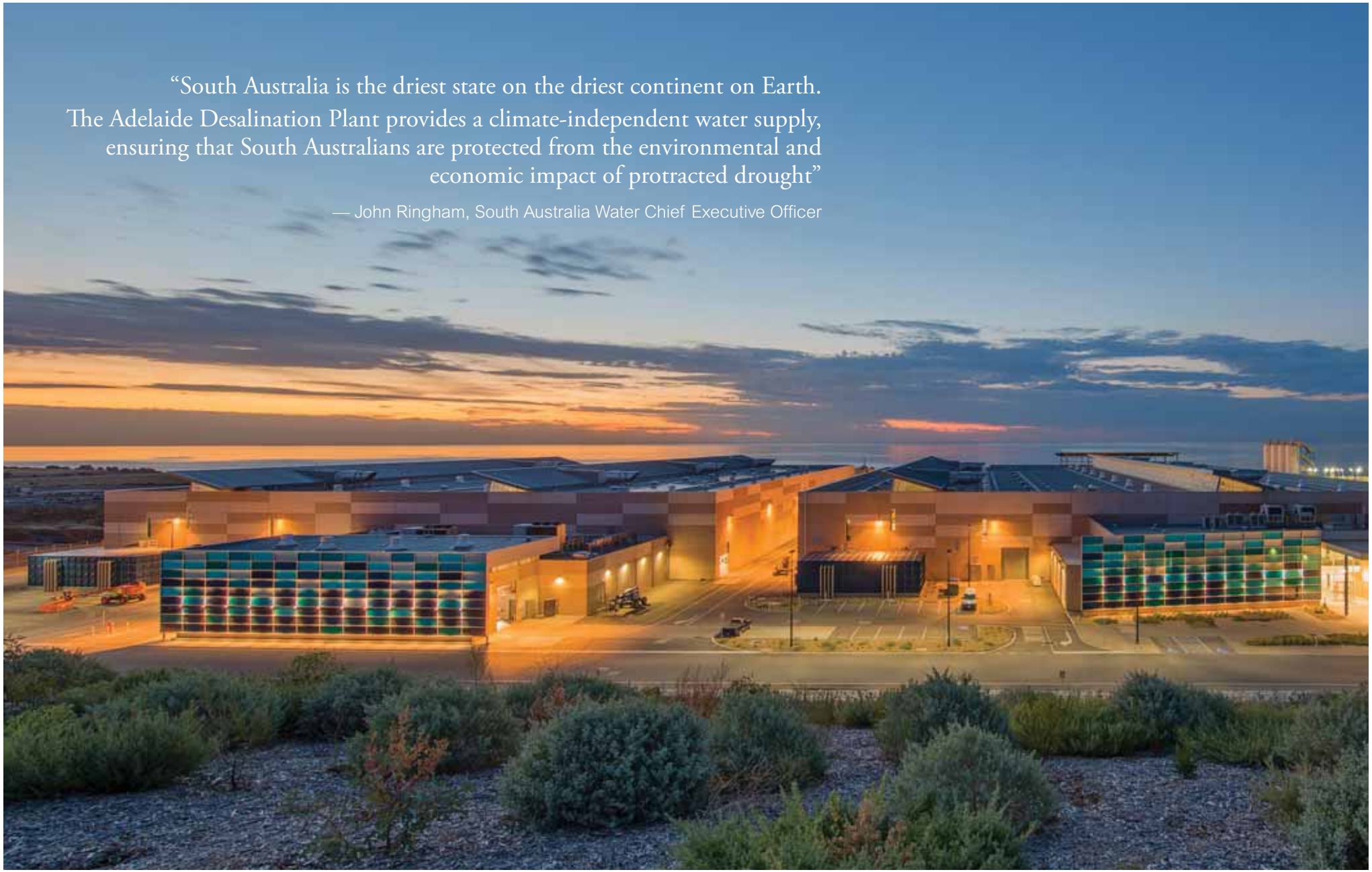
The increase in capacity attracted larger contracts, often in new territories. During the 1990s the company completed a deep sea oil terminal and tank farm in Thailand, a 227 kilometre oil pipeline from Sangachaly to Shirvanovka on the Russian border, an award-winning and record-setting tunnelling project for the Blue Mountains Sewerage Transfer Scheme and an 850 kilometre gas pipeline in Australia. Operations expanded to include work on power plants, refineries, specialised drilling projects and many other civil, mechanical and construction contracts.

By 2000 McConnell Dowell had become majority owned by the Aveng Group, and was fully owned by 2003. The turn of the century marked the start of a new era for a company with established values and a proven track record. This momentum brought with it an amplified capacity for creativity and innovation, as exemplified by repeated peer-nominated awards and recognition which McConnell Dowell has received over the years.

Today, the company specialises in the building, infrastructure and resources sectors through four brands: McConnell Dowell, Built Environs, Electrix and Aveng Water.

McCONNELL DOWELL

CREATIVE CONSTRUCTION™



"South Australia is the driest state on the driest continent on Earth. The Adelaide Desalination Plant provides a climate-independent water supply, ensuring that South Australians are protected from the environmental and economic impact of protracted drought"

— John Ringham, South Australia Water Chief Executive Officer

The Adelaide Desalination Plant, Australia

South Australia is one of the driest regions on the continent and frequently experiences water shortages as a result. In years of drought, as much as 90 percent of Adelaide's water supply comes from the River Murray. Although historically sufficient, population growth over the past decade has raised serious doubts about the reliability of water supply in the years to come.

In 2009 the South Australian government outlined several key components that would secure an independent and sustainable water supply for the region. Central to the strategy was the construction of a 1.8 billion AUD desalination plant. Construction for this project would necessitate close adherence to the environmental policies of the surrounding area, and so both the government and the Environmental Protection Agency monitored progress.

The Adelaide Desalination Plant treats water through the process of reverse osmosis. McConnell Dowell approached the design with the mandate of creating a highly efficient system that would maximise energy savings with minimal environmental impact.

The next phase of development drew on McConnell Dowell's multi-disciplinary strengths. Construction required earthworks, civil structures, marine works, tunnelling, as well as mechanical, electrical and building works. The plant became fully operational in early 2013 and can provide up to 100 gigalitres of drinkable water a year – half of Adelaide's current water needs.

AWARDS

GLOBAL WATER AWARD – DESALINATION PLANT OF THE YEAR 2013

SOUTH AUSTRALIAN CIVIL CONTRACTORS FEDERATION EXCELLENCE AWARD 2012

Bogong Village, Australia

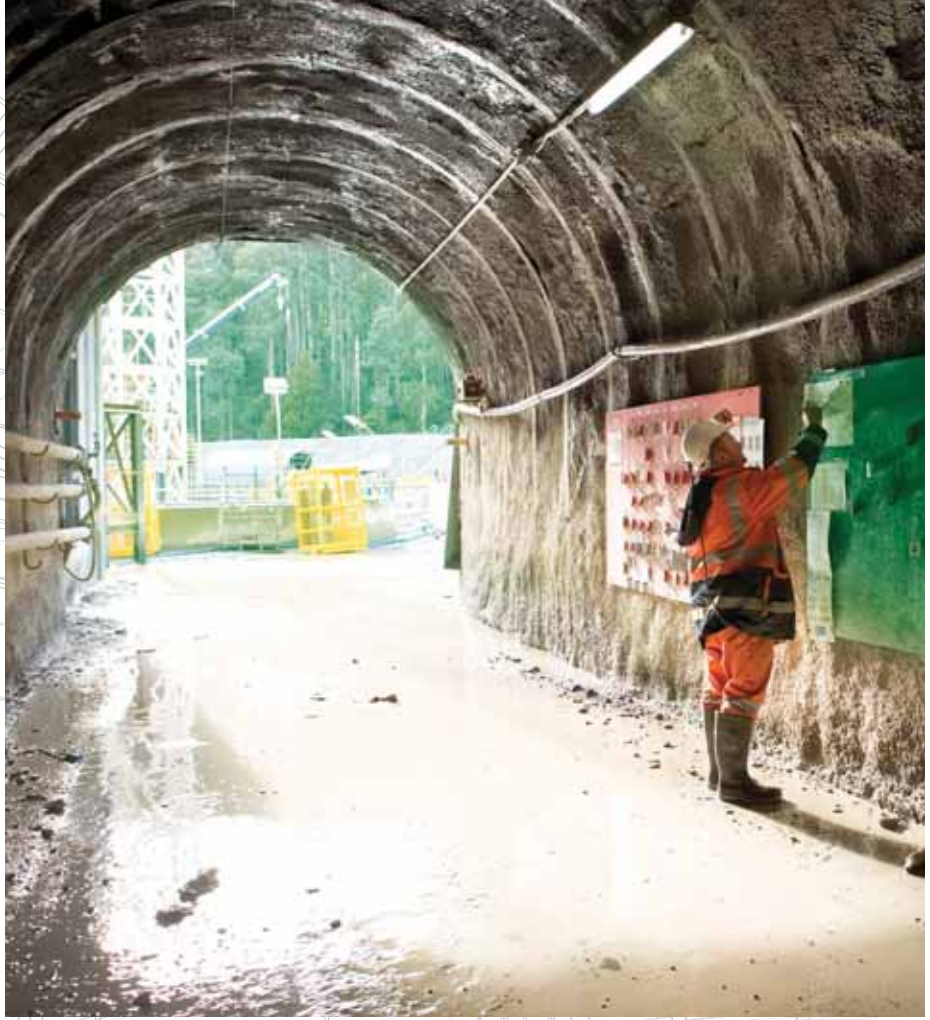
Bogong Village lies at the heart of a tranquil and delicate ecosystem in northern Victoria. The serene surroundings of natural beauty and wildlife are home to a close-knit community that enjoys outdoor activities such as canoeing, cycling, swimming and hiking. The area attracts a high number of tourists every year and, as a result, there is a considerable demand for energy stretching into the greater Melbourne area. Any project undertaken in this ecological haven has to prioritise conservation laws and practices.

The original power scheme developed in the 1950s entailed the continuous release of ecologically harmful discharge into the East Kiewa River. McConnell Dowell was approached by AGL Energy, Australia's largest electricity retailer, to construct a power station that would harmonise with the gentle surroundings of the Bogong area. The new project would need to harness the power of "Mother Nature" itself through an underground tunnel. This would involve operations in several high-risk areas.

Community engagement remained a priority throughout the project. McConnell Dowell upgraded walking paths and roads in and around the area. Awareness programmes and public forums were used to accommodate the concerns of the local population. The team quickly overcame other early challenges, including a lack of geotechnical information about the area and the need for early power generation.

Before work on the generating units could begin, the power station itself needed to be completed. Excavation and construction required the carefully managed coordination of mechanical equipment, which included turbines, generators, draft tubes, inlet valves and scroll casings. An underground waterway was constructed to divert water to the power station.

Tunnelling through massive basalts took place at a depth of up to 400 metres, with shaft excavations up to 100 metres. Roughly 300 000 tonnes of rock was removed. The power station generates 140 megawatts of renewable energy in periods of high demand, eliminating an estimated 88 000 tonnes of greenhouse gasses.



"It was successful, it was economical and it was done quickly as well. We'd love to do it again – this has been one of the most enjoyable projects the company has undertaken in a long time"

— David Logan, McConnell Dowell Tunnel and Underground Director

"The Whangarei District Council and all parties involved in this joint venture are overjoyed to have worked on such a valuable project. The construction of this bridge exhibited McConnell Dowell's capacity for ingenuity and adaptability"

— Jeff Devine, Whangarei District Council Roading Manager and Engineer to Contract

Lower Hatea River Crossing, New Zealand

A spectacular coastline and picturesque landscape characterise the Whangarei District in northern New Zealand. The area has a proud history that dates back to at least 1200, and evidence of the early Polynesian settlers can still be found. Today the population is diverse and multi-cultural, and its people are renowned for seeking to retain balance between modern urban living and more traditional cultural pursuits.

The Lower Hatea River separates Whangarei's eastern suburbs from its commercial and industrial sectors. In 2011 the local council granted the construction of a bridge that would not only provide a crucial connection over the river, but would also improve the functionality of the city's road network at large.

The design of the 265 metre-long bridge would have to reflect the cultural heritage of the region. McConnell Dowell seized the opportunity to work with acclaimed architects on this project, producing a design that was modelled on a traditional Maori fish hook. The design represents strength, good luck and safe travel across water.

A temporary platform was extended from the eastern bank of the river in order to build the first five piers to allow navigation through the channel throughout the project. This was then repeated from the western bank, and from that point the superstructure could be completed.

McConnell Dowell incorporated a 25 metre, 380 tonne bascule section to accommodate boats over 6.5 metres in height – the first bascule bridge road built in New Zealand for 50 years. The system is fronted by hydraulic cylinders that weigh eight tonnes each, aiding the lifting and lowering of the bascule section.

Te Apiti Windfarm, New Zealand

On the North Island of New Zealand lies Manawatu Gorge, a stunning passage with the unusual feature of a water gap, which runs directly through the surrounding mountain ranges. The gorge is also known as Te Apiti, which means “the narrow passage” in Maori, the language traditionally associated with the region.

A windfarm located just north of Manawatu Gorge was set to be the only one of its kind that joined directly to the New Zealand national grid. A 90 megawatt power plant was to be erected within 12 months. Through its subsidiary Electrix, McConnell Dowell was asked to provide electrical services for the project.

Newly adopted electricity governance rules added to the tight time constraints and other challenges presented by the immediate environment, such as flooding. Through creative thinking, proactivity, genuine team spirit and encouragement, the project was successfully delivered on time and within budget.

McConnell Dowell provided balance-of-plant procurement and installed, tested and commissioned 4.5 kilometres of transmission lines, operating at 110 kilovolts. The project also required underground cabling extending for 48 kilometres and a 100 MVA substation, which included advanced communication systems and a static VAR compensator.

The Te Apiti Windfarm started generating power for the national grid in July 2004. The farm forms part of a larger carbon offset project, with New Zealand’s combined windfarm capacity reaching above 300 megawatts. It is the largest windfarm in the Southern Hemisphere.

"Investing in renewable energy is without doubt the best option for ensuring a sustainable future. We were fortunate to work on a project that offered us challenges from which we've been able to learn. We can also be extremely proud of what Te Apiti is achieving on a wider scale"

— Gavan R Jackson, Electrix Managing Director
(a McConnell Dowell company)

Sentosa Bridge, Singapore

Sentosa, a paradise island resort just off mainland Singapore, offers its visitors a range of luxury hotels, golf courses, expansive beaches and even a Hollywood-inspired theme park. The name translates from the indigenous Malay word meaning "peace and tranquillity". About 70 percent of the island is covered by rainforest and is home to diverse fauna and flora.

A new road bridge was to provide an alternative means of reaching the island from the mainland. The project would require a creative approach to construction within the small constraints of the island, which stretches to just over five square kilometres.

