1 1936–1943 ENTERPRISE STRAW

DURING THE EARLY months of 1936 the world's headlines were dominated by news of three men. One was Edward VIII, the dashing young king who had succeeded to the throne of England (and South Africa too) on the death of his father. The second was Adolf Hitler, whose troops were poised to re-enter the Rhineland in defiance of the Treaty of Versailles. The third was Benito Mussolini, dictator of Italy and the inspiration behind his country's invasion of Abyssinia in a belated attempt to build an Italian empire in Africa.

At the southern end of Africa, Mussolini's behaviour raised such serious questions about anything Italian that the entrepreneurs who had invited Umberto Pomilio were beginning to regret it. There were even suggestions that the dapper engineer might be a Fascist spy. Certainly Pomilio seemed tirelessly determined to see the country, exploring sources of raw materials and searching for an ideal mill site. As the syndicate's enthusiasm waned, Pomilio's became all the livelier as he learnt more about South Africa and discovered its potential.

Much of Pomilio's time was spent with Union Corporation, where Whitmore Richards was investigating the syndicate's proposals in the light of instructions from London. On most points Richards was positive. There were adequate raw materials, or so it appeared; there were several possible mill sites; and Pomilio had convinced him that a pulp mill using his process would produce minimal effluent which could easily be disposed of. Richards's only reservation was that the dominant merchants in the paper trade were sceptical about a local mill's chances and intended to continue importing from outside.

Richards's conclusions were forwarded to London and compared with those of a British consulting chemist brought in to assess

Wheat straw for making paper: labourers extract straw bales from a stack at the Enstra mill, near Springs.

Pomilio's processes. He too was positive, and in April 1936 Union Corporation announced that it was ready to back a paper mill, provided there were no problems over raw materials. Then came a bombshell. Without warning, Mussolini's Fascists nationalised Pomilio's mill in Foggia and claimed world rights to his patents. Faced with having to go to the Fascists for permission to build the mill, Union Corporation coldly dropped the whole project.

That might have been the end of the affair, but Pomilio refused to give in without a fight. Within days the Italian was on his way to London to ask Union Corporation's head office to think again. Once there, he used all his powers of persuasion to convince everyone that he was in no way tied to Mussolini's regime and that its claims on his patents could be ignored. Indeed, he offered to sign a three-year consultancy agreement with the mining house and to provide trained men to help erect and operate the South African mill. Pomilio's energy won the day, and Union Corporation announced that in view of his assurances, the project was being revived.

Again the spotlight swung back to Johannesburg, and again it was Whitmore Richards and Tommy Stratten who were given most of the work. Stratten's task was to decide where the mill should be and how it should be designed and supplied. He had already rejected the site offered by Germiston municipality as it was awkwardly located, and was instead exploring the Parys area of the Orange Free State, where water could be drawn direct from the Vaal River. In making his plans Stratten worked closely with Pomilio, who had many practical suggestions based on his experiences in Italy and South America.

Richards's brief was to set up a public company to erect and operate the mill. The company was to have an initial capital of £750 000 (the equivalent of R1 500 000 at the time South Africa's currency was decimalised in 1961, at the rate of £1 to R2) which was expected to cover construction costs and leave a surplus for later expansion. This entailed issuing 1 500 000 ordinary shares each worth 10s, of which 60 000 were allotted to the African Cellulose Syndicate in return for rights to Pomilio's processes. One million were taken up by Union Corporation, which planned to resell 400 000 in a public rights issue. The remainder were offered to other mining houses and to companies and individuals who had contributed to the project.

Logically enough, the new company was named South African Pulp and Paper Industries, Limited, and was formally registered under South Africa's Companies Act on December 17 1936. On the next day its board of directors held their first meeting at Union Corporation's offices in Johannesburg. It was largely an in-house occasion. In the chair was one of the corporation's rising stars, a mining engineer named P M Anderson who was already on the boards of several gold mines and had now been made responsible for the paper

Umberto Pomilio (left), inventor of the Pomilio process; and Josef Gutsche, first manager of Enstra mill.

The reduction works at Union Corporation's Geduld mine near Springs on the East Rand, close to the site chosen to build the new pulp and paper mill (overleaf).

venture. With him were five more directors,[1] among them Whitmore Richards and Umberto Pomilio.

At this early stage the board only needed to authorise the steps taken to organise the new company. The financing arrangements were approved, and Union Corporation was appointed the company's secretaries and technical advisers — exactly the position it occupied in relation to its gold mines and collieries. There was little else to talk about, for as yet there was no decision on the mill's location. Tommy Stratten was now looking at Viljoensdrift near Vereeniging, which seemed even better than Parys. Besides being on the Vaal, Viljoensdrift was perched on a coalfield.

