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18. Information from Mr Len Fryer, former Engineer and Engineer in Charge, No. 1 Machine Shop at the end of World War 2 and now retired from the SEC Victoria.

THE HISTORY OF ORDNANCE FACTORY MARIBYRNONG

CONTENTS

SECTION 1

Origin of the Factory Site

To trace the origin of the factory site we go back to the early 1900's in Australia when there were two types of artillery, the first being the Royal Australia Garrison Artillery whose units manned fortresses such as Queenscliff, Nepean and Gellibrand.

The second type was the Royal Australian Field Artillery, having three permanent batteries - No 1 Battery being in Sydney, No 2 Battery at Victoria Barracks, Melbourne and No 3 Battery in Brisbane.

The Field Artillery at Victoria Barracks Melbourne were experiencing limited quarters due to the expansion of the citizen defence movement.

The army decided that the situation should be relieved and in 1911 land for a Barracks and Depot site was purchased at Maribyrnong and was described as being bounded by the Maribyrnong River and West's Road. The size of the site was 103 acres, 3 roods and 3 perches and the cost was £3,450.

The Barracks and Depot were designed by the Department of Home Affairs, the construction being authorised in January 1912. Construction took place in 1913 and was finalised by January 1914.

Contained in Section 2 is an extract from the Argus Newspaper stating that on Tuesday 17 March 1914, the Victorian Permanent Battery of the Royal Australian Field Artillery left Victoria Barracks to occupy its new Headquarters at Maribyrnong. Section 2 also shows a plan of the buildings at Maribyrnong as they existed at that time.

The Barracks became a training depot for 18 pdr Gun units and was highly active during World War 1 with soldiers under tentage extending down towards the western boundary by the Maribyrnong River.

After the cessation of hostilities in World War 1 the Barracks and Depot continued at a slower pace as horses were being replaced by mechanised vehicles in the transporting of Gun Carriages and Ammunition Limbers.

By 1922 the Commonwealth Government decided to introduce severe cut backs in the expenditure of the Services and the Army suffered the highest reduction in funds. On the basis of reduced funding the Army decided that due to the advance in mechanised transport it would close down the No 2 Battery in Melbourne together with the No 3 Battery in Brisbane and centralise Field Artillery functions with No 1 Battery in Sydney.

The Munitions Supply Board learned of the vacation of the Barracks and Depot at Maribyrnong and through negotiations actioned by Mr J K Jensen on behalf of the Board, the transfer of the Maribyrnong Artillery property was passed from the control of the Army to that of the Munitions Supply Board under approval of the Minister for Defence on 25 September 1922 upon reimbursement to the Army of the amount expected for the site: - approximately £48,000.

SECTION 2

Occupation of the New Royal Australian Field Artillery Barracks and Depot, Maribyrnong

(Extract - The Argus Newspaper, 21st March 1914)

Four dull grey field pieces, and as many sombre-looking ammunition wagons, each drawn by six polished, prancing horses, passed across Prince's Bridge, and through the city streets at noon on Tuesday, 17th March 1914. The men who directed the movements of the gun teams, and those who sat steady and proud on the limbers, all wore the familiar khaki shirts and slack trousers which constitute the workmanlike uniform of the Australian army, but something about this little procession commanded more than passing attention, though few of those who watched the heavy vehicles rumble by knew exactly what is was. These were professional soldiers, and constant drill had made the horses almost as skilled as their masters.

The marching column, with its guns like monsters dragged by the heels, was provided by the Victorian permanent battery of the Royal Australian Field Artillery, officially known as "No. 2." There are three of these regular units in the Commonwealth, with respective headquarters in Sydney, Melbourne, and Brisbane, and each represents the latest development of the mounted cadres established from the Royal Australian Garrison Artillery when Major-General Sir Edward Hutton was at the head of the Australian defence system.

It was moving day for the permanent battery. The little force had been virtually "squeezed out" of its old home at Victoria Barracks, and was on its way to take possession of a new one at Maribyrnong, where the surrounding wide, open space would give the unit elbow-room and opportunities for developing efficiency, which the expansion of the citizen defence movement and the constant demand for more office accommodation had denied in its old headquarters on St. Kilda Road. The passing of "No. 2." battery to the opposite extreme of the suburban area practically marks the last stage in the transition of Victoria Barracks from its original phase as a shelter for troops to that of a purely administrative centre. Now that the field artillery men have moved away not more than 30 permanent soldiers will at any time be accommodated in the St. Kilda Road

buildings, and only a small space at the extreme end of the parade-ground will be reserved for them.

The new Royal Australian Field Artillery headquarters is situated within a 90 acre reserve about a mile and half from the Saltwater River, and two miles north-west of Footscray. The site is close to the Cordite Factory and Ammunition Works, and the Government horses are cared for in the immediate vicinity. Until the means of transit are improved the manoeuvres of the "crack" unit will probably be carried out in a magnificent isolation, and the gunners are not likely to wander far from their new home at night. There are about a dozen separate buildings in the depot, and all are of one story except the actual living quarters for the single men. When the construction of the barracks and gun-park was authorised, in January, 1912, it was suggested that the buildings might be of wood, but experts of the Home Affairs department pointed out the enormous fire risk, and the inadvisability of providing structures so unsubstantial for permanent soldiers. It was estimated too, that maintenance charges would amount to practically £300 per year, whereas with more lasting materials these would almost disappear. In the end it was decided to erect brick buildings on cement foundations, and the cluster of red walls against the hillside now gives the depot a picturesque effect as it is approached from the main road.

The largest building of all provides the dormitory accommodation, and it is divided into two separate establishments, where the men attached to the respective battery sections live as distinct communities, except that they share the common kitchen and the presiding cook between them. Two guns and two waggons form a battery section, and they are so constituted as to be capable of quite independent action in case of emergency; that is why they are not housed under the same roof in times of peace. Each wing of the barracks provides living space for 45 men, in addition to affording the necessary recreation facilities, together with baths and lounges.

The mounted band is to have a special practice hall. The kitchen might be the envy of many modern hotels, and it is kept in constant readiness with unlimited supplies of hot water always available.

On the east is the squat store of the quartermaster-sergeant, where rations, clothing and equipment are kept for issue as required. Permanent soldiers are only permitted to wear civilian attire in special circumstances, and