McConnell Dowell accommodated the project's parameters through its creative construction philosophy, overcoming challenges that included strong currents and limited access for heavy lift barges. The incorporation of a diverse, multi-national workforce was also crucial.

The company designed and constructed a segmentally launched road bridge, which stretched to 380 metres. Completing the project on time required the maximisation of precast concrete elements and the modularisation of the steel truss bridges at McConnell Dowell's Batam Fabrication Yard.

The bridge was completed in early 2010, the culmination of 715 000 injury-free working hours. The Sentosa Bridge now stands as a proud landmark between island and mainland, the innovative alternative to the original cable car built in 1974, which is still in operation.

"We had limited time and important obstacles to overcome, but we did it. We showcased how McConnell Dowell's creative construction can overcome all challenges"

— Dies den Engelsen, McConnell Dowell Singapore Marine Operations Manager

AVENG MINING

With its vast landscape and diverse natural resources, the African continent offers a wealth of raw materials. Any successful mining operation in Africa requires access to specialist equipment, industry-specific knowledge and a workforce that can be mobilised quickly and effectively.

For more than 30 years Aveng Mining operations have stretched across Africa in open cut, shaft sinking and underground mining projects, including design, construction, project management and operations management.

Open cut mining

Cedric and Mike Moolman, two entrepreneurial brothers from the Eastern Cape, invested in bulldozers, scrapers and other earth-moving machinery as the starting point for their company, Moolman Bros Construction, in the early 1950s. Within three years they had earned a name as a steadfast road-building company.

With their eyes fixed on further expansion, the brothers travelled to the United States to assess international standards and practices. Their acquisition of two motor scrapers was a first for a South African company and set a benchmark for the company's innovative approach to operations.

The company grew significantly in the 1970s with contract work that included major roads, airfields, as well as coal and iron ore lines. Owing to its impressive construction operations, Moolman Bros Construction was bought by LTA in 1983.

A broader business strategy became viable with the awarding of several key mining contracts. Two contracts in particular would secure the company's reputation as prominent mining sub-contractors in southern Africa: an open pit platinum mine in Potgietersrus and a colliery near Vanderbijlpark.

Namibia, Mali, Tanzania and Guinea were among the first international operations that signified an expanding presence throughout Africa into the 1990s. The business was then in a position to capitalise on established relationships with the leading mining companies, and began operating exclusively within the mining sector.

Through Aveng Mining, this historic company now operates as one of the leading mining contractors on the continent. Aveng Moolmans' success stems from its dedication to committed relationships with clients, staff and its growing workforce.

Aveng Moolmans specialises in mining services predicated on seamless integration with client operations. Echoing the early history of the company, Aveng Moolmans still owns and operates advanced heavy earthmoving and mining equipment, with the capacity to move into remote and challenging locations. In addition to drilling, blasting, loading, hauling and dumping, Aveng Moolmans provides mine planning, production scheduling and grade control drilling.

Shafts and underground

The development of Aveng Mining Shafts & Underground reflects the importance of a company's vision and ambition.

Starting as a small group within Grinaker in the early 1970s, the specialised unit quickly established a reliable business practice by delivering civil engineering services to clients in the mining industry.

Over several years the company gained a firm foothold in a niche market. As the knowledge base expanded, contracts were awarded working on shaft collars, tunnelling and mining construction from 50 to 80 metres below ground.

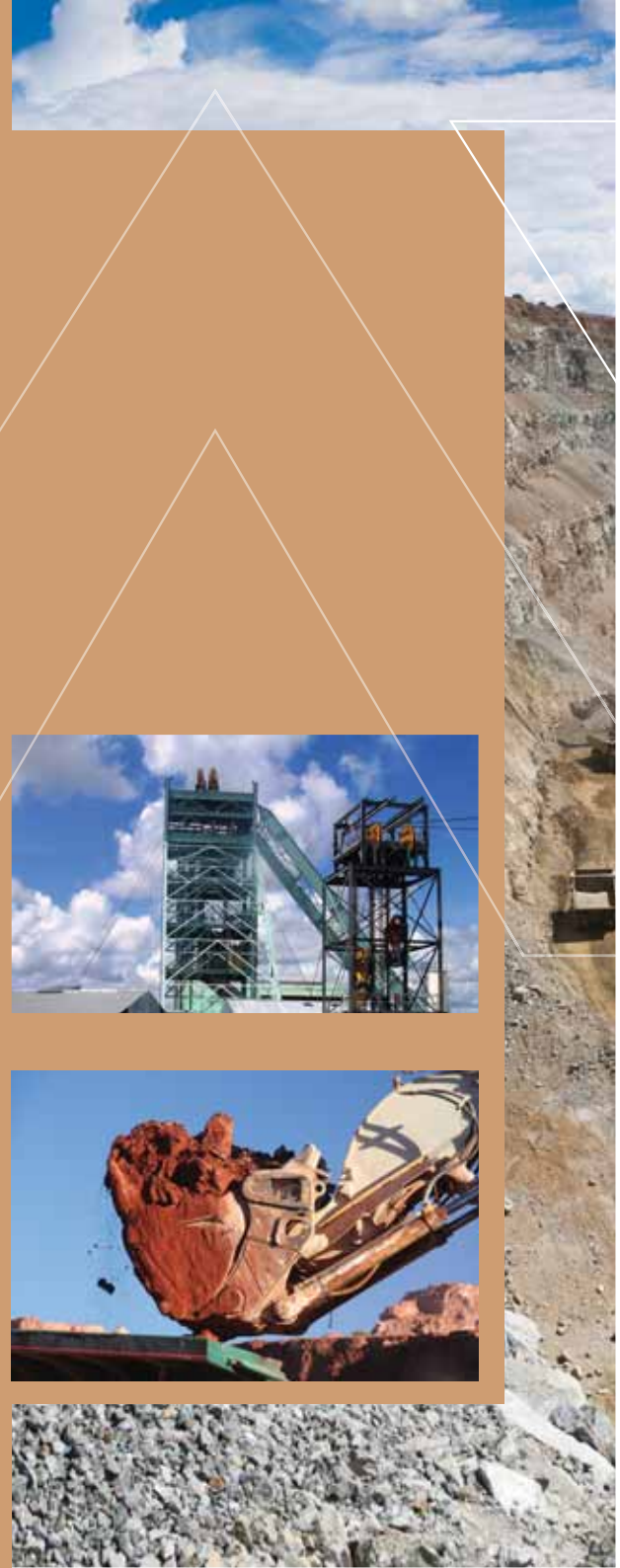
It was in the 1990s that the directors adopted a new mindset, leveraging the collective experience within the unit to land bigger contracts and expand into new areas of expertise.

Embracing innovative technology played a pivotal role in attracting diverse clients and work. From the outset, pioneering the use of new methodologies established the shafts and underground unit as an industry leader.

An early example was the simultaneous sinking of shafts and erecting of headgear. In later years the unit established suspended conveyors in contract mining, as well as the use of mobile winders.

The growth of the business also coincided with the adoption of key management philosophies and values, which included the promotion of participation and inclusiveness for every level of operation. A sharp focus was placed on ensuring the clearest channels for communicating with clients at every stage of a project.

By 2006 Aveng Mining Shafts & Underground was established as a leading player in South Africa, offering comprehensive services comprising vertical access, horizontal development and contract mining. The year also marked the establishment of a firm footprint north of South Africa, following the awarding of contract work at the Konkola Copper Mine in Zambia.



AVENG MINING

Aveng Moolmans

Navachab Gold Mine, Namibia

Evidence suggests that the Ovambo people, one of Namibia's oldest ethnic groups, were smelting copper some time before European explorers arrived in the region. These early forays into mining were a precursor to what would become a thriving industry in the country. Today, Namibia's mining sector accounts for roughly 25 percent of its national income.

"The history of the company would never be the same after this contract – the first one north of the border. It gave us the appetite to grow our presence in Africa, and was the precursor to much success in that regard"

— Adrian Ball, Aveng Moolmans Chairman (1984-2004)

Diamond and uranium mining dominate local operations, but Namibia is also rich in a variety of mineral deposits including gold, silver, lead and zinc. The Erongo region, of which Swakopmund is the capital, is home to the country's only operational gold mine: Navachab.

The gold deposit was discovered in the early 1980s, but it would be some time before operations could begin. Aveng Moolmans was contracted by AngloGold Ashanti in the late 1980s to construct access roads, terrace platforms and a slimes dam on the mine site.

In 1990 a new five-year contract was awarded with a broader scope. This was Aveng Moolmans' first cross-border mining job. The first convoy to leave head office for the journey to Karibib was a remarkable sight. The fleet included Liebherr 984 excavators, weighing in at 120 tonnes, as well as Caterpillar 769 Dump Trucks.

The project entailed the moving of about 500 000 tonnes of ore and waste a month. Work was successfully carried out for 15 years, after which AngloGold revised its strategy and began to run the operation directly.

Sandsloot Platinum Mine, South Africa

While more than 90 percent of South Africa's platinum comes from the North West province, ventures in the neighbouring Limpopo province have also proved successful. The Sandsloot Platinum Mine is located on the edge of a large geological basin.

Aveng Moolmans was awarded the biggest mining tender in Africa to date and quickly brought its earth-moving capabilities to Sandsloot in 1992. The project ran for seven years, bringing many of the company's senior managers into the fray and securing solid grounding for expansion into the rest of Africa.

The contract's scope would gradually grow to include mining with O&K RH200 excavators and Caterpillar 785 dump trucks. Because the excavators and drills were electrically powered, a signficiant challenge was faced in moving and coiling heavy electric cables as the equipment was shifted around in the pit.

"Looking back, this was the project that signalled Aveng Moolmans' ambitions to become a dominant force in African mining"

— Stuart White, Aveng Moolmans Managing Director

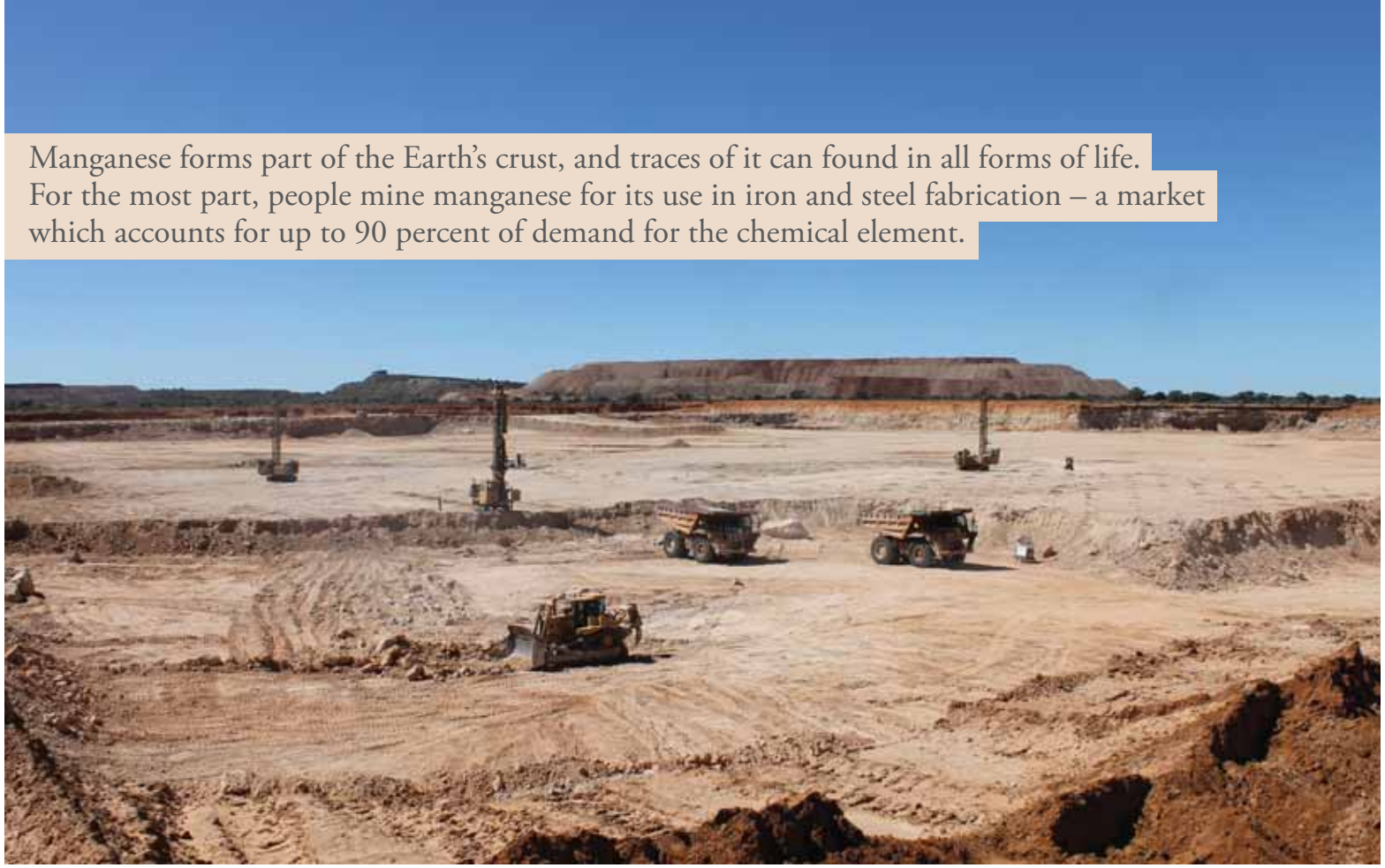
Tshipi Borwa Manganese Mine, South Africa

With roughly 75 percent of the world's manganese supply coming from South Africa, it is no surprise that more than three million tonnes are produced in the country every year. In 2011 construction began on the Tshipi Borwa Manganese Mine in the Northern Cape province, with the first ore to be produced the following year.

Aveng Moolmans was awarded a contract at Tshipi Borwa with the aim of mining 2.5 million tonnes per year. The mine was estimated to remain operational for 60 years and employ about 400 people from the region. Aveng Moolmans undertook extensive training to equip the workforce for the 60-month contract.

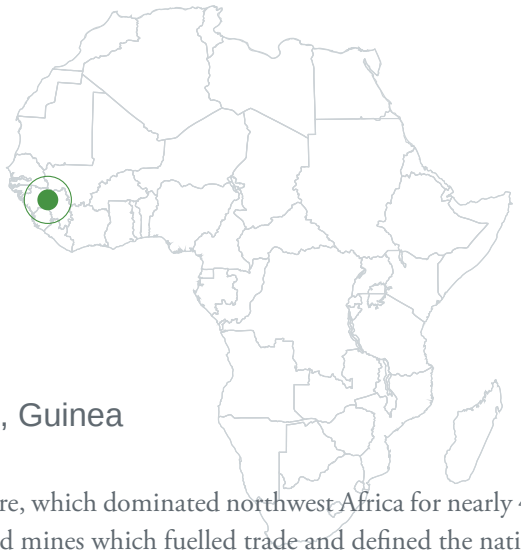
The project requires traditional truck and shovel configuration. Initially, the topsoil is removed and stockpiled for later use during the rehabilitation phase. Once competent rock is reached, the ore can be drilled, blasted and hauled to the primary crusher.