All this time Stratten's design team had been drawing up plans for the mill, broadly based on the patterns followed in Italy and South America, though the South African version was to be larger and would include a wood-pulping section. Already Stratten was ordering equipment. The electrolytic cells needed to make gas were being provided by Pomilio. Otherwise it was tempting to buy from Hitler's Germany, where the Nazi government was trying to boost exports by offering subsidies of 30 per cent. Even so, Stratten appreciated that

obvious patronage of the Nazis would do little to enhance Union Corporation's good name.

That was why the two paper machines which were to be the largest items of equipment were ordered from the Bertrams company of Edinburgh in Scotland, a well-respected firm that had been in business for 120 years. Even so, drives for the machines were discreetly ordered from Siemens of Germany at prices far below those asked by British companies. Later, German suppliers also provided most of the required filters, pumps and pulping apparatus, though less specialised items came from South African sources.

In January 1937 South African Pulp and Paper Industries, Limited, was listed on the Johannesburg Stock Exchange and the 400 000 shares reserved for the public were offered for sale. Within two hours the issue was oversubscribed, and the share quotation soon rose in value. A month later P M Anderson chaired the company's first statutory meeting and reported on progress. Viljoensdrift was still considered the most promising site for the mill — but then the Rand Water Board intervened and said it could not afford to take chances with effluent, so any pulp and paper venture would have to be well away from the Vaal River.

At about this time the company's first manager was appointed — Dr Josef Gutsche, a chemical engineer who had recently retired as general manager of a dynamite factory in the Cape. Gutsche was new to pulp and paper, so almost immediately he was sent off to Europe for three months to visit as many mills as he could. Already, equipment for the South African project was arriving in Johannesburg, but there was still no decision on where it would be located. Now that Viljoensdrift and Parys were out of the running, Stratten was considering a site near Pretoria.

Once again there was disappointment. Pretoria municipality said it could not cope with effluent. In some desperation Stratten turned to a site that Union Corporation already controlled: the farm Geduld near Springs east of Johannesburg, once owned by President Paul Kruger but now the setting of two thriving gold mines — Geduld proper, where mining had started in 1909, and East Geduld, in operation since 1926. For Stratten, one of Geduld's key attractions was a vast quantity of underground water which continuously seeped into the workings and had to be pumped to the surface.

Geduld's water seemed pure enough to be used for making paper, and purer water for boilers and for drinking could be tapped from the Rand Water Board's arterial pipe which ran along Geduld's boundary. Further advantages of the site were that Johannesburg was not far away, and that electric power and a rail service were close by. 'Black liquor,' the chemical effluent that resulted from the pulping process, could be pumped to the mines for use in gold recovery. Coal

for boilers and supplies of straw, wood and salt could be railed in with ease.

The decision to build the mill on Geduld was taken in May 1937, and construction began in the following month. The area allotted for the mill covered 19 hectares just south of Geduld railway station, and one of the first tasks was to lay tracks for a siding connected with the main line. Another was more gruesome. Years earlier, part of the site had been used as a cemetery for indentured mine-workers who had been drowned in an underground flood in 1908. Before building could begin, their remains had to be exhumed and moved to another part of the property.

First Arrivals

IN THE COURSE of 1937 Britain's Imperial Airways introduced a weekly flying-boat service between Southampton and Durban, cutting the travelling time between South Africa and Europe to six days and eight hours. Even then, airmail took at least eight days from

Construction on the mill site: (from left) the straw preparation plant, chemical plant and boiler plant.

The machine house at Geduld, large enough to hold two paper machines ordered from Scotland.

door to door, and relations between Union Corporation's offices in Johannesburg and London were less than close. Often letters crossed in the post, and engineers working on the Pomilio project in the two centres sometimes found themselves at cross purposes.

One bright note for the Johannesburg team was the arrival of three men who had experience of Pomilio mills in other countries. The first was named Deisz and had been in charge of assembling equipment at the mill in Argentina. The others were Italians, Count Piscicelli and Dr Giuseppe Raimondo, who were chemical engineers and close associates of Pomilio. Raimondo was fresh from the Pomilio project in Chile, and he and Piscicelli were to work with Tommy Stratten and his men in organising the chemical and pulping sections of the new mill. When they reached Geduld, the only sign of progress was a neat grid of foundations dug into the veld.

Like its counterparts in Italy and South America, the South African mill was to consist of a number of separate components, each contributing to a continuous production flow from raw materials to finished paper. At least, that was the idea. The components were organised in three main groups or plants, chemical, pulping and papermaking, though some stood outside this arrangement. These included an administrative office block with an adjoining laboratory, stores and an engineering workshop, a steam boilerhouse to be fuelled with

coal, and an electrical sub-station.

Once the foundations were dug, a legion of builders and contractors moved in, and with them a small band of electricians and other artisans signed onto the mill's permanent staff. Gradually the components of the mill rose above the flat landscape. The first to be tackled were the stores building and a home for the two paper machines, and others followed thick and fast. When Gutsche returned from Europe he set about arranging supplies of straw, wood, salt, coal, lime and other raw materials. Coal was available from the Witbank coalfields east of Springs, salt from a pan north of Pretoria, and lime for bleaching from quarries in the Western Transvaal and Northern Cape.