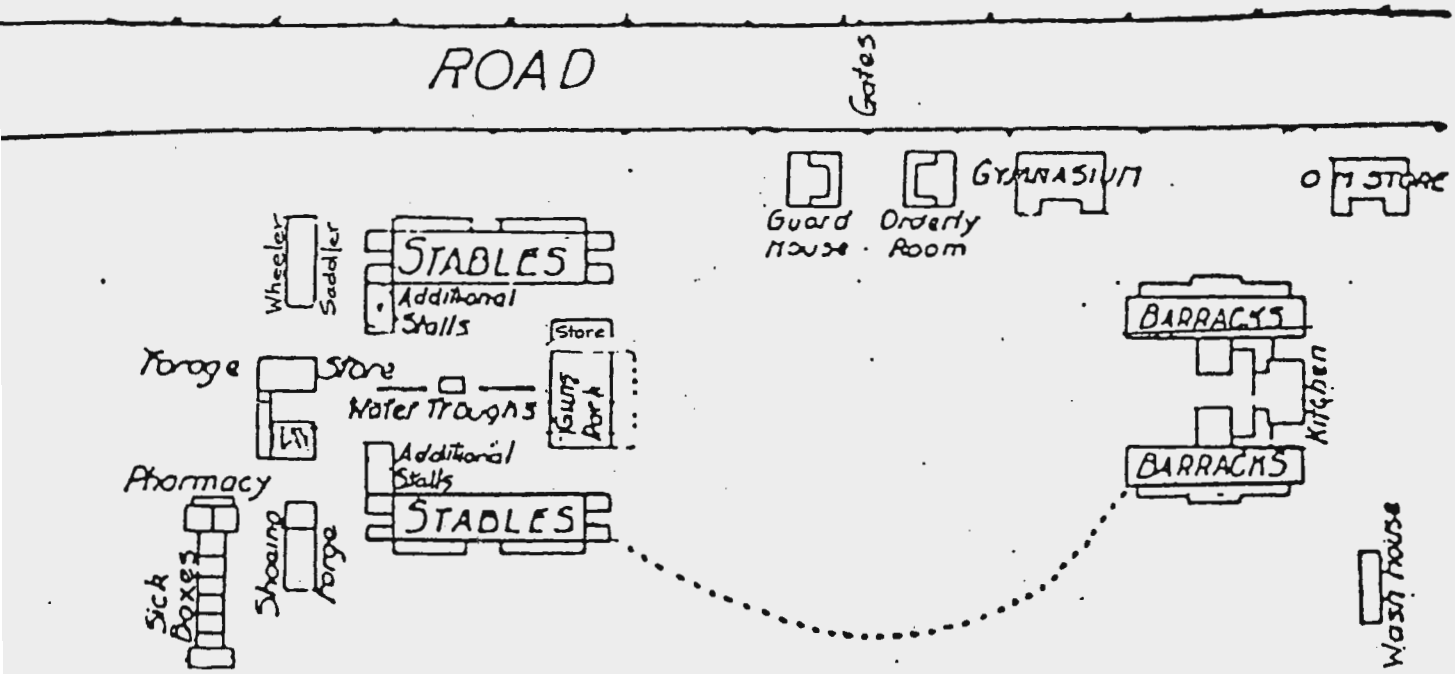
arrangements have been made for keeping the men's plain clothes in safety under the quartermaster's supervision when they should be in uniform. Immediately behind is the gymnasium, with the administrative offices, where the battery commander (Major Ryrie), his chief officer (Captain Miles), the section leaders, and the clerical staff are provided for, further to the north. Opposite headquarters is the guardroom and sentry walk, the main entrance to the reserve lying between. The telephone switch will eventually be fitted in the guardroom, and all the separate establishments will then in in immediate communication both with the central depot office and the district headquarters in Melbourne.

The principal drive leads directly on the parade ground, which measures 120 yards by 100 yards, and is one of the largest in Australia. It is rough yet, like a newly metalled road, but will be ready for use as soon as it can be rolled out. Facing the parade ground is the gun park and mobilisation store, with stables on each side, capable of accommodating 100 horses. The floors are cemented and well drained, and the general fittings would compare favourably with those in a great many suburban homes. The horses have all been specially selected by Major Ryrie, and, when off duty they are destined to live in surroundings which might be envied by many of the citizens who have to provide the money. The artificers workshops are beside the western stable, and forage stores, chaff-cutting sheds, and harness-rooms, are all within convenient distance. Yards for the horses, with ringed hitching posts, and facilities for watering are situated between the stable buildings. There are, in addition, farrier sergeants' forge-rooms, and workshops for the wheeler-fitters and saddlers, together with a pharmacy and sick bay for temporarily indisposed remounts.

Facing the north are the officers' quarters, two splendid brick villas having been erected for the families of the commander and his immediate associate, while a third of somewhat less impressive architectural design, is the home of the bachelor officers. For married "non-coms." and men 17 weatherboard houses, each of seven rooms, have been built at the other extreme of the reserve, and they are all tenanted. Before a "ranker" may take a wife and live in barracks, he must have been a member of the battery for at least three years, and the necessary accommodation must have been made available.

The depot is electrically lighted throughout, and the mains of the Melbourne City Council also provide the necessary motive power for the

chaff cutting machines and other appliances. Although so far removed from the residential centres, the whole of the establishments have been scientifically sewered, one of the most extensive septic systems in Australia having been designed and carried into effect by the Victorian director of works (Mr T Hill). The buildings of the RAFA depot, like those of Victoria Barracks, were all erected on the day labour system, and it is understood that the approximate cost worked out at £45,000.



LAY-OUT OF NEW ARTILLERY DEPOT.

SECTION 3

The Arsenal Plan for the Commonwealth of Australia

1. As a result of suggestions made by Captain Collins, first Secretary of Defence for the Commonwealth, to the first Minister for Defence (Sir John Forrest) in 1901, the General Officer commanding the Military Forces of the Commonwealth (Major General, Sir E. T. Hutton) supported Collins proposals with variations and in April 1902 he reported to the Minister of Defence proposing that several munitions factories should be established at the site of a future arsenal.

   Little more happened to this proposal for an Arsenal until in 1915 the Minister for Defence received a detailed report on the manufacture of munitions and formed an arrangement for the establishment of an Arsenal.

   The Minister decided that the planning of an Arsenal should proceed and he instigated the formation of an Arsenal Site Selection Committee, who proposed that:

   (a) The most suitable location would be in the Federal Territory at Canberra.

   (b) Walter Burleigh Griffin, the architect and town planner ruled out the site within the Canberra City layout.

   (c) The favoured alternative site was then proposed to be located at Tuggeranong on the Murrumbidgee River seven miles from Canberra city centre.

   This proposal was approved by Cabinet on 28 February 1916.

2. Later in 1916 Mr A. E. Leighton was appointed General Manager of the Arsenal Project and although it was only in the paper planning stage at this time, several Australian Technical Representatives from Defence were sent to Britain to study various aspects of munitions manufacture.

3. By the end of 1916 the Federal Munitions Committee established the following broad policy:

   (a) the Arsenal would be the centre for privately owned factories of the Commonwealth and Engineers and Technicians would become familiar with munitions production.

   (b) By organisation every factory would be capable of producing the requirements of the Army and Navy and the Arsenal would be the brain centre.

4. By early 1917 questions were raised as to whether:

   (a) the Arsenal should be in the Federal Territory at all;

   (b) whether the project should be deferred as it was very doubtful that the Arsenal could be in operation in time to be of assistance in the war then current; and

   (c) the Treasury objected to incurring expenditure on a project which had not as yet been approved by Parliament.

5. However planning was proceeding steadily in regard to the accumulation of technical data and Australian Engineers and Technical Representatives were still studying various aspects of munition production in Britain.

6. By November, 1918 and with the termination of hostilities the Military Board had doubts about an Arsenal and awaited a re-examination of the situation particular as it appeared that:

   (a) it would cost less to extend existing factories (SAF Lithgow, NSW, Explosives Factory Maribyrnong, Victoria, and Colonial Ammunition Factory at Footscray, Victoria, Leather and Harness Factory Clifton Hill, Victoria, Clothing Factory at South Melbourne and Woollen Mills at Geelong) than to establish an Arsenal.

(b) Better and more economical access to labour and materials if new capacity was created at Lithgow NSW and Melbourne VIC instead of an Arsenal complex at Tuggeranong ACT.

7. The conference of late November 1918 recommended that:

(a) Government Factories should be best located where they could assist with rapid production in the time of war.

(b) Any additional Arsenal Factories should be located near the Cordite Factory at Maribyrnong, Victoria and the Colonial Ammunition Factory at Footscray, Victoria.

(c) The proposal for an Arsenal at Tuggeranong, Federal Capital Territory should be abandoned.

(d) The Small Arms Factory should be permanently located at Lithgow NSW.

(e) Existing Arsenal Factories should be strengthened to provide reasonable assurance against War needs.

(f) The necessary basic industries be supported by Government action to make Australia self sufficient in time of war.

8. On the 28th November 1918, Cabinet considered the report and decreed that no further action be taken to establish an Arsenal at Tuggeranong or any other alternate location as such and the Arsenal Concept has never since been resurrected.

9. The team of Engineers and Technical Representatives who had been recruited against the Arsenal Plan and most of whom were studying munitions production including various aspects of guns,. carriages, explosives, ammunition and small arms in wartime Britain applied their learning and knowledge most successfully to munitions production in the years in between World War 1 and World War 2 and also during the course of World War 2. These Engineers and Technical Representatives are listed as follows with summaries of their managerial or technical accomplishments during the course of their careers in which they were directly or indirectly concerned

with Ordnance Factory Maribyrnong and or associated Commonwealth Government Factories.