Manganese forms part of the Earth's crust, and traces of it can found in all forms of life. For the most part, people mine manganese for its use in iron and steel fabrication – a market which accounts for up to 90 percent of demand for the chemical element.



"We have four operations running concurrently in the Northern Cape, one of the country's most economically disadvantaged regions. We are proud to bring training and skills development to the communities in which we work"

— Dewald Hattingh, Aveng Moolmans Operations Director South Africa



Siguiri Gold Mine, Guinea

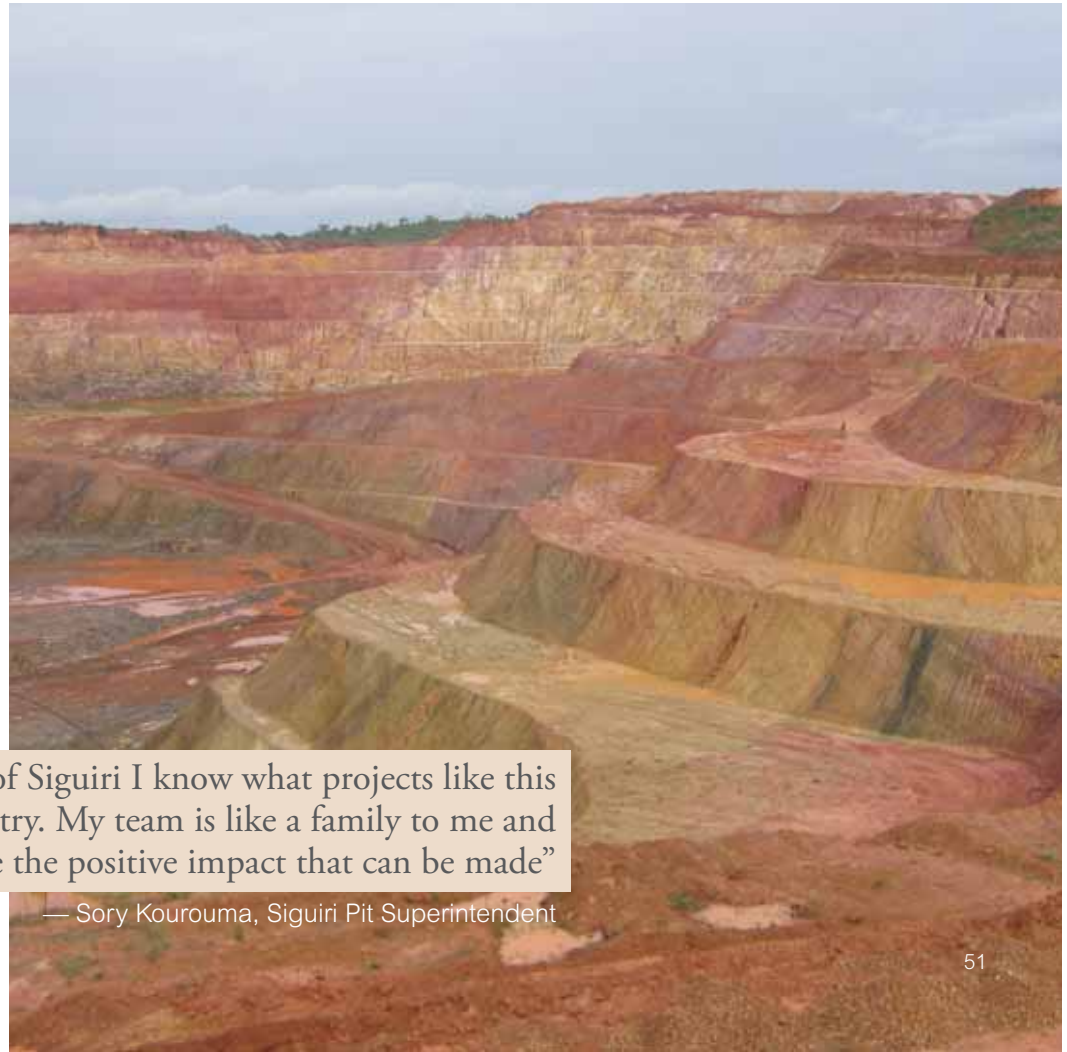
The ancient Mali Empire, which dominated northwest Africa for nearly 400 years, was home to impressive gold mines which fuelled trade and defined the nation's economy. Some five centuries later, the Siguiri Gold Mine in modern-day Guinea is testament to the country's majestic history.

Artisanal mining in the Republic of Guinea offers structure to many people's lives in the villages around the country. The city of Siguiri lies on the Niger River and has a population of about 30 000. With a limited workforce, its informal economy is driven by the gold mine, which employs more than 800 people and has stimulated the growth of other industries, such as carpentry and metalwork.

In early 1997 Aveng Moolmans began operations at the Siguiri Gold Mine for AngloGold Ashanti. The team settled into a new environment that presented the challenges of relentless heat and natural elements not usually associated with open cut mining.

Introducing a large fleet of trucks, excavators, drill rigs, graders, dozers and loaders had a significant impact on the mine. Aveng Moolmans would eventually mine about 16 million cubic metres of rock per year. Once the mineral-rich earth has been extracted it is then processed by AngloGold Ashanti.

For more than 15 years the Siguiri Gold Mine project has enriched the lives of Aveng Moolmans contractors and employees, whether they are involved with drilling, blasting, the dewatering of pits or the loading and hauling of waste and ore.



"As a Guinean national and resident of Siguiri I know what projects like this offer the communities around the country. My team is like a family to me and together we see the positive impact that can be made"

— Sory Kourouma, Siguiri Pit Superintendent

"Sometimes the greatest challenges lie within the rock itself. Our approach is to prepare to deal with any possible geological obstacles and thereby convert *the unforeseen* to *the well prepared for*"

— Japie du Toit, Aveng Moolmans Operations Director

Iduapriem Gold Mine, Ghana

Ghana's Western Region borders the Ivory Coast and the Gulf of Guinea and is characterised by impressive rivers, green valleys and fertile land. When crude oil was discovered in the region in 2007 it only fuelled interest in an area that already boasted a wealth of gold deposits.

Lying just ten kilometres south of Tarkwa, the regional capital, the Iduapriem Gold Mine would eventually operate as a joint venture between AngloGold Ashanti and the Ghanaian government.

When Aveng Moolmans was awarded an initial five-year contract by AngloGold Ashanti Iduapriem Limited in 2008, the registration of Moolman Mining Ghana Limited was a logical outcome. Mining commenced in January 2009, with Aveng Moolmans operating 365 days a year.

The fleet consists of Caterpillar 785 dump trucks and Liebherr 9350 Excavators, as well as ancillary equipment. Works include drilling, blasting, the loading and hauling of waste and ore, and ancillary works. The site employs more than 400 Ghanaians.

The operation presents significant challenges, such as extremely hard rock in some areas and massive underground cavities in softer areas (created by the local artisanal miners who operated in the area prior to commercialisation).

Sadiola Gold Mine, Mali

Land-locked Mali offers a diversity of climates and topography: subtropical savannah in the south, high plateaus in the north and the arid Saharan region in the northeast. Mali is rich in natural resources including copper, diamonds, gold and granite, but many deposits remain untapped.

The Kayes region, once the heart of the West African kingdom of Khasso in the 17th century, holds rich gold deposits that were only explored commercially from the 1990s onwards. Prior to large-scale developments, it was small-scale artisanal mining by the local population that indicated the possibility of substantial gold-mining opportunities.

For more than 17 years Aveng Moolmans has worked with AngloGold Ashanti on the Sadiola Gold Mine in Mali's Kayes region. Operations include work on one main pit and four satellite pits, although work on the mine is constantly expanding and could feasibly continue into 2026.

The use of Aveng Moolmans' operating equipment extends to loading, hauling, drilling, blasting, grade control drilling and dewatering services. Truck and shovel teams have moved more than 160 million cubic metres of ore and waste. The project presents considerable challenges that require flexibility and adaptability, both with respect to the environment and the client.

Consistent with all Aveng Moolmans' operations, the focus was placed on training local labourers to ensure a stable operation that was also sustainable. More than 800 Malians are employed at the mine, and the investment in skills and training is sure to leave a proud legacy in the region.

"My team and I work with a kind of synergy that makes high performance seem effortless. On complex mining sites like this, it's the only way to guarantee a successful operation"

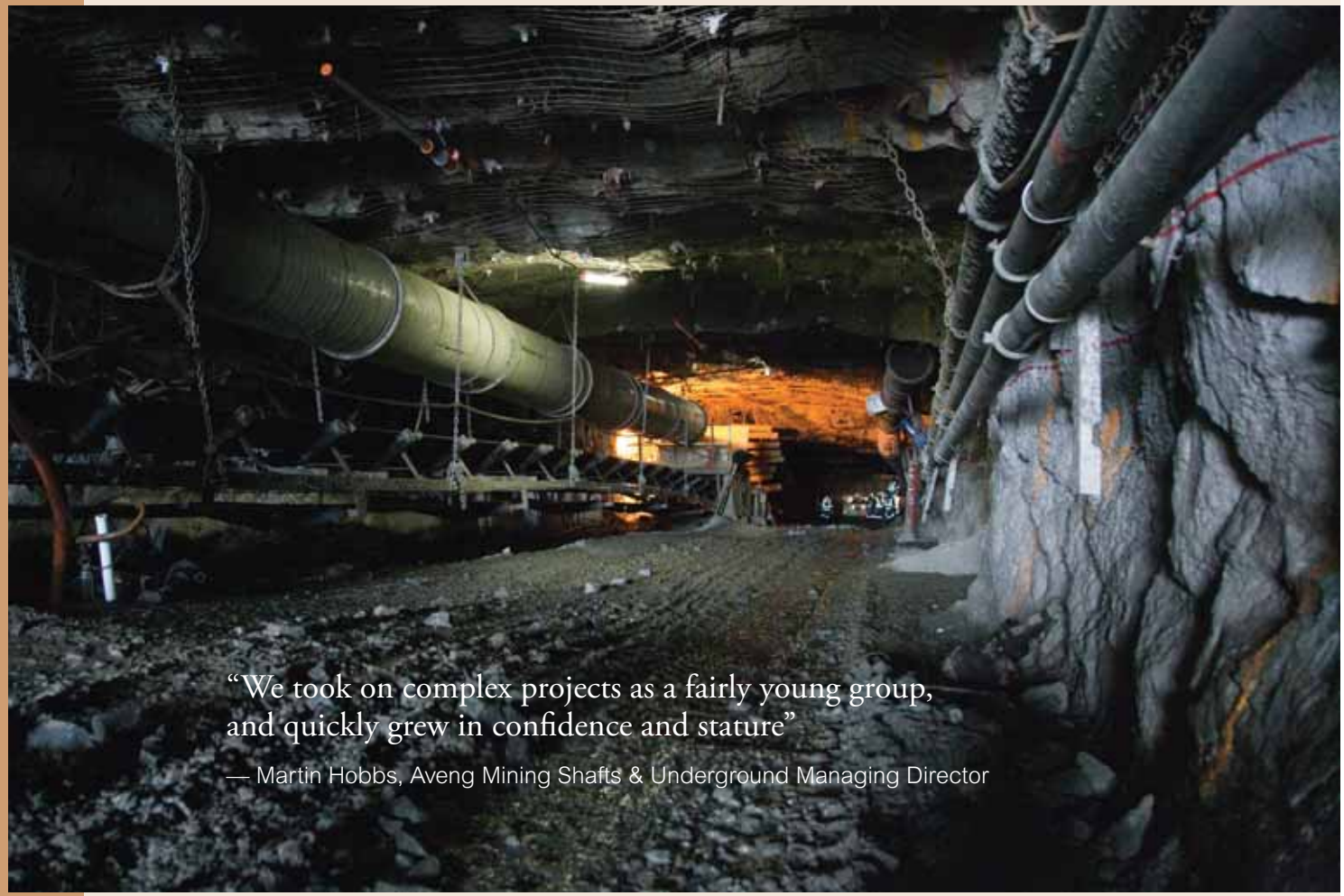
— Issa Djiguiba, Aveng Moolmans Construction Supervisor

Aveng Mining Shafts & Underground

AVENG MINING
SHAFTS & UNDERGROUND

Thubelisha Coal Mine, South Africa

Coal is a natural product of years of organic and geological forces. When dense forests are buried under layers of earth, this organic matter is sometimes protected from the natural forces of degradation. Over millions of years the vegetation is forced deeper underground and, as the pressure and temperature rise, it is slowly converted into coal.



"We took on complex projects as a fairly young group, and quickly grew in confidence and stature"

— Martin Hobbs, Aveng Mining Shafts & Underground Managing Director

From the mid-19th century onwards coal became indispensable as the leading source of electricity in the world. Today, South Africa uses coal to meet nearly 80 percent of its energy needs. Given this fact, it comes as no surprise that of the more than 250 million tonnes of coal produced annually, nearly three quarters is consumed on a national level.

In addition to coal exports, the Sasol-owned Thubelisha Coal Mine supplies coal-to-liquid operations in Secunda, Mpumalanga. In 2009, Aveng Mining Shafts & Underground was contracted to sink and equip the main shaft, which sits 180 metres deep and is nearly 12 metres in diameter, as well as the ventilation shaft, which extends to 168 metres below ground.

In order to meet project-planning requirements, the operation called for the slinging down of trackless mining equipment. This test of patience and professionalism would ensure that strict deadlines were met.

The contract ran for just over four years, during which time several innovative techniques were successfully implemented. These included the cantilever sinking headgear, which was erected in three main lift sections. This allowed sinking operations to start earlier, with one day allocated for erection followed by a short commissioning period for the winder and shaft interlock systems.

"One success followed another as all capital projects were completed within time and budget on both shafts"

— MI Botha, Aveng Mining Shafts & Underground Operations Director

Two Rivers Platinum Mine, South Africa

Plans to develop the Two Rivers Platinum Mine in Mpumalanga began in the early 2000s, despite the fact that platinum had been discovered there 80 years earlier.

Involved from the outset, Aveng Mining Shafts & Underground began the project with a trial phase, which allowed for methodology testing and the first exploration of the ore body. The full project then commenced using a mechanised room and pillar mining method.

The scale of the project and the complexities therein proved a challenge for a team that consisted of 1 700 people moving 250 000 tonnes a month. The high-tech mechanised mining called for the maintenance of 146 major mining machines, with operations later expanding to a second decline shaft.