Wood was to be supplied from estates around Sabie and Graskop in the Eastern Transvaal. Straw was obtained from wherever farmers harvested wheat, especially from the Brits irrigation scheme west of Pretoria. The straw was cheap but the harvest season came only once a year. The company had to make the most of it, so supplied farmers with baling machines and tractors to power them. Because the straw had to be baled dry to prevent rotting, many crews worked by night as well as day, with the balers lit up by electric lamps mounted on the tractors. The lamps were such a novelty that local farm families organised impromptu dances on the veld.

Both straw and wood arrived at the mill site by rail and were stored in a special park beyond the pulping section. It was now 1938, and a reservoir close to the mill site was filling with water pumped from the mines. Several buildings were up and machinery was being installed. In the chemical and pulping plants much of the work was entrusted to Italians[2] who were familiar with Pomilio's way of doing things and in many cases had worked at his mills in Italy and South America. Operators for the papermaking plant were being recruited from Britain by the mill's freshly-appointed papermaking superintendent, Hans Loebecke, who during World War I had commanded a German U-boat.

After the war Loebecke had settled in Britain to run a paper mill and had eventually become a naturalised British subject. Now his task was to find experienced papermakers who were prepared to spend three years in South Africa and put the mill on its feet. Those chosen would be expected to train South Africans who would take over their jobs when they returned home. The same applied with the Italians recruited to work in the chemical and pulping plants. As a first step, Loebecke contacted various papermakers who had worked with him at Gravesend in Kent, one of the busiest papermaking centres in Britain.

Next Loebecke travelled to Edinburgh to interview a number of Scottish papermakers, most of them from a fine papers mill at Inver-

keithing in Fifeshire. Word of the South African project had reached Inverkeithing months earlier when a Vereeniging couple had visited Scotland on holiday. Two of the Inverkeithing men, Bob Burns and Jock McDonald, had been so intrigued that they made a special trip to Edinburgh to see the paper machines being built, then wrote to South Africa to ask if there might be jobs. Loebecke was meeting them and others on the instructions of Union Corporation's head office.

The Edinburgh interviews went well, and as a result Loebecke accepted no fewer than nine of the men from Inverkeithing. Most had already planned to emigrate, though they had been thinking of India or Australia. Loebecke took four men from Gravesend as well as one from Wales and two from Northern Ireland, men known to him from his Gravesend days. All were summoned to London to sign contracts and to receive passage tickets for themselves and their families.[3] They were to travel in three parties, two on successive sailings of the

Stacks of straw and a pile of hardwood in the mill's storage yard, awaiting pulping.

Warwick Castle and the third on an Italian vessel, the *Dulia,* which was departing from Genoa.

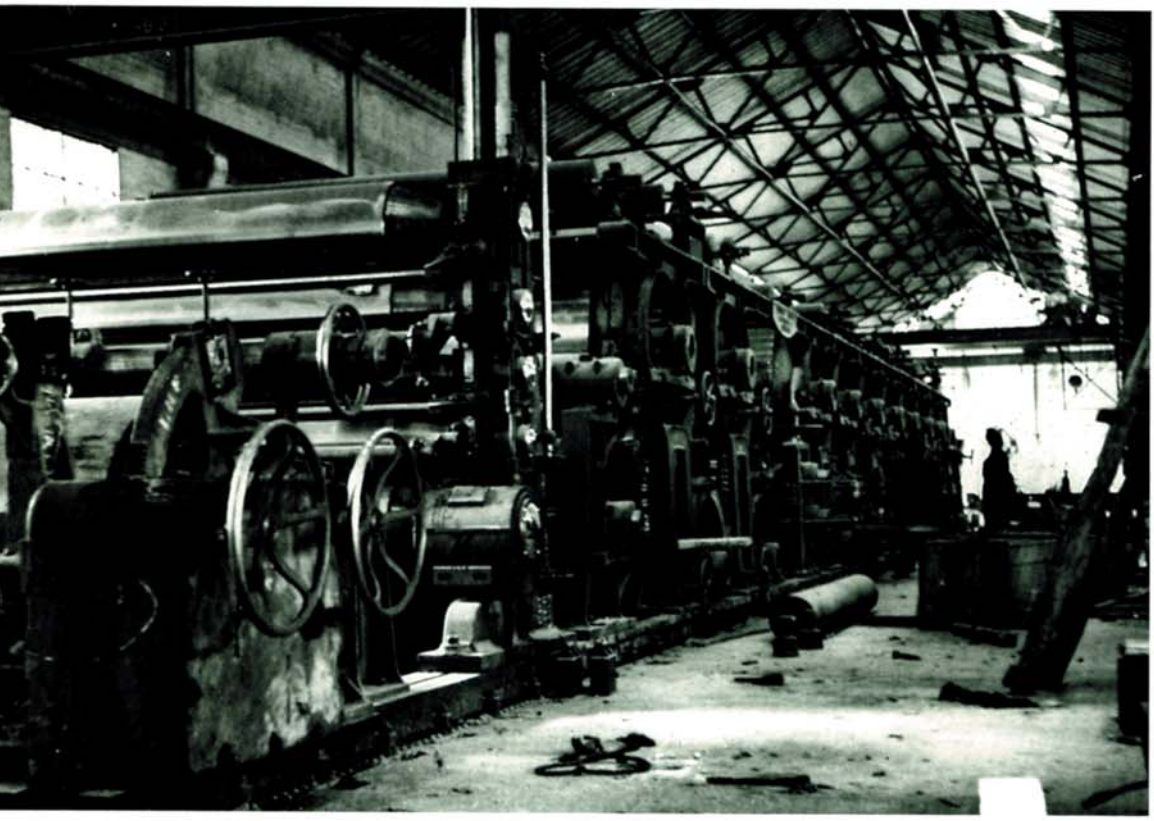
Once in South Africa the papermakers and their families reached Johannesburg by train, then changed for Geduld and reported to the mill. Like the Italians before them, they were left to find their own accommodation, and most opted for boarding houses in the suburbs lying between the mill and the centre of Springs, about five kilometres away. As for work, they found that No 1 paper machine was nearly assembled, but much of No 2 was still in packing cases. Contractors' men were everywhere. To keep the new arrivals occupied Loebecke asked them to help sort waste paper.