(a) Mr A E Leighton CMG, FIC, FRACI, MI ChemE, who was the original Manager of Explosives Factory Maribyrnong (Vic) 1909. General Manager Central Arsenal Organisation 1916 - 21. Controller General of Munitions Supply 1921 - 37. On his retirement as CGMS he continued to serve as consultant on Explosives and Consultative Member of the Munitions Supply Board until 1948. He was also Chairman of the Operational Safety Committee from its inception in 1938 until early 1950.

(b) Mr F S Daley, BMechE, MIPE, FIM. As an Assistant Engineer in Department of Defence was sent to England and from April 1919 assisted Mr F C Spiller who was in charge of the study of gun and carriage production. Daley returned to Australia in late December 1919 where he was stationed at SAF Lithgow until 1923. He was an Assistant Manager, Ordnance Factory Maribyrnong from 1925 to 1932 when he resigned to join the General Motors Organisation. He returned to become War Time Controller of Ordnance Production 1940 - 1945.

(c) Mr R. H. Doyle AMIE(Aust), FAIM. He joined the AIF in World War 1, was injured in Army Service in France and whilst in London transferred from the AIF to the Arsenal staff and assisted Mr A. S. Ford in the study of small arms and machine gun production in 1919/20 and he then returned to Australia. He became Assistant manager SAF Lithgow in 1935, Acting Manager Ammunitions Factory Footscray 1937-1939, Sub Manager Ordnance Factory Maribyrnong 1939-40, in charge of Production Orders and Statistics Directorate 1940, Manager Ammunition Factory, Footscray 1941, Divisional Manager 1942-48 and General Manager Ammunition Factories 1947-50, General Manager Ordnance Factories 1950-51 and Controller General of Munitions Supply 1952 until his retirement in 1958.

(d) Mr A S Ford, AMIE Mech Eng, AMASME, AMIE (Aust). He was sent from SAF Lithgow to England in 1916/17 and again in

1918/20 to study small arms and machine gun production. He returned to Australia in 1920 and joined the Arsenal Staff in March 1920 and transferred back to SAF Lithgow in June 1924. He was Manager of SAF Lithgow in 1930, General Manager of Small Arms and Machine Gun Factories 1940-44, Director Gun Ammunition Production 1944. He served in other Directorates and retired as Chief Mechanical Engineer, Technical Practices, in 1948.

(e) Mr W.M.B. Fowler, BEng & AMIE (Aust). Together with a Mr J.H. Wrigley, he was selected for the study of aspects of non-ferrous components of complete cartridges. These components included Brass Cartridge Cases, Primers and Gaines. He studied at Woolwich Arsenal and leading commercial factories, as a member of the Arsenal Team. He returned to Australian in 1918. He was Assistant Manager, A.F. Footscray pre 1939. During the 1939-45 war he was Divisional Manager of the Ammunition Factories Group in South and Western Australia and was also responsible for constructing and equipping large ammunition factories in several different locations in Australia.

(f) Mr A Mealand MIMech E. MASME. He was appointed in 1918 as Chief Draftsman for the Arsenal Branch and was given offices in the North Melbourne Town Hall. He was later appointed Chief Drafting Officer for the Munitions Supply Board and from 1924-38 was located in offices within the Ordnance Factory. By 1938 a new central Drawing Office Building was completed within the Ordnance Reserve Area and the Central Drawing Office staff transferred to that location. From August 1941 to January 1942 - Mr Mealand was appointed Controller, Production Orders and Statistics. He was later Controller of Machine Tools and Gauges 1944-45 and Australian Munitions Representative, London 1945.

(g) Mr M. M. O'Loughlin AMIE (Aust). A Western Australia Railways and Public Works Engineer. He was seconded for work with Department of Defence 1916-18. From the end of World War 1 in 1918 until April 1919 he was the sole assistant to Mr F C Spiller, Arsenal Engineer studying the production of

standard pattern guns ie. 18 Pdr QF Gun and 4.5" Howitzer at Woolwich Arsenal, England. By late April 1919 and until October 1919 he was joined by Mr F.S. Daley, another Assistant Engineer as part of Mr Spiller's Arsenal, Gun, Carriage and Forge Team. Mr O'Loughlin left England in December 1919 and was located at SAF Lithgow until he was transferred to Maribyrnong as part of Mr Spiller's team charged with setting up the Ordnance Factory. He was Assistant Manager Ordnance Factory Maribyrnong 1925-37, Manager 1937-41, Divisional Manager Ordnance Factories and Manager of the Maribyrnong Factory from1941-1946, General Manager Ordnance Factories 1947-50 and Controller General, Munitions Supply from 1950 until his retirement in 1952.

(h) Mr F. S. Spiller as a member of the Arsenal team in England was in charge of the study of Guns and Carriages, the standard patterns of World War 1 for Field Artillery being the 18 Pdr QF Gun and the 4.5" Howitzer, the former being a long range gun with low trajectory and the latter short range with high trajectory. He was assisted by two other Engineer, Messrs O'Loughlin and Daley and their principal place of study was at the Royal Arsenal at Woolwich. Mr Spiller and his team visited other principal armament firms and therefore came to know of radical changes in gun recoil and other systems. On returning to Australia Mr Spiller was designated as Engineer in Charge of the planning and design of the original Maribyrnong Ordnance Factory and he had O'Loughlin and Daley as his Assistant Engineers. He resigned from Commonwealth Service in 1925.

(i) Mr A.A. Topp OBE Assoc WMC(Met) ARIC, FRACI, AM(Aust) IMM. Originally appointed as Chemist at the Cordite Factory Maribyrnong, he became Assistant Manager of that Factory in 1915. He proceeded to England in 1917 for specialised studies as part of the Arsenal team. He progressively became, Works Manager, Explosives Factory Maribyrnong in 1926, Manager in 1928, Wartime Controller of Explosives Supply, Ministry of Munitions 1940-41, Director of Explosives Supply 1944-47 and finally General Manager of all Government Explosives from 1947-1951 when he retired.

(j) Mr J.H. Wrigley, BEng(Qld), AMIE(Aust), went to England under the War Workers Scheme 1914-1918 and he undertook special training as part of the Arsenal team in conjunction with Mr W.M. Fowler at the Royal Arsenal Woolwich and leading commercial factories that specialised in the production of nonferrous components for complete cartridges. On returning to Australia he became the Engineer in Charge, Gun Ammunition Production Development Project at Ammunition Factory, Footscray in 1922. He later became Manager of the Ammunition Factory from 1928 until his retirement due to ill health in 1938.

SECTION 4

Chronological Sequence of Related Defence Events Pertaining to Ordnance Factory in Particular and the Maribyrnong and Footscray Defence Establishment in General

Period 1907 - 1945

1907 The Commonwealth Government decided to establish a Small Arms Factory in Australia and it also decided to establish a factory for the manufacture of Cordite.

1908 Small Arms Factory site selected and acquired at Lithgow, NSW - 123 acres. Tenders were invited for Small Arms Plant. Pratt & Whitney of Hartford USA had their tender accepted.

1909 Mr A. E. Leighton arrived in Australia and then returned to England to obtain drawings and plant for the Cordite Factory. Department of Home Affairs began erection of the Small Arms Factory buildings at Lithgow, NSW.

1910 Department of Home Affairs commenced buildings and services for the Cordite Factory at Maribyrnong, Victoria. Mr N.K. Brodribb was appointed chemist at Cordite Factory and was sent to England to gain experience in Cordite manufacture. Department of Home Affairs proceeding with Small Arms Factory buildings at Lithgow.

1911 A Leather and Harness Factory was established at Clifton Hill. The Government decided to establish a clothing factory at Miles Street, South Melbourne. Department of Home Affairs proceeded with planning and construction.

1912 Lithgow Small Arms Factory was formally opened on 8 June 1912 under management of Engineer Captain Jacks. A USA Manager and Assistant Manager were appointed - J.K. Jensen was appointed accountant. The first cordite was produced at the Cordite Factory on 12 June 1912.

1913 The Government decided to establish a woollen mill for the production of service uniforms. Mr Smail appointed manager and

recommended Geelong as suitable site. Crown Land was transferred free of charge from Geelong Harbour Trust to Government.

The first 40 rifles produced were at Small Arms Factory Lithgow.