Once the first phase of the project had been completed, Two Rivers became the most cost-efficient platinum producer in South Africa. The operation ran successfully for nine years until October 2012, an achievement largely attributable to a specialised, well-aligned and professional relationship with the client.

Konkola Copper Mine, Zambia

Humans have been using copper in various forms for thousands of years, with the oldest evidence pointing to its discovery in the Middle East. Copper probably gained widespread use in Africa around 1000 AD, but it only became an important industrial mineral relatively recently.

Since it gained independence in 1964, Zambia's gross domestic product has doubled and, today, many parts of the country are highly urbanised. The copper-mining industry has historically been a consistent source of economic growth for the country, though it experienced a dip in the 1990s.

The Konkola Copper Mine is located in Zambia's Copperbelt, near Chililabombwe. Aveng Mining Shafts & Underground was contracted to work on the largest project in the country, in the wettest mine in the world.

The main task involved sinking and equipping an elliptical-shaped shaft 1 505 metres deep. The shaft collar pre-sink was done in extremely soft and unstable ground conditions, necessitating extraordinary geotechnical requirements. The vent shaft, six metres in diameter, went from 875 metres to 1 505 metres below the surface. The team also had to establish a rock hoisting capacity of 25 000 tonnes per day.

A unique feature of the project was the establishment and commissioning of a mid-shaft hoisting facility capable of handling 12 000 tonnes per day at 1 010 metres below the surface. The project also boasted the highest steel headgear in the Southern Hemisphere, 81 metres high and constructed out of 1 800 tonnes of steel. This headgear still stands today as testament to Aveng's capabilities.

Bakubung Platinum Mine, South Africa

Although the early use of platinum goes back as far as the ancient civilisations of South America, widespread acknowledgment of the element can be traced to the Spanish conquistadors, who thought of it as a by-product of silver mining. Because of this, they named it platina, meaning "little silver".

Today, South Africa is acknowledged as the home of platinum mining, and boasts more than 80 percent of the world's platinum group metals reserves. Wesizwe Platinum, a leading national operator, established the Bakubung Platinum Mine in 2011, a flagship project in the North West province.

Having established its capabilities in Konkola and Thubelisha, Aveng Mining Shafts & Underground was contracted to facilitate the sinking and infrastructure development of two vertical shafts – one a man and material shaft and the other a vent shaft.

The project continues to demand closely monitored management systems to ensure that the stringent programme needs are met. This includes embracing new methodologies and incorporating innovative techniques.

The work will guarantee first production in 2018, which will be followed by a ramp up period of nearly five years and then full production.
The main shaft will reach a depth of 1 000 metres and the vent shaft 930 metres. The first station breakaway just below 700 metres is scheduled for early 2014.

AVENG STEEL

While the beginning of the Iron Age marked the widespread adoption of steel weapons, tools and personal artifacts into the daily lives of humans, the start of the 20th century marked the immersion of steel products into industrial development.

The 1900 steel trade industry in South Africa was boosted by new factories and workshops smelting iron, reworking scrap metal and other related processes. However, it wasn't until the 1950s that new, cheaper methods of making steel were explored. From that point on, business surged and several major players in the steel trade industry emerged.

By 1972 Steeldale and the merchandising operation Trident Steel had been established. Although at the time they were operating independently, both companies had a vision to play central roles in the developing economy.

Steel lies at the heart of industrial development. The production of crude steel in the 20th century rose at an impressive rate. As governments invested more and more money into infrastructure, industry and transport, so the demand for steel rose.

The strength, toughness and ductility of the alloy have defined how humans live their lives: the impressive feats of railways, roads, bridges and skyscrapers, and the personal use gained from electricity cables, medical equipment and household and kitchen appliances.

In South Africa, Trident Steel was amongst the first traders to acknowledge the wider benefits of a diversified range of alloy products. From the late 1980s, with South Africa in the grip of Apartheid and with the government driving an isolationist agenda, Aveng took a decisive step away from the status quo by actively embracing global trends and innovations.

Buoyed by the import of new technologies from overseas industry leaders, Trident Steel led the way for a significant national industrial expansion, most notably in the automotive industry.

Aveng Trident Steel

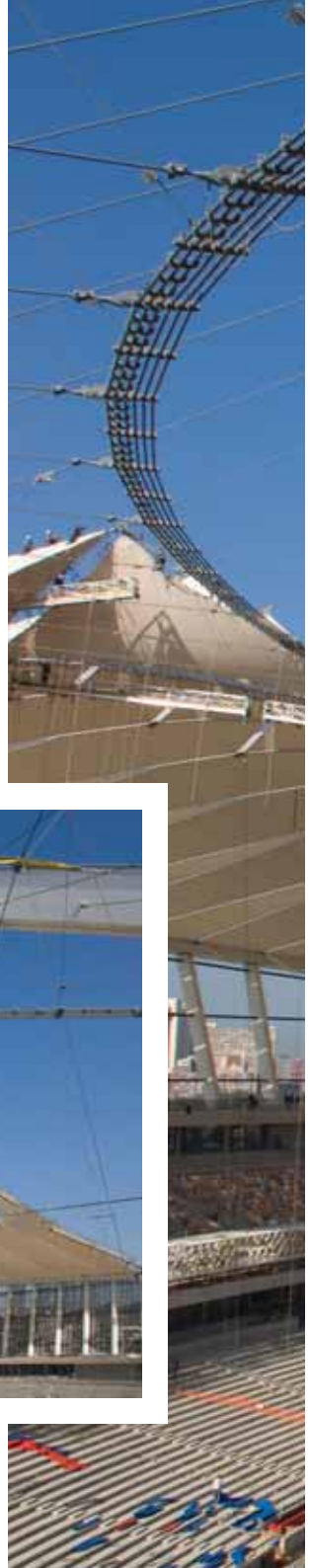
Construction

Steel is the backbone of all construction developments and steel products are central to every stage of progression, be it earth-moving machinery, reinforcing concrete or the structures themselves. Bridges, buildings and power stations are all products of this ancient alloy.

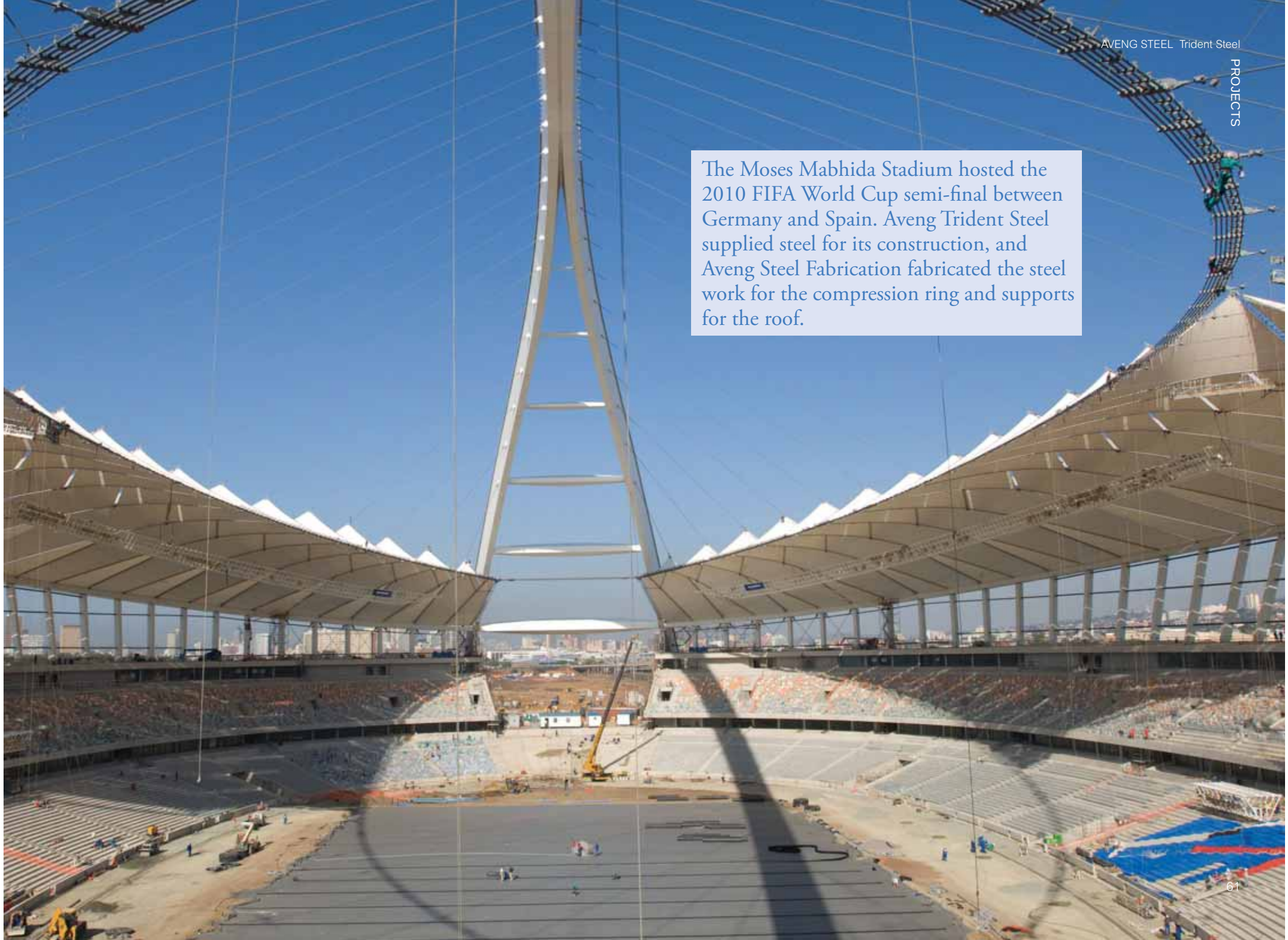
As a leading steel fabrication and processing company, Aveng Trident Steel has spent decades working with South Africa's foremost construction companies to deliver some of the country's most memorable projects. The willingness to embrace innovation and a steady increase in capacity has kept the company at the forefront of infrastructure development.

Aveng Trident Steel's speciality services offer full mechanical and chemical metallurgy testing, fabrication of all carbon and alloy steels, bar peeling and flat spring steel production. Its comprehensive logistics services include 24/7 delivery services, a transport fleet of roughly 140 vehicles, local and international stock pipelines and quality assertion for labelling, quantities and pack condition.

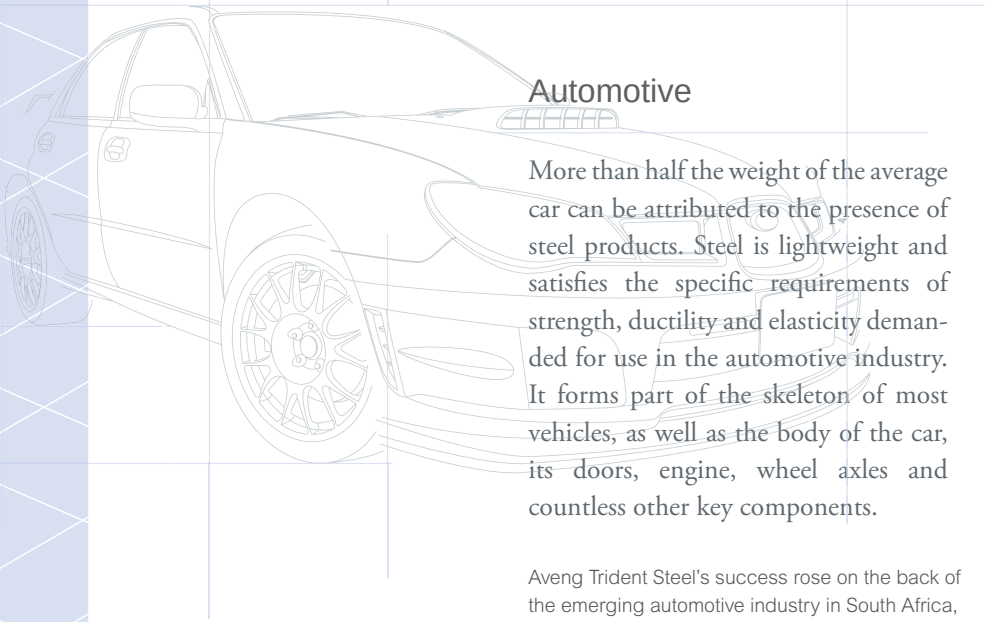
Aveng Trident Steel's wide product range now serves clients across Sub-Saharan Africa.



AVENG TRIDENT STEEL



The Moses Mabhida Stadium hosted the 2010 FIFA World Cup semi-final between Germany and Spain. Aveng Trident Steel supplied steel for its construction, and Aveng Steel Fabrication fabricated the steel work for the compression ring and supports for the roof.



Automotive

More than half the weight of the average car can be attributed to the presence of steel products. Steel is lightweight and satisfies the specific requirements of strength, ductility and elasticity demanded for use in the automotive industry. It forms part of the skeleton of most vehicles, as well as the body of the car, its doors, engine, wheel axles and countless other key components.

Aveng Trident Steel's success rose on the back of the emerging automotive industry in South Africa, which saw significant growth from the 1980s onwards. The company's strength in this area of local industry was sparked by identifying the skill sets and tailor-made equipment necessary to become a leading steel merchant.

To this day, a significant portion of Aveng Trident Steel's business feeds local motorcar production, supported by the company's coil spring, tubing and specialised steel production factories. Aveng Trident Steel offers advanced, high-strength steels, vast structural steel sections, plate and sheet metal of various sizes, as well as a comprehensive range of carbon and alloy spring steel.

Household

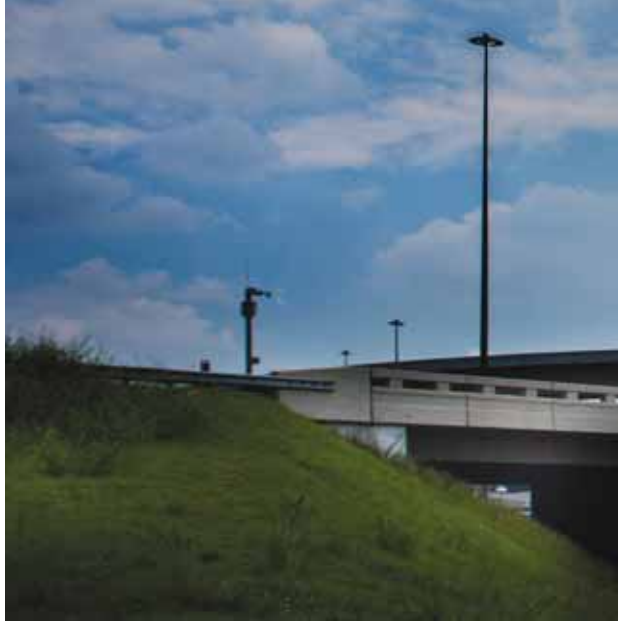
The majority of household goods and appliances contain steel – that's often what gives them their weight. Ovens, microwaves, washing machines and fridges all depend on intricate springs, tubes and fittings for functionality.