After a time the papermakers grew restless and looked around for diversions. Some made a ball of paper laced with string and kicked it around as a football until Loebecke arrived and gave them a dressing-down. What would Dr Gutsche say if he caught them? As yet the men had not met the manager, but when Loebecke went away they made a smaller ball and with it a wooden bat to play cricket. This time they were watched by a small man in a hat who sat on a box and clapped whenever someone played a good stroke. Loebecke returned and was beginning to complain when he spotted the man in a hat. It was Gutsche.

The papermakers came into their own during November 1938 as sections of No 1 paper machine were tried out. Like its fellow it was a standard Fourdrinier[4] machine which turned near-liquid pulp — it was 99 per cent water and only one per cent cellulose — into reels of paper. At the 'wet end' a headbox spread pulp over a horizontal travelling screen of wire mesh, an endless belt propelled by high-speed drives and mounted on vibrating rollers which caused the cellulose fibres to interlink and form a mat. At the same time, most of the water drained through tiny holes in the mesh, some by gravity and the rest through the action of suction pumps.

At the start of the 'dry end,' a travelling felt 'blanket' snatched the wet mat from the wire mesh and fed it to press rolls that squeezed out yet more water. Next the mat began a rollercoaster ride over 22 large steam-heated cylinders that dried the cellulose web as paper and delivered it to the machine's final section, a mangle-like calender that ironed the paper and made it smooth. From end to end the machine was 57 metres long and it could make paper at any speed between 20 metres and 120 metres per minute, depending on the thickness and quality required. The eventual reel was 104 inches (2,64m) wide.

The first paper made on No 1 machine consisted largely of recycled waste paper and was produced on December 3 1938. A month later the machine was ready for its first white furnish — half white waste paper and the other half bleached wood pulp imported from Scandi-



navia. As yet there was no chance of making paper from pulp produced at the mill. A few sections of the pulp plant were operating, but pulp quality still fell far short of what it should have been. The Pomilio process was not as straightforward as it had seemed.

Patience Rewarded

THE FIRST SERIOUS setback at the mill came in the first week of 1939, when Umberto Pomilio had an accident. Pomilio had climbed on to part of the chemical plant when he overbalanced and to avoid falling ten metres grabbed a cable, not realising that it served an overhead crane and carried 380 volts of electricity. Pomilio was stuck to the cable for four minutes before the current was switched off. His hand was badly burnt and took months to heal. All that time he had to carry it in a sling — for him a serious handicap, as like many Italians he found it impossible to argue without waving his arms.

Argument had become a way of life at the new mill, much of it concerning problems in the pulp plant. The straw pulping units were functioning after a fashion but were producing only one-quarter of the pulp expected. This was partly due to nodes in the straw which made much of if unusable, and partly because one of the straw cooking towers had bulged out of shape and threatened to burst, so was out of action. There was an even worse situation in the wood pulping section. There, chips had to be cooked not in towers but in sealed spherical digesters, yet at the end of the cycle seemed to be unchanged except for having a darker colour.