1914 Woollen Mill buildings under construction, machinery and plant arriving from Great Britain and being installed.

Cordite Factory, A.E. Leighton visited India. N.K. Brodribb was appointed Acting Manager. Cordite now in production.

1915 A.A. Topp appointed Assistant Manager, Cordite Factory. N.K. Brodribb Acting Manager. Committee of experts visited India and furnished a report proposing an "Arsenal" in Australia, and the report was endorsed by the Department of Defence and approved by Government.

1916 A.E. Leighton was requested to and accepted appointment as Controller of Arsenal Proposal and selected officers (Technical Representatives) were sent to England between 1916-1918 for training in specialised munitions production. Lt Col Gipps R.A.A.C. sent to England to study munitions inspection. Mr A.A. Topp sent to England to study production of High Explosives and Ammunition Filling.

1917 All defence factories increasing production. N.K. Brodribb was appointed Manager, Cordite factory. Acetate of Lime Factory in Brisbane nearing completion. F.X. DeBavay appointed Works Manager.

1918 J.K. Jensen formally accountant at Lithgow was selected as Administrative Officer of a new Munitions Organisation (including the Arsenal) and proceeded to England for studies.

1919 A.E. Leighton returned to Australia but before the Armistice he had received permission to purchase plant and equipment to be disposed of by British Government . 27 May 1919 A.E. Leighton appointed General Manager of Arsenal Committee. At Brisbane production of Power Alcohol decided in addition to production of Acetate.

1920 The Minister for Defence, Mr G. F. Pearce whilst on visit to London negotiated with the British Government to purchase munitions machinery and plant to the value of £300,000 less a rebate of 50% in value of the total cost and and with additions was finalised at £200,422. In September 1920 a Board of Business Administration was appointed to administer Australia's Defence Factories.

1921 MSB Munitions Supply Board created to control Defence Department's Factories, constituting:

Chairman	Mr A.E. Leighton, CGMS
Member	Col T.S. Thomas, Finance Secretary Defence
Member	Mr M. Maguire, Assistant Secretary Defence
Secretary of Board	Mr J.K. Jensen

On 1 January 1921 the Federal Government acquired the works of the Colonial Ammunition Factory, known from then onwards as Small Arms and Ammunition Factory.

1922 Activities under the control of the Munitions Supply Board 1922 included the Drawing Office and the Research Laboratories moved from Victoria Barracks to new buildings in the Cordite Factory Area. Production of cordite at the Cordite Factory Maribyrnong almost ceased in mid year whilst a change over was made to TNT and other explosives.

1923 The Munitions Supply Board was responsible for the establishment of new factories in addition to its routine responsibilities. Geelong Woollen Mills disposed of by the Federal Government and became a private company - the "Federal Woollen Mills".

The Harness Factory at Clifton Hill was closed down on 31 March 1923.

1924 The Munition Supply Board took over the R.A.F.A. Barracks and Area at Maribyrnong for an Administrative Centre for Victorian Munition Factories and for the establishment of an Ordnance and Shell Factory. N.K.S. Brodribb appointed Executive Officer and Manager at Ordnance Factory. Inspection Branch was under Lt Col H Gipps and the Central Drawing Office under Mr A Mealand,

and both these officers were transferred to the Ordnance Factory Area on 29 September 1923.

A nucleus of staff, technical and trade employees were being assembled at Ordnance Factory Maribyrnong.

The Eastern stables were in the process of being converted to a Shell Shop and the Western Stables were in process of becoming a Tool Room with attached Heat Treatment Section.

1925 All sections had an office within the Administration Building (ex R.A.F.A. Barracks) and the Ordnance Factory commenced production with the operation of a Woodworking Section in a small corrugated iron building and the equipping and operation of the Shell Shop and Tool Room continued.

1926 The New Gun and Carriage Shop building was completed as was the No 1 Forge Shop - Later in the year some plant and equipment was installed in both shops.

1927 All activities on the Ordnance Factory area were continuing and increasing.

1928 The combined office at Maribyrnong for the Administration of the Factories continued until 1 July 1928 when the Finance Section for the now combined gun ammunition and small arms ammunition factory was transferred to the Footscray Management.

Mr J H Wrigley was appointed Manager of the combined gun ammunition and small ammunition factory. Production and employment at Ordnance Factory continued and was increasing.

1929 Production and employment at Ordnance Factory continued and was increasing.

1930 This year the start of the General Economic Recession in Australia naturally affected labour and supply conditions in connection with the production of munitions. Ordnance Factory, Maribyrnong - building, plant, production and personnel still increased but the Central Drawing Office reduced operations.

1931 At Ordnance Factory Maribyrnong the Administrative and Drawing Office continued at a reduced rate similar to the previous year but the workshops continued plant installation with an increase in both production and personnel.

1932 The Central Drawing Office, the Ordnance Workshops and Small Arms Ammunition Factory increased in both production and personnel.

1933 The Administrative Office at Maribyrnong continued its co-ordination and administration of Maribyrnong and Footscray Factories. The Central Drawing Office's work load expanded. At the Ordnance Factory Workshops production of the 3" 20 cwt H.A. anti-aircraft gun was contemplated and Mr M.M. O'Loughlin was Assistant Manager in charge of gun manufacture.

1934 All activities on the Maribyrnong area continued and expanded particularly in the Central Drawing Office where the volume or work was greatest since its inception. Mr M.M. O'Loughlin proceeded to England in February 1934 to investigate the processes of Gun Manufacture. The new No 1 Projectile Shop (Southern End) was completed in December 1934 - All other Ordnance Factory Workshops were in steadily increasing production.

1935 All activities in the Maribyrnong Area increasing in output, Mr M. M. O'Loughlin, Assistant Manager returned from England in January 1935. Initial operations started on production of 3" 20 cwt. anti-aircraft guns, also the manufacture of shell bodies and the quantity production of projectiles proceeded. Production and personnel in all sections increased.

1936 The Administration and Co-ordination of the Maribyrnong and Footscray Factories continued under the direction of NK Brodribb until 13 May, 1936, when Mr Brodribb was transferred to the Central Administration, Department of Defence for special duties.

Upon the transfer of N.K. Brodribb to Central Defence Administration on 13 May 1936, Mr M.M. O'Loughlin was appointed Acting Manager and Mr R.H. Doyle Senior Engineer,

Small Arms Factory Lithgow was transferred to Ordnance Factory as Acting Assistant Manager. Large extensions were made to the Forge Shop and some additions made in the extension of the two Gun and Carriage shop bays.

The first two 3" 20 cwt. HA Anti-Aircraft guns were completed and submitted to Firing Proof at Port Wakefield Proving Ground with successful results.

The Inspection Branch (Army) located at Maribyrnong on the Ordnance Area had two Artillery Proof Ranges, one at Port Wakefield - South Australia and one at Fort Gellibrand, Williamstown and its work load has considerably increased with the acceleration in munitions production. The Central Drawing located within the Ordnance Area was also experiencing as similar increases to that mentioned above. Mr M.M. O'Loughlin was appointed manager at Ordnance Factory on 11 November 1937. Production and Personnel were continuing to increase.

1937 This year saw the inauguration of the Defence Cadet Engineer Training Scheme. The first four cadets appointed were:

J.G. Jensen (AFF) Later became Production Manager, Ammunitions Feeder Factory Mildura. Killed in aircraft accident January 1945

K. Patterson (AFF) Later resigned and went to a Dry Battery Company and then to Rheems Pty Ltd.

F.J. Malone (OFM) Joined OFM in 1935 as a Junior Technical Assistant, made a Cadet Engineer in 1937 then Senior Engineer in 1942. He was then appointed Manager - Ball Bearing Factory, Echuca and later Manager - Ordnance Factory Maribyrnong

R.I.M. Moss (OFM) Later became Assistant Manager OFM, Assistant Manager OFB, Supply Representative Washington, Manager Ordnance Factory, Bendigo.

1938 Central Drawing Office and Army Inspection Branch, both located in the Administrative Office (previously R.A.F.A. Single Mens Barracks) at Ordnance Factory were both experiencing an expanding work load and increasing numbers of personnel to cope with the work load.