Aveng Trident Steel supplies a wide range of products to the steel industry in South Africa as well as Sub-Saharan Africa, drawing on resources that include extensive steel yards, modern and comprehensive steel-processing and steel-service centers, specialty steel divisions and tube manufacturing plants.

Processing within the company's specialised cutting division includes state-of-the-art, computerised, high-definition plasmas, lasers and gas cutting machines, guillotining, chamfering and bending services, and the manufacture of welded tubes, including an extensive range of square and rectangular sections.

"We offer our customers a quality product, delivered on time at a competitive price"

— Hercu Aucamp, Aveng Steel Managing Director



Aveng Steeledale

Established in the mid-1950s, Aveng Steeledale has become a leading manufacturer of wire and welded mesh products used in the construction, engineering, mining, security fencing and agricultural industries, with 20 branches located across South Africa's major cities.

Aveng Steeledale's comprehensive product range includes: the cutting and bending of reinforcing steel, stock lengths, construction mesh (all references), white mesh, wire products, preassembled reinforcing steel (including cages, columns and stirrups), detailing, and contract management (on-site rebar installation).

The company has contributed to some of South Africa's most iconic structures, including: FNB Stadium, Moses Mabhida Stadium, Constitution Hill, Nelson Mandela Bridge, Koeberg Power Station, Kusile Power Station and De Hoop Dam.

Sasol Projects

For energy and chemical giants Sasol, Aveng Steeledale has supplied steel products for numerous oxygen and effluent plants, cooling towers, pipe tunnels, chimneys and water treatment plants.

Over the last 20 years, advances have been made in many areas of reinforced concrete construction, such as the use of additives and mix design to improve concrete strength and workability, and new formwork and support systems to improve the stripping time associated with boxes and decking. This has aided project development and allowed for faster turnaround times.

Gillooly's Interchange

Once a farm, now one of the busiest interchanges in the southern hemisphere, Aveng Steeledale supplied materials for the construction of the Gillooly's Interchange in Johannesburg. The winding interchange forms part of the Johannesburg Ring Road, which encircles the city.

Aveng Steeledale was contracted to supply reinforcing steel and mesh for the ring road and bridge. The project continued for 36 months and required 5 000 tonnes of reinforcing steel and 1 000 tonnes of construction mesh.

The two-tonne bundles of reinforcing steel had to be colour coded to ensure correct offloading, section by section. The mesh was unlike any other manufactured by Aveng Steeledale, and required precise planning that coincided with the strict project deadlines. Clear communication between the site and the factory was vital.

The highlight of the project was the 270 metre bridge, which was pushed out incrementally from pier to pier across the existing carriageways. A yard had to be established alongside the intersection to make construction possible, and the bridge required more than 100 rebar installers working on site.

Like so many Aveng projects, the Gillooly's Interchange connects cities and communities.

Aveng Steel Fabrication

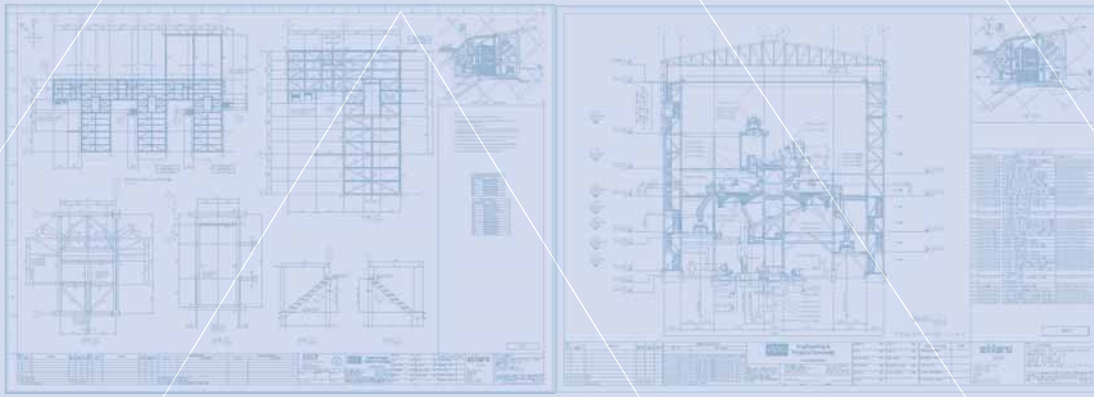
Medupi Power Station Expansion

Plans for a new power station in Limpopo were initiated in 2007 by national electricity provider Eskom. The Medupi Power Station takes its name from the Sepedi word meaning “rain that soaks parched lands”, and when the plant was granted significant extensions it was set to become the largest dry-cooled coal-fired power plant in the world.

Aveng Steel Fabrication was contracted to provide a bucket wheel reclaimer for use on the Medupi expansion works. The complexity of the project was clear from the outset – precision and integrity needed to be strictly monitored given the heavy loads associated with the mobile machine.

The project took place over the winter months, and the cold weather required greater emphasis on methodology. The pre-established machining schedule meant that programme and progress were always the focus, and assembly preparation had to be strictly accurate. The welding sequences were equally precise, made more difficult by limited access points.

Due to the volume of welds and time constraints, at times up to 20 coded welders were required to work simultaneously on either the lower or the upper ring girder. In spite of the challenges, Aveng Steel Fabrication succeeded in producing the four main parts of the reclaimer, using nearly 250 tonnes of steel in total.



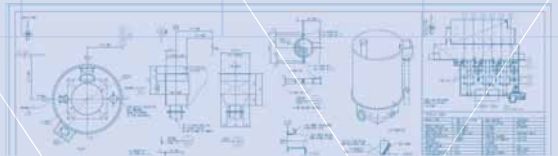
AVENG STEEL FABRICATION

Part of the Medupi expansion project entailed structural steelwork on the power station's chimneys. Aveng Trident Steel supplied all the raw materials for the project.

The complexity of the project presented significant challenges but succeeded thanks to intense preparation and an emphasis on methodology.

AWARD

OVERALL WINNER: MINING & INDUSTRIAL CATEGORY - STEEL CONSTRUCTION AWARD 2012



AVENG MANUFACTURING

Establishing a manufacturing business that is immersed within the mining, construction and railway industries requires steady growth, adaptability and invention. Aveng Manufacturing had its beginnings in familiar surroundings, but through embracing these qualities it unlocked new territories and now stands as a leader in its field.

When companies such as Grinaker and LTA began periods of rapid expansion in the 1970s, the need for reliable suppliers warranted the formation of new manufacturing companies. Over the years, numerous companies were established to supply these industries with high-quality products, services and solutions.

The demand for specialised products grew steadily. Railway construction entailed the need for landscaping. Mineral processing required valves for water and effluent. New building designs demanded the design and installation of curtain walling over claddings systems and specialist shop-front glazing.

As a series of mergers and acquisitions unfolded during the 1990s and early 2000s, the Aveng Group began to benefit from a consolidated manufacturing division. In 2007 Aveng Manufacturing was reorganised to offer a comprehensive product range, management for the construction and maintenance of railway lines, curtain walling, process control instrumentation, process system solutions as well as engineering, construction, mining and water projects.

AVENG MANUFACTURING


RR-24-M-12

Lennings Rail Services

Limpopo Railway Line, Mozambique

Mozambique's railway history stretches back to colonial times in the late 19th century. Over the 100 years that eventually saw independence from Portugal and the subsequent civil war, railway projects were scattered in time and location, with projects being completed, abandoned or destroyed throughout the country.

Recognising the significance of an adequate railway that linked the capital Maputo with northern Mozambique, the United States Agency for International Development (USAID) provided funding worth R352 million for a comprehensive railway rehabilitation project in 2002.

Building on years of work on infrastructure projects throughout Africa, Aveng Manufacturing Lennings Rail Services committed to the project with eager anticipation of a fruitful collaboration with Mozambican suppliers and contractors, as stipulated by the project stakeholders.

The project entailed the rehabilitation of the railway from Maputo to Aldeia De Barragem, which lies 225 kilometres north, and repairing all bridges between those points. The extent of the project was amended to include a further 300 kilometres after the initial phase.

Work included repairs to station buildings along the route, new railway tracks, new culverts and extensive earthworks. The successful collaboration saw 1 300 Maputo labourers employed, many of whom were semi-skilled or unskilled. The revised project scope meant rehabilitation also extended to the Zimbabwe border.

"Considering the magnitude and complexity of this project, we were thrilled to complete it on schedule and to the required quality standard. We left many friends in Mozambique, particularly our Mozambican members of staff, but also the subcontractors and suppliers who made the project possible"

— Ben Schellingerhout, Aveng Manufacturing Lennings Rail Services Contract Manager

AVENG MANUFACTURING LENNINGS RAIL SERVICES

Northern Railway Line Extension, Namibia

The first Namibian railway was constructed in 1895 by the German colonial government and, by 1903, there was an extensive track running from Swakopmund to Windhoek. Today, the country's railway network has been developed substantially, including roughly 2 500 kilometres of Cape gauge track, with the main line running from the border of South Africa to Windhoek.

A 246 kilometre railway track and associated components comprised the Namibia northern railway line project. Aveng Manufacturing Lennings Rail Services was invited to be part of a joint venture that would entail a two-phased operation between Tsumeb and Ondangwa.

All railway sleepers – some 400 000 – were made at Aveng Manufacturing's factory in Tsumeb. The project also required the use of several industry-specific pieces of equipment on the track, including a tamper, a ballast regulator, two sets of gantries and a flash butt welder.

The initial phase included the establishment of the contractor's site, surveying and stacking. The construction of the skeleton track was the foundation of subsequent operations, including the lifting, aligning and tramping of the track and the construction of turnouts and level crossings. The project was later extended to include a further 90 kilometres of mainline between Omuthiya and Ondangwa.

The incorporation of Namibian workers was an important part of operations. The total staff complement on site was 230 people, 19 of whom were expatriates and the rest Namibian nationals. Thanks to a dedicated team, and solid cooperation between all stakeholders, the project was successfully completed with unquestionable quality and professionalism.

"Any project that extends for hundreds of kilometres requires commitment and cooperation over a long time. We are lucky to have worked with people who embody those qualities every working day"

— Wouter De Gidts, Aveng Manufacturing Lennings Rail Services Managing Director

The Pilbara Iron Ore Infrastructure Project, Australia

The Pilbara is a dry and rocky region in Western Australia which stretches for more than 500 000 square kilometres. The region contains three national parks and is famous for its vast landscapes and natural features. It is also where the majority of Australia's iron ore is mined.

Aveng Manufacturing Lennings Rail Services joined forces with McConnell Dowell to work on railway lines that would serve several iron ore mines in the Pilbara region. The project would serve mines owned by the Fortescue Metals Group, one of Australia's largest iron ore exporters.

The railway lines would have to handle some of the heaviest hauls in the world. The project formed part of the Pilbara Iron Ore Infrastructure Project, and when completed would join the mine to the Port Hedland via a 256 kilometre railway connection.

"It is a privilege to work in conjunction with McConnell Dowell and extend Aveng Manufacturing Lennings Rail Services' footprint into that corner of the world"

— Solly Letsoalo, Aveng Manufacturing Managing Director

Infraset

The first concrete sleepers manufactured in South Africa in 1957 did not meet the standards of South African Railways (SAR). Concern about the lighter wooden and steel sleepers led to a trial order being placed with Grinaker for 30 000 sleepers in 1958. It was a success and, following the award of a contract for 550 000 sleepers, a factory was built in Brakpan.

Aveng Manufacturing Infraset – derived from the words infrastructure, service, excellence and technology – was established in 2001 after the merging of three companies: Grinaker Precast, Grinaker Duraset and Frazer Fyfe. Today the company manufactures precast concrete products for the landscaping (paving and retaining walls), infrastructure (pipes, culverts and manholes) and railway (mainline and private sleepers, poles and masts) markets.

The Edge of the Sea, South Africa

As a historically Nguni-speaking region, Umhlanga was destined to become a part of King Shaka's Zulu kingdom in the early 1800s. Lying on the east coast of the KwaZulu-Natal province, Umhlanga's population grew in the latter half of the century with the influx of European settlers and Indian labourers. The beauty of the seaside location makes it a popular holiday destination to this day.

The ocean walk that stretches from Durban to Umhlanga is supported in part by the Waterloffel seawall, protecting coastal landmarks from the relentless power of the ocean. The seawall, reinforced by precast concrete support, was originally completed in 1993, but new sections were added in 2007 and then again in 2011.

Aveng Manufacturing Infraset supplied concrete Waterloffel retaining blocks for the seawall, which would have to withstand both active soil pressures and unpredictable climatic events.

The section of seawall built at The Edge of the Sea was unique, having been designed to incorporate a modern beach amenities centre, a life-savers tower, a rescue boat launching ramp, a grassed entertainment area, a restaurant, a covered amphitheatre, built-in showers and steps to the beach.

The seawall's capacity for resistance would be severely tested in March 2007 when huge waves devastated the KwaZulu-Natal coastline. The event, declared a national disaster, incredibly left 85 percent of the seawall intact, with only those sections that had yet to be capped sustaining significant damage.

"The Edge of Sea project is testimony to the importance of product quality, design efficiency and sound construction techniques to create a structure that will withstand the most extreme weather conditions"

— Steven Ross, Aveng Manufacturing Infraset Sales Manager

Duraset

The invaluable supporting structures that make construction projects possible are sometimes visible, but they can also remain hidden from the public eye. Aveng Manufacturing Duraset offers engineering support solutions to the mining and geotechnical industries, providing structure both conceptually and physically.

AVENG MANUFACTURING DURASET

Safety in the mining industry has become a focal point in recent decades and, thanks to improved knowledge and technical abilities, many lives have been saved on an annual basis. Aveng Manufacturing Duraset's range of critical safety products includes: steel rock reinforcement tendons (roofbolts), cable anchors, stand-up support products and strata control products, which are supplied to the gold, platinum, coal and copper industries in Africa, Europe, Russia, Chile and Canada.

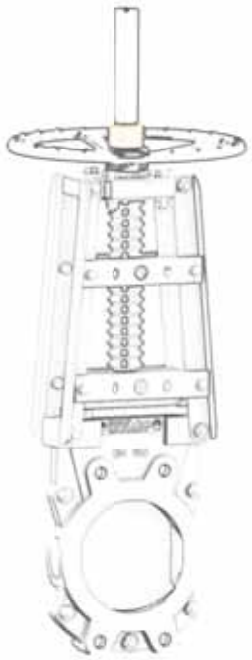
Dynamic Fluid Control (DFC)

Supplying the world with valves, Aveng Manufacturing DFC has a hand in successful water and mining operations on a global scale. Quality valve manufacturing and professional assessments and allocations are central to the prevention of equipment failure and improving efficiency.