Pomilio insisted that the digesters had worked well in laboratory tests. When the results were checked, it was found that his technicians had used not wood chips but shavings from a carpenter's plane, which needed much less penetration. One of the Italians, Vincenzo di Paolo, suggested treating the wood chips with a stronger caustic solution and cooking them at higher pressures than the digesters had been designed for. There were improvements, but the management's faith in Pomilio and his process was rapidly disappearing.

Considering what was happening it was no surprise that costs were much higher than anticipated. It was taking £42 to make a ton of indifferent wood pulp, whereas prime bleached pulp from Scandinavia was being brought into South Africa for £12 10s per ton. Because

A group of S A Pulp's British papermakers on arrival at Geduld in 1938.

Inside the machine house, with the No 1 paper machine ready for commissioning.

much of the mill's straw pulp was substandard, a ton of acceptable straw pulp cost £39. It took £34 to make a ton of paper using a blend of local and imported pulp, compared with the £22 that was the average invoiced price of imported printing paper sold in South Africa.

In spite of the discouraging figures, production went forward. Pomilio insisted that all would be well when everything was functioning smoothly, and blamed the problems on inefficient operators. The papermakers decided that until the pulp improved it was better to go for quantity rather than quality and produced nearly 40 kinds of paper in different grades and thicknesses. These included writings and printings, embracing duplicating paper, ledger paper and envelope paper, and various kinds of wrappings. Even then a high proportion of the paper had to be rejected and piles of 'broke' awaited repulping for use on a small cardboard machine.

Samples of the paper were slipped into special printed folders and delivered to the company's first sales manager, Jimmy Learmonth, who had an office in Johannesburg. Learmonth then distributed the folders to potential customers, especially the paper merchants or supply houses as they described themselves. These merchants were powerful. With few exceptions, South African printers undertook to buy all their paper from the supply houses, which in turn promised that they would only deal with the established printers and not with newcomers who might want to steal their customers.

Several of the supply houses were subsidiaries of overseas paper companies, and even the independent merchants liked the flexibility of being able to buy from around the world. As a group they ordered only token quantities of paper from the local mill, even when its products were heavily subsidised so that they could hold their own against imports. The only substantial orders received by Learmonth came from the Government Printer in Pretoria and from Union Corporation mines, all instructed to use the mill's products. As a result the papermaking plant was working at less than half its capacity.

Union Corporation watched its offspring's progress with foreboding. Construction of the mill had cost far more than expected, and the company's capital had been exhausted before the end of 1938. The mining house had come to the rescue by providing a loan of £40 000, and later this was increased until eventually it stood at more than £200 000, yet it would be a long time before the paper company could hope to pay it back. A wag at Union Corporation commented that the mill could not have been in a more suitable place, for 'geduld' is Afrikaans for 'patience.'

The mill might well have been named Geduld just like the farm

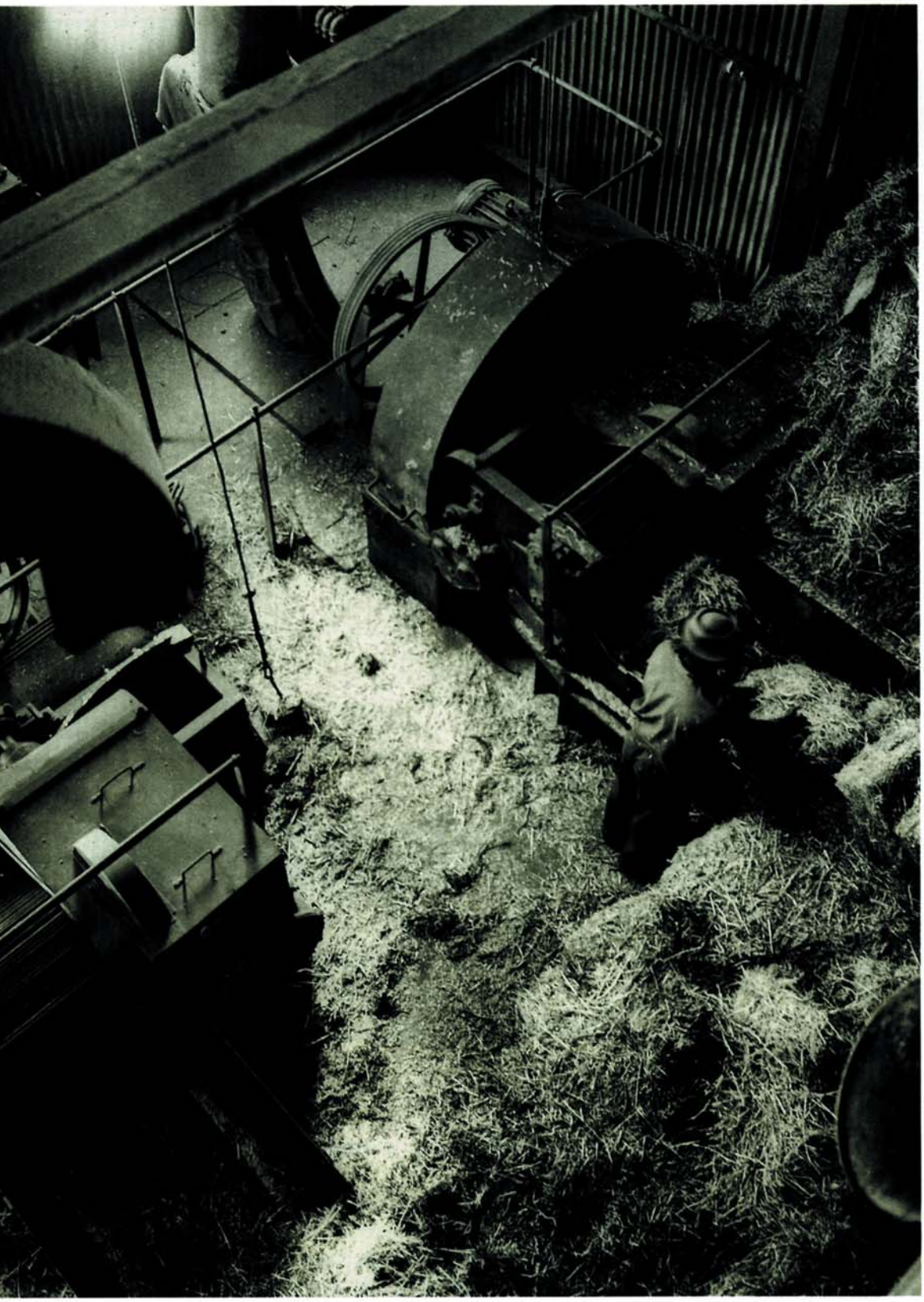
A bird's eye view of the new mill, photographed in 1939.