Mr V.C. Parker, Engineer, Machine Shop left for England in March 1938 to study 3.7"AA and other gun productions. A large extension to No 1 Forge Shop had been completed and plant re-organised.

A three bay, saw toothed roof extension to No 1 Machine Shop was structurally complete at the end of the year and heavy machine tool foundations were being completed.

1939 Early in 1939 a move was made by the Government to form a Department of Supply and Development, including the transfer from the Defence Department of the Munitions Supply Board, Principal Supply Officers Committee and the Contracts Board.

On 17 June 1939 the Supply and Development Act was assented to and the formation of the Department of Supply and Development was started. 3 September 1939, Australia declared war on Germany. Establishments under control of the Factory Board in Victoria were:

Central Drawing Office - Maribyrnong
Stores & Transport Section - Maribyrnong
Research Laboratories - Maribyrnong
Clothing Factory - South Melbourne
Explosives Factory - Maribyrnong
Ordnance Factory - Maribyrnong
Ammunition Factory - Footscray
Small Arms, Factory in Lithgow NSW was also included. A number of armament annexes were started and equipped with the assistance of the Principal Supply Officer's Committee and the Advisory Panel of Industrial Organisation under the chairmanship of Mr Essington Lewis.

1940 On 26 January 1940, the Hon Sir F.H. Stewart was appointed Minister of Department of Supply and Development on the resignation of the Rt Hon R.G. Casey, PC. On 14 March 1940 the Hon A.W. Fadden was appointed Assistant Minister for, Department of Supply and Development.

In May 1940 Mr Essington Lewis was appointed Director-General of Munitions. On 11 June 1940 the Rt Hon R.G. MenziesKC became the Minister for Munitions.

Thirty munitions annexes had been approved up to October 1940 and twenty three had commenced production by that date. Each of the major factories was controlled by a Manager who was responsible to the Factory Board.

In December 1940 the new No 5 Explosives Factory at Albion produced TNT. This factory was built and owned by the Commonwealth Government and operated on their behalf by ICIANZ Ltd.

To meet the increased demands of labour for munitions establishments advantage was taken of the Commonwealth Technical Training Scheme to fulfil the requirements for skilled engineering tradesmen by the introduction of technically trained "dilutees". The training scheme made provision for trainees or dilutees from September 1940 onwards and as required.

1941 On 26 March 1941, the Australian Shipbuilding Board was created under the National Security (Shipbuilding) Regulations, "To be responsible for the building of Merchant Ships and other vessels (other than Naval Vessels) and for the repair and maintenance of all Merchant Ships."

Munitions establishments and factories under the control of the Factory Board were considerably added to in 1941. Amongst the established factories, Derrimut Explosives Depot was taken over in March 1941 and the Ballarat Explosives Factory commenced production in September 1941.

In September 1941 the Menzies Government resigned due to the result of Commonwealth Elections held in September 1941. The Hon. John Curtain was elected Prime Minister and formed a Ministry, and the Hon. N. Makin was appointed Minister for the Navy and Department of Munitions.

On 8 December 1941, Australia followed the lead of Great Britain and declared war on Japan.

1942 Two new Establishments began life in 1942 and they were New Pyrotechnic Section, Maribyrnong - January 1942 and Ordnance Factory Bendigo, Victoria - March 1942. In April 1942 the Director General of Munitions approved of the grouping of certain Munitions factories producing similar munitions which were to be directed by a Divisional Manager, each individual factory to have its own Works Manager, or Assistant Manager.

Mr M.M. O'Loughlin was appointed Divisional Manager, Ordnance Factories. Mr V.C. Parker was appointed Works Manager Ordnance Factory Bendigo and Mr J.L. Simpson, Works Manager Ordnance Factory Maribyrnong. The Munitions Department was receiving specialised equipment and material under an Agreement with the United States of America termed Lend-Lease.

1943 In the Government munitions establishments the totals of output and employment reached a peak during the year 1943 and considerable substitution of female in lieu of male labour had been made wherever possible releasing Manpower for the Services and other war industries.

Towards the end of 1943 owing to the satisfactory state of the Munitions Requirements programme, reductions were ordered in production and personnel.

During the year three feeder factories as adjuncts to Ordnance Factory Maribyrnong were:
Horsham Shell Annex, Victoria - September 1943
Hamilton Shell Annex, Victoria - October 1943
Stawell Shell Annex, Victoria - October 1943 and it ceased production in November 1943 being transferred to the control of

Department of Supply and Shipping for Lease to Messrs Davies Coop. & Co. for the manufacture of cotton goods.

1944 In May 1944 the Ordnance Feeder Factory or Annex at Hamilton Victoria ceased production and was handed over to the Department of Supply and Shipping for lease to E.W. Tilley Plastic Manufacturer.

In July 1944 the Ordnance Factory Echuca, Victoria commenced the manufacture of Ball Bearings.

1945 On 25 January 1945 - The Mildura Ammunition Factory under the control of Mr J.G. Jensen (an original cadet from the first four Defence Cadets of 1937 and son of Mr J.K. Jensen,) finally ceased production.

From 1 July 1945 Departmental principals were:
Mr A.A. Topp - Explosives Supply Directorate
Mr M.M. O'Loughlin - Ordnance Production Directorate
On the Board of Factory Administration were the following:
Chairman - Mr N.K. Brodribb - Controller General, Munitions Supply
Member - Mr A.A. Topp, Director of Explosives Supply
Member - Mr M.M. O'Loughlin, Director of Ordnance Production

SECTION 5

OFM History - 1922 - 1945

On February 28, 1922, the Munitions Supply Board submitted to the Minister for Defence a programme for the extension of munitions production capacity estimated to cost £900,000 over a six-year period (plus £355,000 which had already been spent for plant and other facilities which would be absorbed) and including £240,000 of the new money for "Ordnance & Shell Production", comprising:

• Building & Works	£115,000
• Plant	£95,000
• Gauges and Tools	£30,000

Expenditure already incurred for this project totalled £174,500, mainly for plant items purchased during the disposal of surplus munitions plant from British war-time factories. They included many excellent heavy machines including a 1500-ton press for forging heavy gun parts, such as gun jackets and liners.

The proposed new Factory was to be erected on land at Maribyrnong, adjacent to the area already occupied by the Explosives (Cordite) Factory.

Planning and design was entrusted to F.C. Spiller, Engineer-in-Charge, assisted by F.S. Daley and M.M. O'Loughlin, Assistant Engineers. The production contemplated was 18-pdr. and 4.5" Q.F. field artillery components, together with ammunition to serve those guns.

Fortuitously, while the planning of the proposed new factory was proceeding, Army plans were being advanced to vacate the Royal Australian Field Artillery training depot which adjoined the site of the Explosives Factory at Maribyrnong. This depot comprised large barracks, stores, stables, gun parks, amenities blocks and three attractive residences, all built in brick and spread over 103 acres of land. Some buildings were extensive in floor-space and could be immediately and usefully occupied for manufacturing purposes,even though not ideal.

Transfer of this property from the control of Army to that of the Munitions Supply Board was approved by the Minister for Defence on September 25,

1923, on reimbursement to Army of the amount expended on the site - approximately £48,000.

This enabled the plans for the Ordnance Factory to be advanced by several years and provided reserve space that was to be of immeasurable value for the extensions needed after the outbreak of World War 2. Two brick buildings - formerly large stables - were adapted for a shell-production unit and a toolroom with stores and tradesmen's shops were accommodated in other existing buildings.

The first unit of the Factory to be ready for production was, consequently, the experimental shell shop in which some 40 reconditioned British machines were installed in 1924, together with hydraulic copper-bonding press and sand-blast units. Machines selected from those used by Australian engineering concerns who had undertaken during World War I to make high-explosive shell-bodies for the British Government were also installed.

Twenty-five 18-pdr high explosive shell bodies were produced in 1926 in a pilot run to prove the tooling and to test the planned sequence of operations. Although there was at the time no Army demand for this ammunition, a first production run of 1,000 shell was then authorised, the completed shell to be held in store awaiting Army orders.