Tharisa Project, South Africa

Tharisa Minerals approached Aveng Manufacturing DFC to aid plans for expansion within the platinum group metals and chrome mining sector. The processing plant required valves manufactured for abrasive and corrosive applications.

Cyclones, which are used to concentrate mineral particles, depend on efficient valves, which DFC duly provided in addition to actuators. Receiving the order in February 2012, DFC provided the valves in May of that year and the plant was fully operational by the November.



Grootegeluk Medupi Expansion Project, South Africa

Eskom's Medupi Power Station demands large supplies of coal, and mining group Exxaro initiated the Grootegeluk Medupi Expansion Project to address that need.

Receiving the order in July 2010, DFC began delivering items to the project in March 2011, including a total of 2 540 manually operated valves and a mix of 318 electric, pneumatic and hydraulic-operated on-off valves.

"With more people on the planet and the same amount of rain as a thousand years ago DFC's Water-Demand products need to perform at ever increasing levels, optimizing every precious drop."

— Ray Kirby, Aveng Manufacturing DFC Sales Engineer (1966-2013)

Facades

Alice Lane Towers, South Africa

Perhaps the most important aspect of building design is the visual artistry that catches the imagination of the beholder. Aveng Manufacturing Facades uses high-performance glass, metal, natural stone and composite panelling to supply and install specialist façade solutions.

The iconic building at 15 Alice Lane Towers was designed to add a prominent landmark to the Sandton skyline. The striking architecture required a façade that resembled falling paper, and this would entail an unconventional methodology that could accommodate the unusual curves of the building in its assemblage.

Structurally, the curved "underbelly" of the building ruled out the use of conventional post-and-panel systems. Hoisting and installation presented a challenge because work had to begin begin in mid-air, just above the atrium entrance level.

To produce the requisite "falling paper" effect, glazed black and white glass was used, as well as glazed wings that cantilever 2.5 metres past their gable ends.

Innovative techniques were applied to glass alignment and closures in order to work on the fan-like structure that saw the towers joined through link bridges, each floor being at a different angle to the floor below.

The team worked on the east and west elevations using 400 millimetre deep-composite panelled boxes, also known as pillows. A dramatic visual effect was aided by the use of dark grey glass, which appears as slashes across the façades.

Not only was the Alice Lane project a first in terms of design, it also set an example for the integration of innovation, community engagement and safety.

The Atrium, South Africa

The office complex known as the Atrium is attached to Sandton City, and is currently undergoing a significant upgrade. Aveng Manufacturing Facades was contracted to complete a new façade that would add a unique focus point to the celebrated Sandton skyline.

The project includes a recladding of the existing structure with a fully glazed façade, replacing the old strip window and concrete exterior. The predominant feature is the full-height atrium screen, made of clear glass, which will envelop the entire recess and create a sense of space and grandeur. The curved structure is accentuated through the use of contrasting flush glazed elements, and is complemented by the full stature of the atrium screen and glass roof.

Automation & Control Solutions

AEL Fly-ash Boiler Control System, South Africa

Aveng Manufacturing Automation & Control Solutions provided equipment for an upgrade to AEL Mining Services' fly-ash boiler control system. After considering the many possible distributed control systems products available, Aveng Manufacturing Automation & Control Solutions selected the DeltaV, offering comprehensive technical assistance for its implementation. The DeltaV was more suitable to AEL's continuous-process chemical and explosives plants on their Nitrates Campus in Modderfontein.

Sasol Wax, South Africa

Apart from its use in the candle industry, Sasol's wax has a number of unique applications. It is often produced for use with the hot-melt adhesives that glue cardboard boxes and wood joints together. More recently, it has been used as an additive to reduce the temperature at which bitumen can be laid in road construction and for the forming of PVC objects, such as pipes or window frames.

Aveng Manufacturing Automation & Controls Solutions was contracted to provide products for a two-phase upgrade to Sasol Wax's Sasolburg site, just outside Johannesburg. The upgrade would see Sasol Wax double its hard wax production in South Africa.

Products for the Sasol Wax project and Omnia plant (above right) include: Rosemount pressure transmitters, Rosemount temperature transmitters, Rosemount radar transmitters, Fisher control valves, Micro Motion, Brooks and Elomatic.

AVENG MANUFACTURING
AUTOMATION & CONTROL SOLUTIONS

Omnia Porous Ammonium Nitrate Plant, South Africa

Aveng Automation & Control Solutions provided the Emerson DeltaV Digital Control System (DCS) solution for the Omnia porous ammonium nitrate (PGAN) plant, which is part of Omnia's world-class nitric acid complex in Sasolburg. It began operations towards the end of March 2012, and Aveng Automation & Control Solutions developed the software, design and construction of the DCS cabinets, the testing, commissioning and handing over of an operational control system for the plant, and continues to provide after-sales services and support for the control system.

The Omnia complex is the first of its kind to be built in South Africa for many decades. It represents a milestone investment in the production of nitric acid and will alleviate the pressure Omnia experienced as a result of an increasing shortage of this critical raw material.

The complex is a much-needed investment for the future of southern Africa's mining and agriculture sectors. Despite Omnia's existing plant being operated at full capacity, the growth in Omnia's markets has led to an increasing shortage of nitric acid, which has restricted its application in the fertilizer market.

The capital cost – at less than $200 million – compares favourably with international benchmarks for similar plants. Start-up was achieved in a record construction period of 21 months – a very tight time schedule for a capital project of this nature. The complex will enhance South Africa's capacity to produce nitric acid and ammonium nitrate using world-class technology.

The complex comprises a nitric acid plant, an ammonium nitrate plant, a porous ammonium nitrate plant, a fleet of 145 specialised ammonia rail tankers, and other ancillary facilities. The nitric acid plant will produce 1 000 tonnes per day, which is 40 percent more than the current plant.

Omnia uses international leading technology to eliminate greenhouse gases at its new and old nitric acid plants in Sasolburg, such as EnviNOx® of ThyssenKrupp Uhde, which is more than 98 percent efficient.

AVENG ENGINEERING

There is an unseen commodity that precedes all mining, construction and engineering projects. It is what enables both the large-scale implementation of ambitious infrastructure as well as the modest execution of more focused operations. Aveng Engineering is in the business of selling ideas, because ideas are what drive development.

The origins of Aveng Engineering can be traced to what was previously called LTA (and would eventually become Aveng Grinaker-LTA). In the early 1980s the need for a specialised division that could consolidate the project management and process engineering knowledge within the company was recognised, and LTA Process Engineering was formed.

During those initial years, services were aimed at clients within the chemical, mineral process and petrochemical industries. In addition to planning and consulation, the company soon established a reputation for professional on-site operations and its portfolio grew to include renewable energy and power plants.

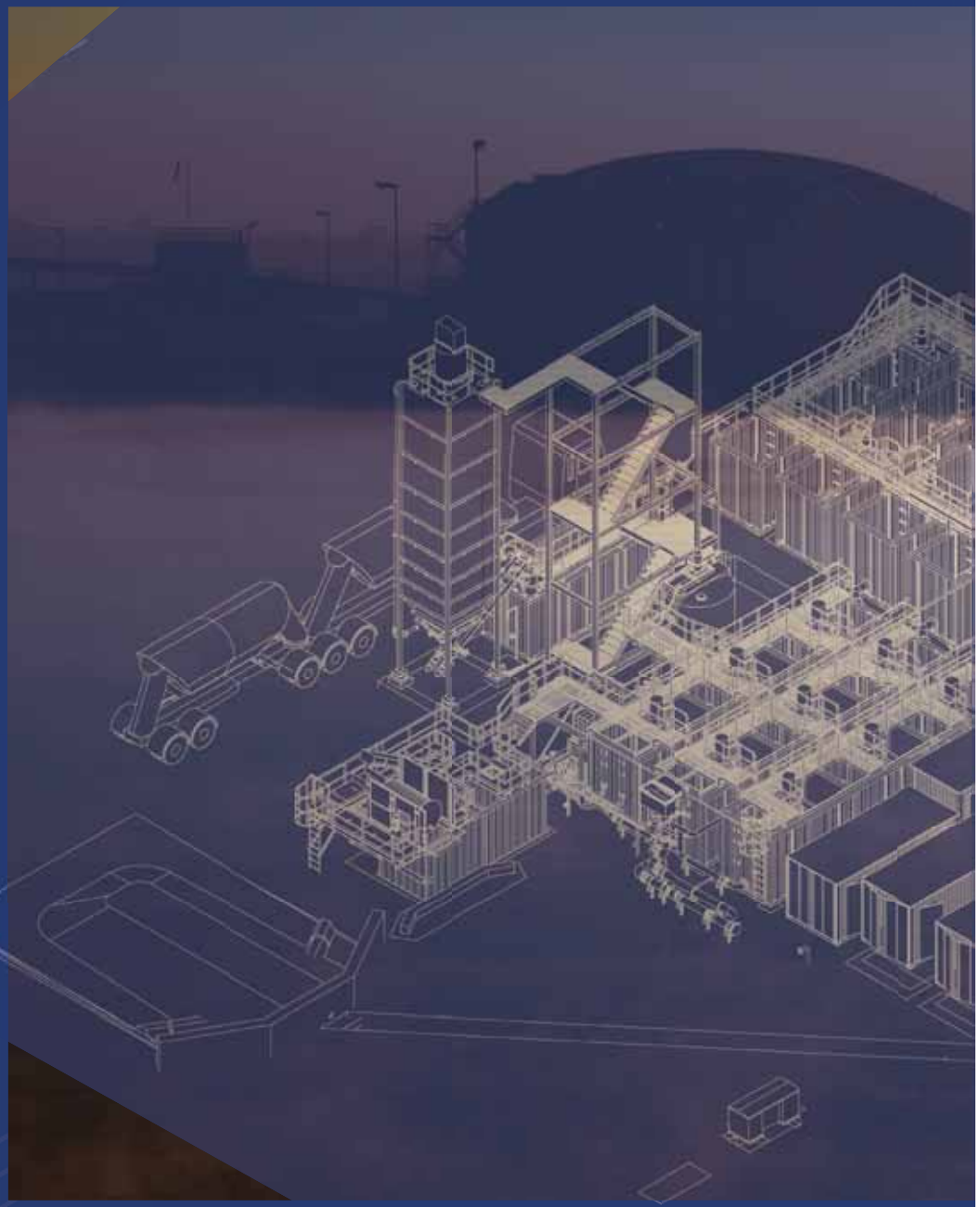
In the 1990s, the Operations and Maintenance division was established, capitalising on collective experience with gold, coal, diamonds, platinum group metals, sulphuric acid and heavy minerals. Gradually specialty services grew more diverse as employees from various fields of expertise were brought into the business.

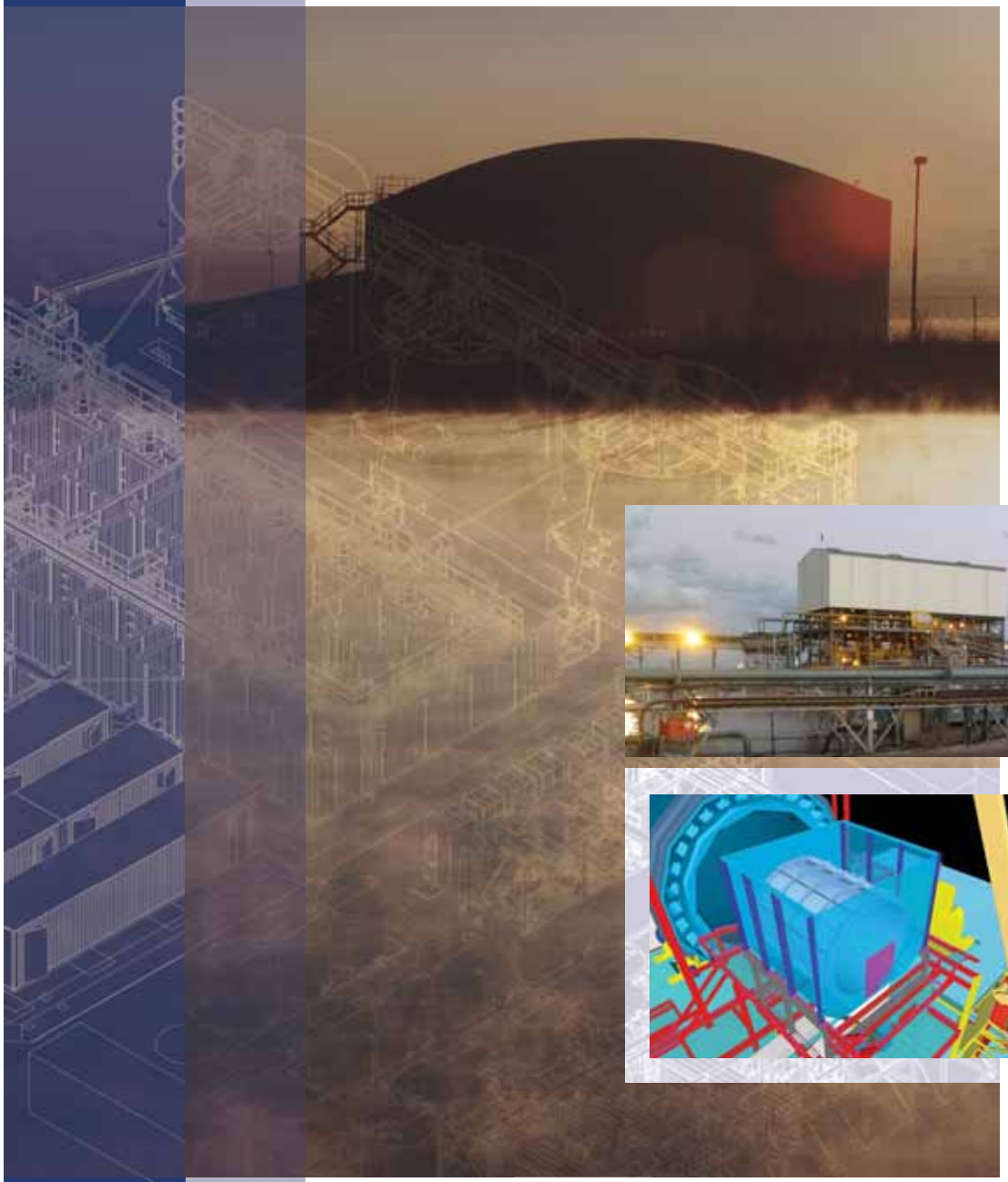
By the time it became the Aveng Engineering and Projects Company in 2005, the business had solidified its people-oriented approach to work. Rather than directing its resources to the material objects that create structures or are extracted from the earth, there was an emphasis on what made those operations possible. Ideas, capabilities and skills were, and continue to be, highly prized within the company.