Advertisement from a special feature on S A Pulp in the Rand Daily Mail, April 24 1939.

and its two gold mines, but it was not to be. A small post office set up at the mill needed a name of its own as there was already a Geduld post office serving the mines. The company organised a competition and the prize went to an entry suggesting Enstra, short for Enterprise Straw. Soon employees were referring to the whole plant as Enstra Mill, and that is still its name today. At the same time, the company's

rather unwieldy name was often abbreviated to S A Pulp or in some circumstances to Sappi.

Enstra mill was already well-known as one of the largest industries on the East Rand, and numbers of would-be employees were asking for jobs. The majority were still in their teens and some came from as far away as Cape Town and East London. Among the arrivals were



young graduates, especially chemists, who had answered Union Corporation advertisements. Black and coloured labourers were recruited too, most of them drawn from townships on the edge of Springs. By the middle of 1939 the mill's employment roster included 22 staff, 164 white artisans, operators and technicians and 432 black and coloured labourers.[5]

By August 1939 it was clear that Europe was on the brink of war, and the South African supply houses frantically imported quantities of paper in case the lines of communication were broken. For Enstra and S A Pulp, that meant sales dropped still further — though as employees admitted, the company had only itself to blame. Some grades of paper were so weak that they could not be creased without breaking — if a large coin was dropped into an envelope, it went straight through the bottom — and there were wide inconsistencies between one making and the next. The papermakers blamed Enstra's pulp, and the pulp plant operators blamed Pomilio.

Britain declared war on Germany during September 1939, and South Africa followed suit a few days later. A number of Enstra employees joined volunteer regiments that drilled near the mill, and Union Corporation sent word that Enstra's workshops might be needed for making munitions. Otherwise the only evidence of war was a sudden lack of imported pulp. A Swedish ship carrying pulp to Britain had been sunk, and future shipments to countries such as South Africa were being diverted to Britain in case there were further mishaps.

This meant that Enstra was going to be thrown on its own resources. To encourage everyone, there was a sudden improvement in sales. The supply houses could no longer rely on imports, so each placed orders with S A Pulp. Taking advantage, the company raised its prices by an average of £10 per ton, meaning it was no longer making a loss. There were few complaints and paper merchants appreciated that they were lucky to have a local supply, the more so as there was talk of rationing. As an extra windfall, the company found customers for chemical by-products including hydrochloric acid.

Early in 1940 Gutsche resigned as Enstra's manager because of ill health. His successor was to be Joseph White, the manager of a cyanide factory in Witbank, but he was not coming for another six months. In the meantime Whitmore Richards moved to Enstra as

In the straw preparation plant, bales are broken open and straw is fed to cutters to be chopped fine for the pulping process.

Partially digested straw is fed into the top of the chlorination towers (overleaf).

caretaker manager. As hostilities were stepped up, employees' leave was limited to one week per year with a cash payment to make up for the balance. A number of men left on active service and more wanted to join them, but Richards worked hard to persuade them that they would do more good if they stayed at their jobs.