Included in the products contemplated under this expansion programme to be made at the new Ordnance Factory were guns and gun-carriages up to 4.5 inch calibre to a total of 33 a year on the basis of a single-shift of 43-hours weekly and 40,000 shell annually. Initial production was proposed of 18-pdr. equipments, then the 4.5 inch howitzer and later the 60-pdr. B.L. gun. The project was approved by the Government on May 22, 1922.

Manufacture of the 18-pdr. gun had been studied by engineers Daley and O'Loughlin at Woolwich Arsenal in England during 1919-20 and the planning for the Ordnance Factory included capacity for making that gun. Despite the efforts which went into the production of the tooling and gauges for making the gun and the experimental production of the more difficult of the gun's arms parts. The gun was destined never to be made in Australia. The combination of the world-wide depression of the early 1930's and the increasing obsolescence of the 18-pdr. gun - which had been a standard

weapon of the British Army since 1904 - brought about the abandonment of the project in favour of a more modern gun.

It was recognised that, while the gun-manufacturing plant would be balanced for an out-put of 38 gun-equipments annually, a considerable proportion of the plant would have machining capacity for a much greater output per machine and that many of the machines could handle larger types of guns if necessary.

This reserve capacity enabled the Factory in later years to undertake production of the much larger anti-aircraft guns without the need to purchase and house complete new plants. For each new type of gun, however, some additional machines were needed.

The first of the new buildings to be erected was the large workshop planned specially for production of guns and gun-carriages - a steel structure in two bays, each 50-ft. wide and 350-ft. long and each served by a 10-ton travelling crane.

Factory planning provided next for the setting-up of the Forge, for which suitable mechanical hammers and forging presses, a 3-ton steam hammer, a 1500-ton hydraulic forging press and several shell-forging presses had been procured in England under the arrangements for disposal of war-time surpluses.

Funds to a total of £31,000 for the erection of the Forge Shop - a building 200-ft. long by 120-ft. wide - were approved during October 1924. Another 100-ft. was added to the length of the building later.

During 1925, Spiller resigned and Brodribb carried on with the establishment of the Factory as Acting Manager with Daley as Assistant Manager responsible for the Carriage Workshop, Toolroom and Woodworking Plant and O'Loughlin as Assistant Manager in charge of the Gun Workshop, Shell Shop and Forge.

During 1926-27, installation of plant was completed in the Gun-machining Shop and the Carriage Shop was approaching the same stage. Construction commenced that year of the General Woodworking Shop to cost £21,000, to which it was intended to transfer the activities undertaken in the existing woodworking plants at the Ammunition and Explosives

Factories, as well as responsibility for production of artillery vehicles and any other timber products needed by the Services in time of war.

In the Forge Shop the 1500-ton hydraulic forging press was erected during 1928, together with the installation of gun-tempering and shrinking furnaces and pits, hydraulic shell-forging presses and associated furnaces and ancillary units.

By June 1929, when the workforce totalled 162, manufacture of tools, jigs and gauges for the recoil mechanism of the 18-pdr. gun-carriage was still in full swing and facilities were being provided also for the quantity production of high-explosive and shrapnel types of shell for 18-pdr. guns and for the 3"20-cwt. anti-aircraft gun.

The Ordnance Factory capacity at that stage included a large forging shop equipped with the largest hydraulic forging press in Australia, together with appropriate supporting furnaces. It was, consequently, possible to forge large gun-bodies. There were also carriage and gun-machining shops, a steel-plate fabricating shop and the woodworking shop. Gun manufacture, however, did not commence until 1934, when an order was received for supplies of 3" 20 Cwt,.A.A. guns for the Army. The first of those guns passed proof tests at Port Wakefield (S.A.) on June 22, 1937.

In common with the other Factories, the Ordnance Factory was conducted under "nucleus production" conditions after the Great Depression of 1930 restricted Defence activities. By mid-1930, however, production of 18-pdr. and 4.5" Howitzer shell had commenced and the completed cartridges passed all tests. Shell for the Navy had been ordered and commercial demands for such items as forgings and metal and wooden components of motor-cars and marine engines were made for the first time.

The following figures indicate the volume of work undertaken at the Ordnance Factory during the worst of this Depression period and the source of the orders in hand.

SOURCE AND VALUE OF ORDERS

Year	Defence Dept	Other C'wealth Depts	State Gov't	Commercial	Total
	£	£	£	£	£
1923-39	10,4313	9,143	-	215	19,776
1930-31	37,550	6,487	98	2,212	46,347
1931-32 (anticipated)	20,000	1,000	250	12,470	33,720

Service orders in hand at this time included the conversion of 6-inch shell, manufacture of 60-pdr. cast-iron shot, reconditioning of 18-pdr. shell, lapping and milling of 6-inch B.L. guns and the modification of breech mechanisms and percussion locks.

A large volume of grinding and repair work was carried out on aero and motor-car crankshafts and crankcases for the Military and Air Services. A mail-handling plant was made for the General Post Office, Sydney and an elaborate piece of apparatus - a Celostat - was in production for the Mount Stromlo Observatory at Canberra.

Replacement by Australian-made products of the motor-car and truck axles which were being imported by the motor industry from America was discussed with the Factory management during 1930, at the time when the Factory's forging equipment had been installed and proved but was likely to be lightly loaded with service orders because of the Great Depression.

After a trial batch of car axles to be sold as replacement parts had been forged to the complete satisfaction of General Motors (Aust.) Pty. Ltd., it was agreed, despite protests from the Victorian Chamber of Manufactures, that orders would be accepted from that Company for car parts previously imported and that orders would not be accepted from any other party for motor-car components which were obviously intended for fitment to General Motors cars. Motorcar shock absorbers and universal joints were also made, together with adjustable wrenches but a "threatened" order for tin-openers was not accepted!

This work, however, tapered off by the end of 1931, when the General Motors group commenced production within its own factories. Mr Daley, Assistant Manager of the Ordnance Factory, resigned and joined the Company in this venture but was not replaced at the Ordnance Factory, the only change in the duties of the management team being that the Chief Draftsman (A Mealand) was given responsibility for the oversight of the Toolroom as well as of the Central Drawing Office.

Increasing demands by the Services compensated for the loss of this commercial work, including shell and other components of artillery ammunition in various calibres. A substantial order for 8" practice shell of a type formerly imported from England brought into use for the first time the 1500-ton hydraulic press and associated furnaces. By the end of 1939, twenty different variations of projectiles were being made, as well as anti-submarine depth-charges and smoke-floats to be filled at Explosives Factory, Maribyrnong.

In the Woodworking Shop, the growing importance of the R.A.A.F. was reflected in the orders handled for the reconditioning of a Seagull flying-boat hull and of Wapiti sea-plane floats. Other aircraft work successfully handled during the next four years included the production of six De Havilland Moth fuselages together with thousands of metal components for Moth, Bulldog, Wapiti, Avro and other types of aircraft being assembled and maintained in R.A.A.F. workshops as well as struts, skid planes and other wooden items.

Motor bodies, ammunition boxes, artillery wheels, miniature artillery ranges and a large assortment of details of camp equipment added to the variety.

Australian timbers had largely replaced imported timbers in this work, more than 200,000 superfeet of mountain ash and pinus radiata having been expended, together with lesser quantities of King Billy pine, yellow-wood, blue gum, spotted gum and jarrah.

Pressure on the Factory for the production of projectiles for the Army and the Navy - 15 types of shells and bombs were on order in early 1933 - emphasises the inadequacy of the converted stable than being used as a Shell Factory but which had been equipped merely as a pilot plant for a systematic study of manufacturing techniques.

Consequently there was included in the 1933-34 Estimates the amount of £35,000 for a Projectile Shop of about two-acres of floor space to cost £30,000, plus £5,000 for plant and tools. This was approved in September 1933 and the new building was available in December 1934.

In February of that year, Mr O'Loughlin - at this time Works Manager of the Factory - left for England for 12 months to study the machining and forging of heavier types of projectiles and the manufacture of light armored-cars and of aero engines, as well as the production of the mobile 3-inch 20-cwt, anti-aircraft gun then favoured for strengthening the nation's anti-aircraft defence.