Aveng Engineering offers diverse project management and process engineering services through Aveng Minerals, Aveng Power and Aveng Water. The latter two have facilitated expansion into areas such as nuclear energy and acid mine drainage.

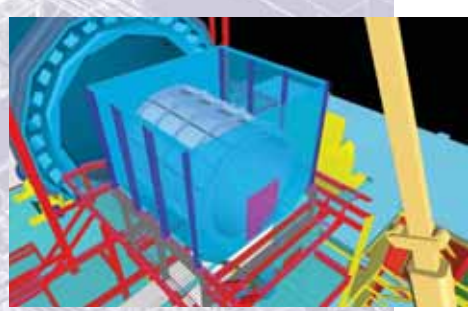
The group has an established presence throughout Africa, strengthened by its legacy-driven philosophy regarding remote operations. By continuously investing in local workforces through training and development, and by utilising local resources and infrastructure, the long-term sustainability of its operations is guaranteed.

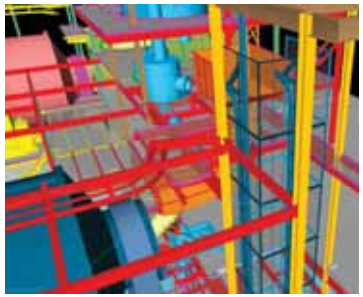
Some 30 years after its inception, Aveng Engineering today offers comprehensive end-to-end services, from feasibility studies, conceptual engineering and design to quality control, operations and maintenance.





AVENG ENGINEERING





Aveng Power

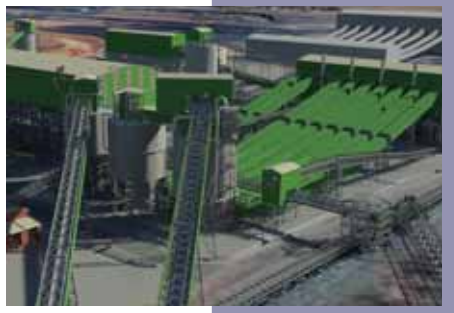
Capitalising on its rich deposits, South Africa has relied heavily on coal-fired energy plants for electricity generation. Nearly 50 percent of all coal consumed in the country supplies businesses and households with electricity. Aveng Engineering, comprising Aveng Power, Aveng Water and Aveng Minerals, has played a role in the development of South Africa's most notable power stations.

Medupi Power Station in Limpopo was built with the capacity to produce 4 800 megawatts of electricity – the fourth largest power plant in the world. Aveng Engineering facilitated civil works which included the use of 790 000 square metres of concrete and 62 000 tonnes of reinforcing steel.

The project included construction of the plant's chimneys and silos, a security building, a compressor house, two substations, two coal stockyards, an ash conveyor and conditioning plant, and a radio tower building. Through the Aveng Group, the manufacture and installation of 153 354 diameter inches of piping was central to establishing the plant's mechanical capabilities.

Kusile Power Plant in Mpumalanga is the country's most advanced coal-fired plant, and Aveng Engineering provided the balance of plant and process management solutions for the project. This included working with other Aveng Group entities to supply and install 78 kilometres of piping, 1 000 tonnes of steel and free-issue mechanical equipment.

Other prestigious contracts awarded to Aveng Power include: Komati, Kendal, Majuba, Camden, Tutuka, Hendrina, Kriel, Duvha and Matla (all in Mpumalanga), Matimba (Limpopo), St Aubin (Mauritius) and Kogan Creek (Australia).



AVENG POWER

As early as 1911 an article in *Scientific America* warned that a reliance on natural fuels could have disastrous implications for future generations, and that identifying diverse energy sources was a necessity. The early renewable energy debates have since developed into multi-disciplinary research and development industries.

The potential to use wind, natural heat and water to ultimately supply communities with electricity has become part of our modern-day reality. Indeed, as a growing unease around climate change gains traction in political spheres, so too have these elegant solutions become more desirable.

Wind farms

Harnessing the power of the wind is no recent development – the use of sailing ships dates back thousands of years. However, it wasn't until the late 1800s that wind was first converted into electricity. This unpredictable energy source now drives more than 200 000 wind turbines around the world.

Aveng Engineering has had a hand in several notable developments in Australia and New Zealand. These include designing and constructing access roads, crane hardstands, wind turbine foundations and ancillary works prior to the erection of 27 wind turbines for the Clements Gap Wind Farm in South Australia, along with the construction of the Snowtown, Capital, Hallett, Te Apiti and Wattle Point wind farms.

Hydropower

South Africa's Ingula Pumped Storage Hydro Scheme is found in the Drakensberg mountain range on the border of the Free State and KwaZulu-Natal provinces. Aveng Engineering assisted in the construction of two new access roads, as well as various cast in-situ, multi-cell culverts and the upgrade of nearly 60 kilometres of existing roads.

The Muela Hydropower Station aimed to benefit from water power offered through the Lesotho Highlands Water Scheme. Aveng Engineering constructed the 72 megawatt power station, which has the longest headrace in the world. The project included a 52 000 cubic metre concrete lining and an underground excavation of 102 800 cubic metres.

Notable international projects include: construction of an underground power station complex for the Cabora Bassa Hydro-electric Scheme, the refurbishment of the Ambuklao and Binga hydropower plants in the Philippines, the construction of the 10.5 megawatt Mubuku Hydro Scheme in Uganda, and the development of the acclaimed Bogong Hydro Power Project in Australia.

Geothermal power

The Earth itself generates energy through the radioactive decay of minerals, historically exploited by humans with the occurrence of hot springs. Originally restricted to certain geographical regions, modern technology has seen the global application of geothermal power, from large-scale power plants down to household use.

In New Zealand, the Te Mihi Geothermal Power Station was awarded an upgrade, which began in 2011. Aveng Engineering led the engineering, procurement and construction of a new 166 megawatt geothermal power station.

Other international projects include: construction and civil engineering works on an 89 megawatt thermal/bagasse power station called Savannah in Mauritius, and work on the Hwange power station in Zimbabwe, including the construction of a natural draft cooling tower with associated pump bay, CW ducts, buildings and filter structures.

Aveng Nuclear

Roughly five percent of South Africa's national electricity grid is drawn from nuclear power – a figure that is likely to increase in coming years. The country's reliance on coal-fired power plants will inevitably need to be addressed.

The Koeberg Nuclear Power Station was developed in 1976 in order to supply power to the Western Cape province and supplement the country's growing electricity requirements.

Aveng Engineering, then operating under the name LTA, formed part of the consortium that was awarded the contract for the construction of the plant – the first of its kind in South Africa.

The project included the construction of the main civil engineering works, sea water pumphouses and additional buildings with an electrical output of 1 844 megawatts.

"We were there when the first nuclear project took shape in the country, and this has ensured that we have the experience and expertise to look forward with confidence to future developments in nuclear power in South Africa"

— Dr. Rob Adam, Aveng Group Executive: Nuclear & Africa

Aveng Water

Seventy percent of the Earth is covered in water. Life on the blue planet would not be possible without water, yet human beings have only relatively recently acknowledged the importance of monitoring the levels of potable water on a global scale.

The biological and chemical treatment of water has played a large role in reclaiming contaminated water and returning it to the natural environment or supplying it to communities. Since 2011, Aveng Water has provided consulting and contracting services for the mining, municipal and industrial water sectors, specialising in the design and engineering of water treatment plants.

eMalahleni Water Reclamation Plant, South Africa

Concern about the flow of water affected by acid mine drainage (AMD) into South Africa's surface and ground water systems has grown considerably as the potential long-term effects slowly become more apparent. The eMalahleni Water Reclamation Plant in Mpumalanga is the first plant in the world of its size to successfully treat AMD-affected water. Aveng Water designed, built and is operating and maintaining the plant.

Operating in conjunction with coal-mining projects in the region, the eMalahleni Water Reclamation Plant treats 30 megalitres a day and will soon expand to 50 megalitres. It uses neutralisation, reactor clarification and multi-stage ultrafiltration technology. Twenty percent of the water used by the eMalahleni local municipality is supplied by the plant. The by-product of AMD treatment, known as gypsum sludge, is sold to the manufacturing industry for use as gypsum board and building materials.

TECHNOLOGY TOP 100 - TT100

ACHIEVERS AWARD 2012

"Water is our most precious resource.
We are fortunate to have worked on projects that reclaim environmental stewardship for future generations"

— Gavin Young, Aveng Engineering Managing Director

Optimum Coal Water Reclamation Plant, South Africa

As businesses in the mining sector become more aware of demands made on their industry to balance mineral extraction and environmental impact, so investment in new technology and infrastructure will grow. Optimum Coal took the opportunity to manage water supplies affected by their operations by constructing a reclamation plant.

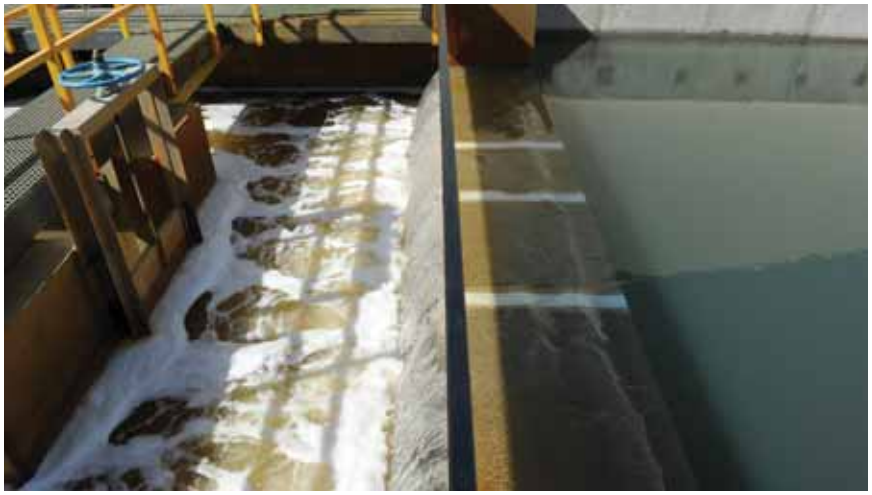
Aveng Water designed and constructed the Optimium Coal Water Reclamation Plant in 2010. It has the capacity to process 15 000 cubic metres of water a day, and has a 98 percent recovery rate. Once treated, most of the water is subsequently used by the municipality of the neighbouring settlement, Hendrina. The standard of the reclaimed water has received accolades from the Department of Water Affairs.

Our most precious resource

Sewage, industrial waste and acid mine drainage all contribute to placing the world's water supplies in jeopardy. Aveng Water uses emerging technologies to treat polluted, unsafe water and restore it to meet the international standards of water-drinking quality as outlined by the World Health Organisation.

These posters (right) formed part of Aveng Water's media campaign to spread awareness about its unique water purification projects.

The client gift activation took the form of water bottles covered with an outer wrapping depicting the colour of contaminated water prior to treatment, with a perforated pull-tab which, when pulled, removed the wrapping to reveal a clean bottle of purified water – a symbolic representation of the treatment process. The campaign won a Silver Loerie Award in 2012.



Erongo Desalination Plant, Namibia

Just north of the Erongo region in Namibia, not far from Swakopmund, lies an open cut uranium mining project which has been in operation since 2010. The region is characterised by a lack of both surface and ground water, and the intensive mineral extraction process necessitated the construction of a desalination plant.

The Erongo Desalination Plant was designed, built and continues to be operated by Aveng Water. It maintains the capacity to process 57 000 cubic metres of water a day, with a focus on pre-treatment using ultrafiltration followed by reverse osmosis – a chemical process that separates solute and solvent. It is the largest plant of its kind in southern Africa.

AWARD

THREE YEARS LTI-FREE IN 2013

Aveng Minerals

With experienced professionals based both throughout South Africa and around the world, Aveng Minerals has the capacity to support project execution for a wide range of mineral processing applications. These include uranium, diamond and heavy mineral processing, gold extraction and base mineral beneficiation.

AVENG MINERALS

"The Moma Sands project exemplified our team's diverse capabilities, culminating in the successful completion of a highly complex project"

— Gavin Young, Aveng Engineering Managing Director

Moma Sands, Mozambique

Once applied to the wide spectrum of human endeavours, titanium can be found as far as outer space, its tensile strength the perfect attribute for building spacecraft. Somewhere closer to home, Mozambique's glorious shoreline contains hidden treasure: Its coastal terrain holds the largest deposit of titanium-bearing mineral sands in the world.

The Moma titanium minerals mine on Mozambique's northern coastline produced 842 900 tonnes of heavy mineral concentrate during 2011 and had an estimated 139-year production life. When plans to increase capacity were finalised, the project required professional engineering, procurement and construction management services to ensure successful expansion.

The expansion was set to increase Moma's production by 50 percent. Aveng Engineering was contracted to manage the project's civil, mechanical and electrical engineering, as well as earthworks, platework, piping, instrumentation and system integration contractors.

Work started with a new dredge pond. Segmenting the ore body between the old and the new dredge ponds on different levels was a challenging starting point, requiring the use of significantly more powerful machinery. The new dredge, manufactured and tested in the United States, had to be reassembled on site as part of the second phase of the plant's development.

Project delays resulted in Aveng Engineering offering additional resources to ensure a less encumbered process. Other significant additions included a new wet concentrator plant, an expanded mineral separation plant and a supplementary dry mining system.

You can **dream**,
you can **strategise**,
you can speak of what's to come,
but **your legacy** points only
to what you've done.

There are bricks and mortar, and the labour that joins them. There are machines and equipment, and the skills that direct them. There is development and infrastructure, and the vision that drives them.

Beyond building.

3

Expansion and growth

Aveng believes that the key to affecting change through infrastructure development is to partner with governments through their programmes and initiatives. In South Africa, the National Development Plan (NDP) outlines a long-term strategy to secure future growth, and Aveng has highlighted the need to speak to its objectives.

The new Sasol head office (left) will add another landmark to the Sandton skyline and provide a new home for the petrochemical giant.

Governments drive nation building through the support of new industries and innovation. This is particularly evident with regards to essential services such as providing electricity and clean water to the nation. Aveng has put measures in place that will ensure it remains at the forefront of these two important fields in the years to come.

The nature of **power projects** has evolved rapidly over the past two decades, with the need to strengthen alternative means of energy provision becoming more apparent in the light of climate change and new environmental legislation. Aveng has already begun to expand into growth-generating businesses in the infrastructure value chain, including renewable energy and baseload power projects.

As concerns grow over securing clean water supplies for future generations, the government is also investing in **water treatment and reclamation projects**. Aveng has already made significant headway in its application of new technology, and currently treats more than 50 megalitres of acid mine drainage-affected water per day. The group is well placed to make the most of future opportunities for expansion as this crucial issue comes increasingly to the fore.