The papermaking superintendent, Hans Loebecke, was in an unfortunate position as it was well known that he had commanded a German U-boat in the earlier world war. As a naturalised Briton, Loebecke had every right to continue working at Enstra, but he was a strict disciplinarian and in some quarters was less than popular. A group of men who objected to Loebecke's presence approached the mill's chief engineer and threatened to go on strike unless he was removed. The engineer told Whitmore Richards, who explained the position to Loebecke. There and then the superintendent packed his belongings and departed.

For some months it had seemed likely that Mussolini's Fascists would eventually enter the war on Germany's side, and S A Pulp made arrangements for the Italian operators to leave the country. Even so, several stayed. As the situation deteriorated, armed police arrived at the mill and escorted the Italians as they went about their duties in case they had any thoughts of sabotage. War with Italy came in June 1940 and the remaining Italians were taken away for internment. Umberto Pomilio was already out of the country, but in terms of war regulations he was regarded as an enemy subject resident in Italy, so was automatically discharged from S A Pulp's board.

Occupational Hazards

DURING THE FEW months preceding September 1939 S A Pulp had been losing between £10 000 and £20 000 a month. Following the increase in prices, in March 1940 the company made a profit of £4 000 and by June this had risen to £16 000. There were gratifying orders from the Government Printer and also from the supply houses, together with compliments over the way in which Enstra's paper was improving. At long last the pulp plant was performing more successfully.

Right at the beginning of the project — even before the company's formation — Whitmore Richards had been told that a local mill should aim to provide only bread-and-butter grades of paper, but should make sure they were available in many finishes. That was the policy adopted now, with advice from the Government Printer who had a special interest in S A Pulp's success. For the first time, Enstra paper was being exported — to East and North Africa, where the Government Printer was setting up field printing shops to support the

Enstra office staff in 1942: in the front row (from left) Jack Job, Jimmy Learmonth, Joseph White, Stan Carlsson-Smith and Frank Totney; and at the back Leonard Job (seventh from left, partially hidden), Grant Robertson (eighth from left), Dick Gray (fourth from right) and Ben Coetzee (third from right).

South African forces sent to fight the Italians.

Enstra's sudden popularity made all the difference to morale at the mill, not least among the British papermakers. Following Joseph White's arrival, three of the Britons had been allowed to break their contracts and return home, and three more had joined up, but the remaining ten — most of them Scotsmen — now had the support of a cadre of South Africans and kept the two paper machines running around the clock and all through the week. Some of the South Africans complained that the Scotsmen liked to keep their secrets close to their chests, but were told it was tradition.

There was a lot to learn. In the absence of instruments, papermakers assessed quality by look, feel and taste. They could tell everything they needed to know about paper's quality by holding it up to the light to test its opacity; by rubbing it between forefinger and thumb to measure its grammage or mass; and by touching it with the tip of the tongue to test for ink absorption. All old-time papermakers prided themselves on a keen eye, soft fingers and sensitive taste buds. The same was true of the beatermen, the operators responsible for blending the pulp before it was fed to the machines.

At Enstra, a beaterman had to deal with a variety of raw materials,

not only short-fibred straw and long-fibred pine which was included to give the paper strength, but also waste paper and perhaps a little imported pulp though this was used only sparingly. On night shift, beatermen sometimes smuggled in imported pulp from the stacks outside — something their day shift counterparts could not attempt for fear of being caught out by the management. As a result, night production was much more effective and there were puzzling short-falls at stocktaking time.

The beatermen had to work closely with the machine crew — a machineman at the wet end, a dryerman and his assistant at the dry end, a 'press boy' who was usually a papermaking apprentice and had to keep the machine clean, and a foreman in control. The machines were so big and made such a noise that those in the crew usually communicated in elaborate sign language. At Enstra there were two independent crews on each shift, watching for faults and problems such as a break in the web of paper, and ready to take remedial action by catching a 'tail' of moist paper on the palm of the hand and slapping it towards the next aperture.

Hand-feeding was dangerous, and missing finger-tips were commonplace. One dryerman's assistant lost his whole arm. There were similar dangers in the finishing house among those working with guillotines and the super-calender, a rack of highly-polished, steam-heated rollers that gave paper extra smoothness. Even so, accidents were few, and the papermakers appeared well off when compared with those working in the chemical and pulping sections. There, Pomilio's poison gas was living up to its name, and besides that men were suffering from burns caused by caustic soda or lime.

In both these sections, chlorine gas leaked from badly-joined earthenware pipes. Many labourers went about their work with wads of cotton waste pushed up their nostrils. A few gasmasks were available in the chemical section, but these were usually spurned because they were hot and uncomfortable, and because it was rumoured that they had been taken from dead soldiers. Instead, operators came to accept runny noses and constantly sore eyes as part of the job. Many developed coughs and some were frequently sick.