An order for twenty four of these guns in 1934 launched the Factory into gun production. The first guns, completed in 1936, introduced the system of "Auto frettage" for making gun barrels. The design comprised a jacket and a liner in which worn liners could be replaced by mechanical disassembly by new ones in half an hour as compared with the earlier method of using heat and shrinkage to build the new liner into the assembly.

During Mr O'Loughlin's absence, planning of the necessary additional factory buildings proceeded actively, provision having been made in the 1933 Programme to the amount of £25,000 for this purpose, as well as £13,700 for a new Toolroom to replace the converted stable still being used for housing the precision machinery for tool and gauge manufacture as well as taking care of the work on the anti-aircraft gun.

To cope with the increasing requirements of forging work for guns and shell manufacture and the heat-treatment of various steels, approval was given in 1936 for the Forge Building to be increased in area by 50 per cent at a cost of approximately £23,500 - it was nearing completion by June 1937. A Plate Section was established in 1932 as an adjunct to the Forge Shop to take care of the increasing volume of fabricated steel work, including the mountings and parts of the travelling platform of the 3-inch anti-aircraft gun and armoured-car bodies.

With the retirement of Mr Leighton from the position of Controller-General of Munitions Supply, he was succeeded, on November 2, 1937, by Mr Brodribb whose place as Manager of the Ordnance Factory was taken by Mr O'Loughlin. The other Assistant Manager (Mr Statton) was promoted

to the position of Sub-Manager until 1939 when he became Manger of the Ammunition Factory. Mr R.H. Doyle transferred from the Small-Arms Factory to become Sub-Manager of the Ordnance Factory.

Experience during the first 12 years of operations at the Ordnance Factory had clearly demonstrated that the quality and variety of the plant installed there and the training and experience of the workforce were such that there appeared to be no requirement of an engineering nature likely to be demanded by the Australian Services which technically could not be handled successfully.

It was, however, another matter when volume of production became important, as it did when effect had to be given to the conclusions of the Imperial Conference of 1937, as reflected in the augmented Four-Year Programme - to be spread over the period 1936-37 to 1939-40 - with provision for extensions at the Ordnance Factory at an estimated cost of £330,000, as follows:

•	Extensions to the Gun & Carriage Workshops	£65,000
•	Additions to the Toolroom	20,000
•	Additions to the Projectile Shop	30,000
•	Roads, Drainage, Sewerage, etc.	4,000
		£119,000
•	Plant and Tools	£211,000

By the end of 1937, both gun and shell manufacture were proceeding satisfactorily.

Also included in the new Programme was £300,000 to establish new capacity for the manufacture of the heavier 3.7 inch anti-aircraft gun on fixed mounting. A saw-tooth building, 525 feet long by 162 feet wide, was built for this purpose, to house machine tools and other plant selected as the best available throughout the world. In the programme funds were provided also for substantial additions to the plant for tool and gauge production, for a new Shell Shop and for another new building for the manufacture of machine-gun links, pyrotechnic stores and sheet-metal components.

The new Shell project included the installation of a second complete shell-forging plant which, incidentally, was ordered from Germany as being the

most modern of its kind in both speed of output and economy of operation. This plant was supplied and installed before the War began.

The first of the 3.7" A.A. guns was completed by May 13, 1940 - only 10 months after the drawings of the guns were received in Australia. By 1943, these guns were being produced at the rate of four per week.

In October 1938 a further revision of the programme had been prepared which, so far as the Ordnance Factory was concerned, included:

- increased production of anti-aircraft guns;
- provision for heavy plate work for armoured cars;
- repair and reconditioning of guns and equipment; and
- plant for producing 9.2-inch projectiles and 250-lb. bombs.

While these expansion projects were being developed, production activities were proceeding on a modest scale. For 1936-37, the Factory output was valued at £72,630 and at £95,847 the following year, by which time the work-force had increased to 845, many of whom were engaged in developing new projects. Production for 1938-39 had jumped to £338,120 in value.

By June 30, 1939, the Factory assets were valued at £1,452,193, including:

• Land and buildings	£447,009
• Machinery and plant	757,331
• Stocks in hand and work in progress	248,124

and the 1,325 employees included 51 females. This was a dramatic increase in workforce from 657 in 1936, 695 in 1937 and 845 in 1938. In April 1941, the total was 3,639 of whom 172 were females.

Still further extensions at the Ordnance Factory were provided for in the Expansion Programme proposed in June 1939 which included £360,000 as the estimated cost of a factory to make 25-pdr. Q.F. gun howitzers.

In a statement submitted for War Cabinet consideration on September 6, 1939, which included proposed expenditures of £855,000 (of a total of £2,755,000) "... to provide extensions to the Gun, Gun Ammunition and Explosives Factories for manufacture of 25-pdr. field-gun equipments and ammunition", it was noted that:

"The present gun and ammunition Factories cannot undertake the 25-pdr. gun equipments and ammunition while they are employed upon other war requirements. The present Gun Factory is already prepared to undertake to make the large number of 2-pdr. Q.F. Anti-Tank Gun with its existing resources.

"The 18-pdr. and 4.5-inch Q.F. guns and carriages are obsolete although quite effective for local defence. The 25-pdr. equipments, however, would be required for an overseas Expeditionary Force.

"In addition, if these equipments can be made in Australia, it is probable that overseas orders can be expected. The plant to be purchased would be suitable for more anti-aircraft guns if required."

The War Cabinet Decision, dated September 29, 1939 was as follows: - "Above approved, with exception of £855,000 provision for 25-pdr. gun and its ammunition. The Anti-Tank Gun manufacture is to be proceeded with."

On other papers, a direction was given to proceed also with the 3-inch mortar at the Ordnance Factory.

The case for establishing plant for the production of the 25-pdr. guns and ammunition was strengthened by the request received from the British authorities on October 19, 1939 for proposals regarding the supply of that gun, together with a forecast of likely deliveries. Further consideration by War Cabinet was, however, indecisive until it was pointed out that, irrespective of the desirability of assisting with supplies of these guns for Britain, additional gun-making plant was essential to meet the war-wastage of the obsolete 18-pdr. and 4.5-inch guns with which the Australian Army had been equipped during World War 1 and earlier and that any surplus capacity could be absorbed on production of 25 pdr. guns if still required.

On January 17, 1940, capital funds totalling £400,000 were approved for the production of 25-pdr. gun equipments but production of ammunition for those guns was still not authorised. Later, with further extension of the 25-pdr. gun project, the gun carriages and trailers were entrusted to industry and instead of two gun equipments per week, the Factory built up its output to 16 guns and breech mechanisms a week.

By "good" planning, a building already being erected at the Ordnance Factory as a charge against funds provided for another smaller project approved earlier and which had floor-space of 3.5 acres with provision for extension to 5.5 acres - the latter being coincidentally the same space as was needed for the 25-pdr. gun plant - was able to be "diverted" for the new project. Mr Jensen claimed that his confidence that the 25-pdr. project would eventually be approved had inspired him to anticipate approval and to plan the building for that project.

Four months later - May 21, 1940 - approval was given for an expenditure of £30,000 for further shell-forging plant and furnaces for the Factory to provide for production of 400,000 shell annually and to safeguard the Factory against any breakdown in the German plant then operating. Statistics prepared at that time show that 46,000 anti-tank and artillery shell and four anti-aircraft guns were being made each month.

On June 18, 1940, approval was given for the expenditure of £1,980,00 as the first section of a further programme estimated to cost £14,000,000 for increased manufacturing facilities to meet the expected war-time needs of the Army. This initial stage included the proposed installation at the Ordnance Factory of three units of shell-forging plant from the USA at an estimated cost of £110,000.

Two months later, the Treasury obtained Parliamentary approval for a Loan Bill of £10,200,000 which included £1,000,000 for gun-production, £700,000 for Aircraft bombs and £4,000,.000 for the Government Factories section of increased gun ammunition production.

On September 18, 1940, £400,000 (increased to £500,000 three months later) was provided for the production of bombs for the R.A.A.F. The outstanding item in this project was the 250-lb. semi-armour piercing bomb to be made at the Ordnance Factory. Additional buildings and plant for gun manufacture at the Factory were authorised on April 3, 1941, at an estimated cost of £290,000 and £156,802 was provided on June 30, 1941 for further shell and bomb manufacturing capacity.