There will also be a renewed focus on transport projects within southern Africa, with a specific focus on **national railway networks**. Aveng has already made its mark in the ambitious rail projects in the Limpopo province and Nambia, and hopes to spread its influence to Mozambique in the near future.

The Mall of the South shopping centre to be constructed in Meyersdal, Johannesburg.

These developments are by no means restricted to southern Africa. Aveng, which already has a strong presence throughout Africa, aims to **add greater emphasis to its work on the continent**. The vast experience in Africa offered by Aveng Moolmans, from Botswana to Guinea, provides the platform from which all the Aveng operating groups can grow. Aveng Moolmans recently secured contract extensions on the Langer Heinrich Uranium Mine in Namibia until 2019. The deposit is located in the Namib Desert, roughly 80 kilometres from Walvis Bay.

The Styldrift Project for Royal Bafokeng Platinum in the North West province will utilise fully mechanised mining methods on a room and pillar layout and entails underground infrastructure creation and mining production build-up to steady state. This is the largest project in Aveng Mining Shafts & Underground's history.

Over the last decade, Africa's telecommunication, banking and retail sectors have expanded at a rate incomparable to that achieved in the 1980s and 1990s. The need for supporting infrastructure was inevitable, and investment in construction projects has increased in equal measure. **Africa's collective gross domestic product stands firm** along with developing nations such as Brazil and Russia.

Through McConnell Dowell, Aveng already has considerable experience in another emerging market, that of **Southeast Asia**. Population numbers are on the increase in the region, and the capacity for infrastructure development along with them. Aveng aims to strengthen its presence in the construction and engineering sectors, **anticipating new opportunities in the mining, oil and gas industries**.

All of these prospects require close collaboration with the many governments that are adding value to the structures and industries that serve their citizens. The Aveng of today has inherited an enthusiasm for securing a better life for the next generation. The group's growth in the decades to come will rely on the same philosophy.

Nevertheless, the role of the private sector cannot be understated, and indeed more than 50 percent of Aveng's construction revenue comes from this sector. Public money matched with private sector capacity can deliver an ambitious vision to grow the economy, create jobs and develop society.

Developing communities

Aveng has shaped the infrastructure of regions across Africa and the world. Underpinning its growth in depth and capability has been a genuine commitment to community development, an undertaking that transcends physical structures and monuments. Aveng's dedication to uplifting the communities in which it operates is articulated in its mission statement, which promises to leave a positive and lasting legacy of which stakeholders, their families and future generations can be proud.

The Aveng Community Trust

Through the Aveng Community Trust, the group has illustrated its commitment to skills development. The dire shortage of engineering and other technical skills in South Africa threatens the sustainability of the infrastructure sector and the economy at large.

The Trust works to address this skills shortage, a nationwide challenge which limits the impact the construction industry can have on the socio-economic wellbeing of South African citizens. The group's corporate social investment (CSI) programme speaks to the government's national directive to develop the capabilities of future business owners and workers, and to encourage economic regeneration.

Investment in the skills that will ultimately stimulate economic growth and employment is key to securing a better future for South Africa.

The Trust strives to make a meaningful difference to the communities in which the Aveng Group operates, focusing on relevant, sustainable, community-driven projects that contribute to the needs of local industry and society as a whole.

Through its Artisan Training Institute, the Trust has focused its impact on technical skills development, with additional resources contributing towards the advancement of maths and science excellence at secondary school level.

Over the past five years the Trust has directed millions of rands towards skills development programmes in urban centres and economically disadvantaged areas alike, supported by additional training and bursary contributions.

The Aveng Community Trust is committed to several on-going projects, which are selected for both sustainability and scalability. In addition to the artisan training, Kutlwanong and LEAP maths and science programmes, Aveng's community building project is another example of a meaningful CSI initiative.

This flagship project uses indigenous and green building design concepts within the context of a skills development programme related to construction. It utilises local resources and provides a world-class learning environment for learners and teachers.

The project runs in three provinces (Limpopo, KwaZulu-Natal and Gauteng) with new schools as well as community centres for children affected by HIV and AIDS established in Isandlwana, Randfontein and Thohoyandou. The project provides unemployed members of the community with accredited training in the "rammed earth" building technique.

"The community building project is the best example of a CSI project I have ever encountered"

— Tom Boardman, Chairman of the David Rattray Foundation and business leader

"A legacy is not just about buildings and infrastructure; it is about ensuring lasting social impact"

— Juba Mashaba, Aveng Human Resources Director

A CASE STUDY

Nombuso Mazibuko finished her schooling in Isandlwana in 2006 and struggled to find work in the years that followed. Unemployment became her reality, and she began to lose hope that change was possible. The idea of a fulfilled life after school became a fantasy, and since her parents relied on government grants she no longer had a support network.

The Aveng community building project offered Nombuso the opportunity to rise above her circumstances. She enlisted as a volunteer and was soon working in a team chosen to build a new school in Isandlwana: Buhlebamangwe Primary School.

She started the project with no technical skills whatsoever, but soon became an indispensable team member. Nombuso was asked to stay on for the next project and was able to transfer her skills to newcomers. She went on to work on a further three projects in her hometown.

Thereafter, Nombuso found employment with Beyond the Line and worked on projects throughout the country. She went to Thohoyandau, Limpopo, and helped with the transfer of practical skills to the project team working on a community centre.

Equipped with a range of skills that have practical applications, Nombuso changed her circumstances for the better. Not only has her professional life flourished, she also has the capacity to improve her family life: She built her grandmother a two-bedroom house, and was able to pay her son's school fees.

Nombuso's story is a shining example of how Aveng's community building project has influenced the communities in which it operates. She is currently employed as a foreman on the Acorn to Oaks school project in Acornhoek, with a bright future ahead of her.

(Case study by Tshikululu Social Investments NPC)

celebrate
passion
energy

Aveng Volunteer Work: Honouring the Mandela Legacy

Aveng staff members inject energy and passion into CSI programmes. Nelson Mandela Day, an annual celebration of the legacy of South Africa's iconic leader, is a fixture in every operating group's calendar and offers the opportunity to plan and execute community service projects.

"In return for everything Madiba has taught us, we owe it to him to support his work and legacy by doing and living our own as best we can, not just on this day, but throughout our lives"

— Former United States President Bill Clinton

"Do your little bit of good where you are; it's those little bits of good put together that overwhelm the world"

— Archbishop Emeritus Desmond Tutu

Sustainability and Environmental Stewardship

The Nedbank office block in Umhlanga, on KwaZulu-Natal's North Coast. The building achieved five-star Green Building status. The project reduced waste streams and recycled certain waste products into raw materials.

The Aveng Group has integrated an informed and proactive outlook on sustainable development across all its operations. Environmental stewardship is not only a practical measure for future growth, it is grounded in moral compassion and assumes responsibility for large-scale developments. A group-wide commitment to sustainable business practice is the only viable approach in the new millennium.

"The Aveng philosophy is that sustainability starts at the top, with responsible management, and filters all the way down through innovation"

— Dr. Rob Adam, Aveng Group Executive: Nuclear & Africa

AWARDS

Aveng has received several sustainability accolades, including:

The Global Water Award for Desalination Plant of the Year: Adelaide Desalination Plant 2013 (**McConnell Dowell**)

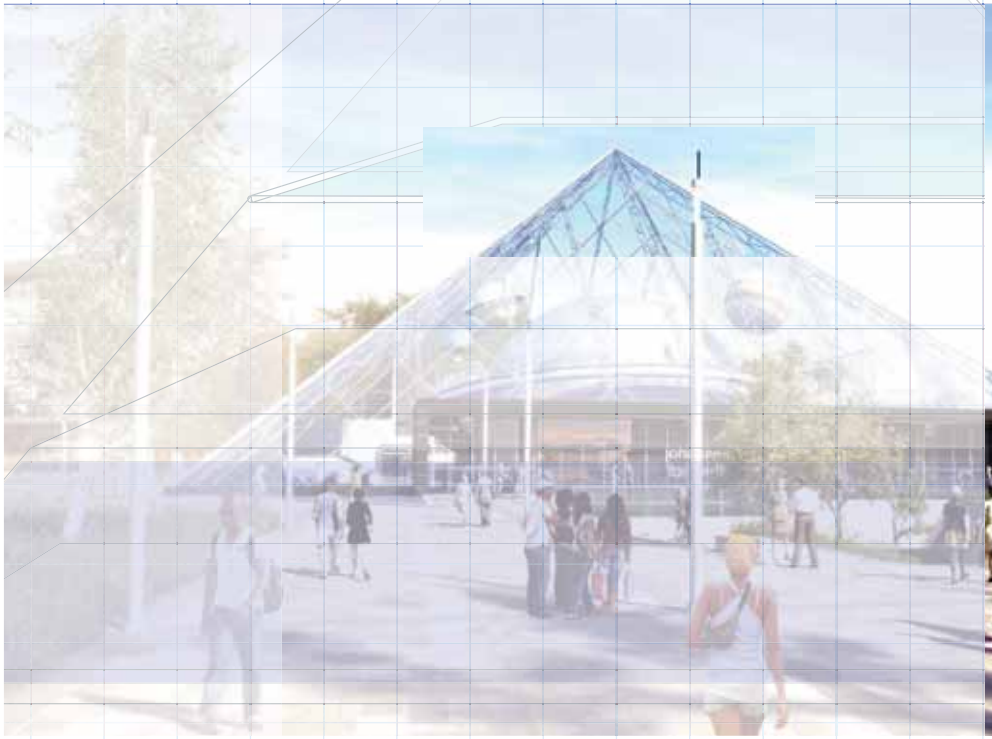
The Department of Water Affairs Blue Drop Status Award (**Aveng Water**)

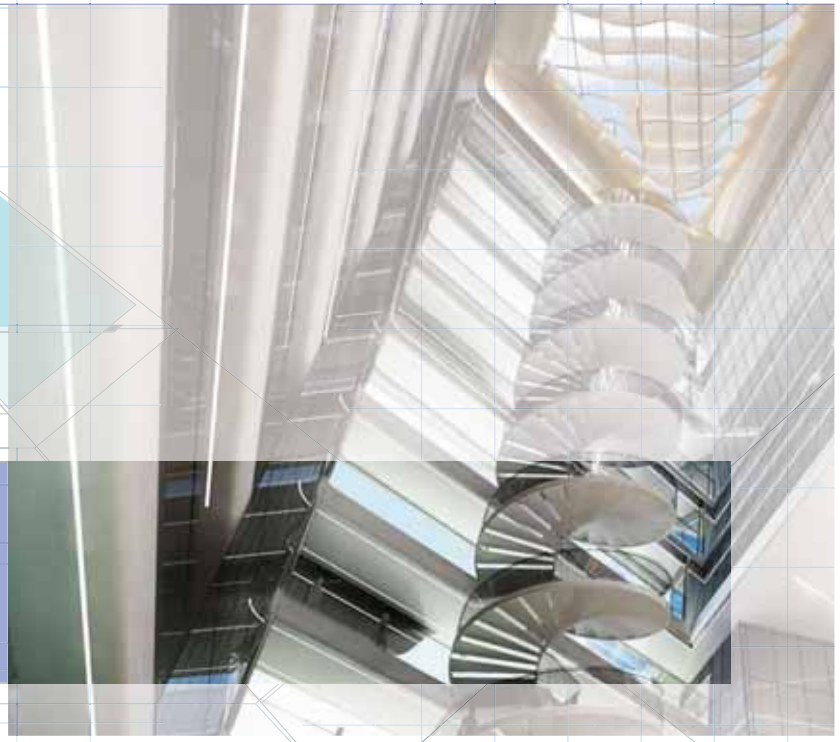
Six Green Stars rating for a Department of Environmental Affairs building 2012/2013 (**Aveng Grinaker-LTA**)

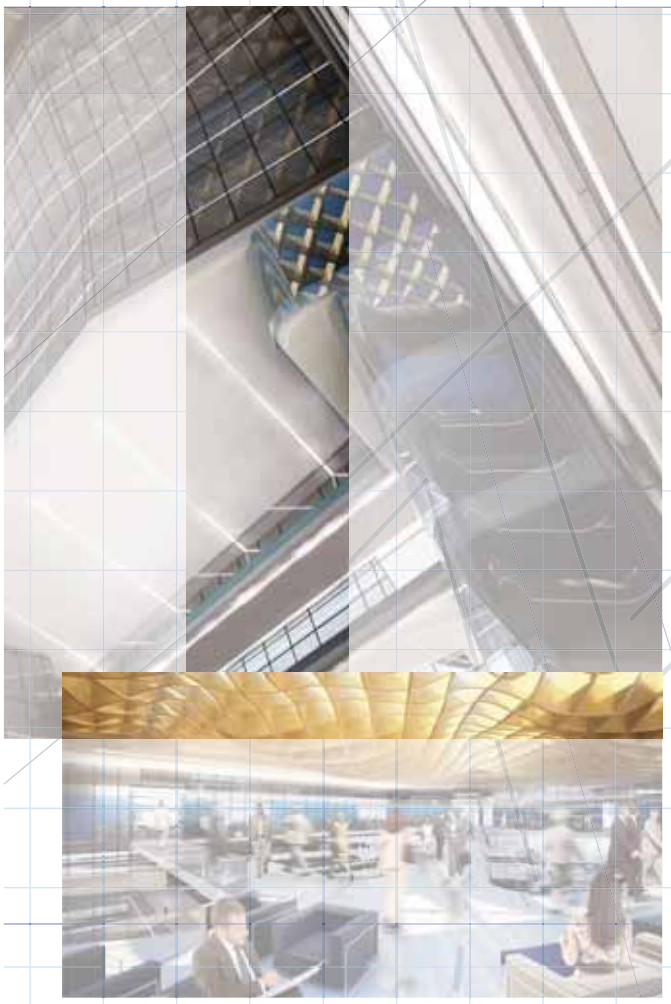
The Green and Gracious Builder Award for Beauty World: MRT Singapore (**McConnell Dowell**)

NOSA Awards 2011 (**Aveng Manufacturing Steeledale – Pinetown and Richards Bay plants)**

Towards tomorrow







From humble beginnings in early Johannesburg to establishing a global presence, Aveng has grown beyond the expectations of its early founders.

Yet the journey continues, and a bright future lies ahead.

Wherever it goes and whatever form it takes, Aveng will continue to value its philosophies, its people and its contributions to nations around the world.

This is Aveng’s lasting legacy.

ACKNOWLEDGEMENTS

This book would not have been possible without contributions from Aveng's current staff and management, directors, clients, partners and former employees. Thank you to all those who provided project information and assisted with interviews, drawings and photographs that have added colour to the documenting of Aveng's rich history.

AVENG GROUP
Leaders in infrastructure development
CELEBRATING 125 YEARS • 1889 – 2014