Much of the trouble stemmed from the concrete chlorination towers in the pulping plant, where the tile linings were cracking and allowing chlorine to seep through to the outside. The gas had a yellow-green colour and was often clearly visible, so when operators spotted a leak they tried to plug it with putty. On several occasions the labourers sent to shovel straw into the open holes at the top of

Chlorination towers in Enstra's pulping plant, with straw shovelled in at the top and treated with chlorine gas to separate its fibre.

Enstra as it looked in the early days, with Geduld station in the middle distance and Geduld mine beyond.

the chlorination towers took unauthorised naps, meaning that the level of straw steadily dropped and they woke to find themselves choking in escaping gas. The labourers fled, and it was left to supervisors with handkerchiefs clutched to their noses to rush in and shovel straw for all they were worth.

Gas was an occupational hazard at Enstra, and so was an unpleasant odour that spread through the surrounding countryside. The culprit was 'black liquor,' now being pumped to an evaporation dam between the mill and East Geduld mine. In time, solids in the effluent had putrefied, gassy bubbles were forming on the surface, and wind or rain burst these bubbles and released a vile smell. Once the source was tracked down, the mill stopped using the dam and instead piped the effluent to agricultural land where a tenant farmer

claimed it was good for his crops.

The smell was much reduced, but Springs municipality insisted that there was still an 'obnoxious nuisance' and demanded that S A Pulp should take further action. The company wanted to be helpful but pointed out that at least part of the problem was a new sewage works which had gone into operation not far from the mill. In fact, Enstra was using the works' recycled water which was softer than the water pumped from underground. The chief reason for the change was that underground water had caused dolomitic build-up in pipes, one of a number of unforeseen problems that were forcing S A Pulp to arrange new sources for several of its key materials.

For instance, it had been found that salt from north of Pretoria had the wrong chemistry, so the mill now drew supplies from pans near

the Orange River in the Northern Cape, where Union Corporation had set up a special salt extraction works. Pine thinnings still came from the Eastern Transvaal, in spite of occasional transport hiccups, but supplies of Transvaal straw were erratic so much of it was now bought from farmers in the Orange Free State. Even then there was a setback, for in 1941 there was a serious fire at Enstra in which 1 450 tons of straw were destroyed. The fire had apparently been caused by a careless smoker.

Straw supplies had been a headache for some time, and Enstra's management wondered if they could be supplemented with other forms of fibre. One possibility was the wild tamboekie grass of the Eastern Transvaal, which looked similar to esparto grass successfully pulped by a number of mills in Europe. A harvesting team was put to work in the Elands River valley west of Nelspruit, but though the cutters were told to stick to the roadsides and the edges of the rail line, one enthusiast harvested a field of hemp and the company had to compensate an angry farmer. Even then the project was disappointing. Transport made the grass expensive, and it contained even more nodes than straw so was difficult to pulp.

Another possible feedstock was waste paper, though Enstra used less than it might have because of general scarcity, and because much of what was available was going to two other mills: the little Premier Paper at Kliprivier which was still in business though it had new owners, and a Durban operation known as National Pulp and Paper which made board. In 1942 S A Pulp, Premier and National joined forces in setting up a Waste Paper Recovery Association to co-ordinate salvage. At one point waste paper reaching Enstra included quantities of reject petrol rationing coupons, which were eagerly scavenged by mill employees.

For some raw materials like size and colouring matter S A Pulp had originally relied on overseas sources, but for most of the war had to go without them. Mill chemists did their best to find substitutes — for instance, a home-made size produced from ordinary yellow soap dissolved in water. This was mixed with the pulp to give paper a better writing surface. Mill engineers had to use all their ingenuity to devise spares for the pulping plant and paper machines, but for some precious items like wire forming screens the company depended on imports and could only pray that they were not interrupted.

In the event, most ships carrying cargo for S A Pulp reached South

Bleached pulp uptake machine in Enstra's bleaching plant.

Papermakers at the wet end of No 1 machine: back row (from left), Doug Cox, Fred Whitehead, Dolf Michelley, Geordie King, George Peden and Harry Gibson.

Africa without incident. The one exception carried sections of a plant for liquefying chlorine gas, a new initiative at Enstra as it was believed that liquid chlorine would be a valuable by-product. For security's sake the plant's sections were divided among several ships, one of which was sunk. Replacements had to be ordered and there was a long delay before they arrived, but when they reached Enstra they were quickly assembled, and S A Pulp's first liquid chlorine was produced in 1942.

That same year saw a change of managers, as Joseph White's two-year contract came to an end. In his place S A Pulp appointed an experienced British papermaker, but wartime restrictions made it difficult to find him a passage to South Africa. In the interim Whitmore Richards again filled the breach — this time as managing director, with an acting works manager based at Enstra. The new manager eventually arrived in March 1943 and Richards relinquished his temporary title. As a lasting memorial of the period he left a thatch-roofed works canteen, built in the style of a Cape Dutch homestead.

'Old' Harry Smith beside the super-calender in Enstra's finishing house, used to 'iron' paper extra smooth.