The original Factory - No. 1 Gun Shop and No. 1 Projectile Shop - provided for the annual production of 38 guns and 50,000 shell under 1926 planning conditions. These shops had been supplemented by additions which had

been built, equipped with plant and brought into service before the War-time production peak had been attained, in 1943, comprising:

- Projectile Shops

  For production of 750,000 shell of some 30 types annually, and including limited quantities of shot also.

- Woodworking Shop

  For production of ammunition boxes and other timber items as needed.

- Sheet-Metal & Pressed-parts Factory Workshop

  For the manufacture of charger clips and machine-gun links for .303" ammunition at the rate of 20,000,000 annually.

- Shell & Bomb Forging Unit

  For the weekly production of:

250-lb. S.A.P. Bombs	500
500-lb. S.A.P. Bombs	100
25-pdr. shell forgings	30,000
6" shell forgings	3,000

  together with other miscellaneous forgings, including those for 9.2" H.E. shell.

- No. 2 Machine Shop for an output of:

Predictors (which control the fire of anti-aircraft guns)	5 per month
25 pdr. guns (ordnance)	16 per week
Bofors A.A. guns	5 per week

  with provision for an increase to 10 per week of certain Bofors components.

- Plate Shop

  To cater for the production of mountings for 3.7" and Bofors guns.

- No 1 Machine Shop Extension

  For machining 3.7" A.A. guns at the rate of 4 per week as well as 4" Naval Ordnance (guns only), the relining of barrels of 4" Mark V naval guns and general purpose machining involved in the reconditioning of machine-tools.

- No. 2 Projectile Shop

  For the production of 25-lb. S.A.P. bombs, of 8" Naval practice shot and of other heavy projectiles.

- No 1 Gun Forge Shop Extension

  Including the installation of several horizontal "Bogie" heat-treatment furnaces and of large vertical electrical furnaces complete with subsidiary quenching tanks for the heat-treatment of guns of to 6".

As at June 30, 1943, capacity had been provided also for the production of 500-lb. S.A.P. bombs, 9.2" shell, 40-mm and 3.7". AA guns and 17-pdr. guns (ordnance only) with which it was planned to replace the 25-pdr. guns.

Pressure on the capacity available at the Maribyrnong Factory had made it necessary not only to place orders with commercial industry through the Ordnance Production Directorate but also to plan to provide relief on a decentralised basis by the establishment of suitable Government Factory capacity in country locations in Victoria which could be supervised by the parent Factory. O'Loughlin had by this time been appointed also as Divisional Manager for the Ordnance Group with responsibility for the activities at the Maribyrnong Factory until 1948 and also of those being set up at country centres in the western half of Victoria.

SECTION 6

Ordnance Factory Maribyrong

A Concise Production History from 1946 to 1993

1946 - 1958	The production of Service Equipments is contained in Section 12 of these notes and Commercial Productions is contained in Section 11.
1959	The manufacture of 80 Ton Capacity Liquid Oxygen Storage Tanks for the Blue Streak Rocket Project W.R.E.
1960	Design and manufacture of Shell Forging Presses for the range of 105mm projectiles used in the Vietnam War.
1961	The manufacture of Sulzer Marine Diesel Engine Components.
1962	The manufacture of Rocket Motor and Launcher Assembly for the "Ikara" Anti Submarine Missile.
1964	Modification of Shell Forging Presses and Production Lines to produce 4.5" and 5" Naval Projectiles.
1965-1967	Production of large quantities of the following types of trailers etc. 1/2 ton trailers, 20 ton trailers, 60 ton tank transporter 2 ton and 5 ton fire fighting vehicles.
1966	Manufacture of armour for A.M.F. vehicles in Vietnam and Aluminium Armour for Armoured Personnel Carriers.
1970	Manufacture of 500 lb bombs.
1971	Electron Beam Welder installed in No 2 Machine Shop Development of the "Rodinga" Rocket Motor.
1973	Computer Aided Machine Tools installed in No 1 Machine Shop

1976 - 1978	Manufacture of 105mm Tanks Barrels for export
1980	Design and Manufacture of a Heavy Shell Line for the production of 155mm projectiles. The manufacturing line was commissioned in 1990.
1981-1992	The 105mm Light Gun (Project Hammel) was in production at this period of time and was the only major project undertaken in latter years.
1982	A Flow Forming Machine was installed in No 2 Machine Shop and was used to manufacture thin walled high strength pressure vessels for use in Rocket Motor production.
1984	A Main Frame Computer was installed to provide for all data processing and machine command required within with the factory
1985	The manufacture of the "Harpoon" Booster Rocket for export
1987	The manufacture of Turbine Bases for General Electric Co., fuel tanks for "Jindivick" and "Winnin" Rocket Motors
1989	Reconditioning of major items for the Snowy Mountains Hydro Electric Authority.
1991-1993	The manufacture of 105mm tank barrels, 76mm Oto Melara naval type gun barrels and the manufacture of components for the Australian Submarine Company, namely Torpedo Tube Sections, Bilge Pumps, Air Receivers and Periscope Mountings

The need for improved productivity within the factory was evident from the early 1970's and in which period computer aided machining was introduced.

Over the years 1970 to 1990 the number of computer aided machine tools or centres rose to just over 60 number just prior to closure of the factory.

The introduction of C.A.M. allowed the number of machining personnel to be reduced without losing production capability and also improving productivity.

One measure of productivity is the dollar($) output per employee and this figure rose from less than $40,000 per employee to over $100,000 per employee just prior to the factory closure in December 1993.

SECTION 7

Tool Room - Building 67

The first Toolroom was originally located in the Western Stable, Building No 36 (ex R.A.F.A.). In 1925 the staff comprised one Foreman, two Apprentices, nine Tradesmen and one Storeman Clerk. Heat Treatment was in a separate small building with one Tradesman and one Apprentice. The next and final location was in a new brick structure west of the old R.A.F.A. barracks and construction commenced in October 1935 and was completed in October 1936 as Building No 67. Later after 1939 an extension was made to the south end of Building No 67.

Tool Room Staff and Foremen from 1924 - 1939

Martin Hahn	Original Foreman - 1925 onward until late 1930's
James Brown	Original Leading Hand - 1925 onward until late 1930's

With the approach of World War 2 the Tool Room expanded rapidly particularly in the early war time period. Foreman in order of seniority in this period were:

Bill Burrett
Wally Haddow
Jack Stephens
Harry Stephens
Eric Peel

Tool Room Heat Treatment from 1924 - 1946

Tom Shields	Tradesman, Leading Hand, Foreman Grade C
Jack Moore	Apprentice, Tradesman then H.T. Foreman, No 1 Forge, then Forge Shop Engineer
Jack Lister	Apprentice, Tradesman, then Engineer

During World War Two and for a continuing period into the post war years the Tool Room Engineers were Martin Hahn, William Simpson, with Miss Marge Commons as Clerical Assistant.

It should be realised that the Tool Room was in production at least two years before the Gun and Carriage Shop became operative. In the early years the Tool Room acted as the Engineering Labour hirer and allocator for a period of five years or more.

It is interesting to note the rise of Tool Room Apprentices shown as follows:

Bill Burret	Foreman Grade A (ex AFF Apprentice, then OFM Toolmaker)
Ted Boase	Draftsman
Stan Bell	Technical Assistant / Technical Officer /Senior Technical Officer
Charlie Chalmers	Draftsman
Eric Curwood	Draftsman / Engineer / HOS / Production Manager
Frank Fay	Engineer (later S.E.C. Transport Manager)
Noel Fisher	Foreman No 2 Machine Shop
Jack Hird	Foreman Sheet Metal Tool Section
Chris Nuttall	Foreman No 2 Machine Shop
Ken Polglase	Technical Officer
Harry Stephens	Foreman Tool Room
Jack Stephens	Foreman Tool Room

Other Tool Making Tradesmen attaining the rank of Foreman or other similar positions were:

Hugh Anderson	Foreman
Syd Castleton	Foreman
Roy Curwood	Inspector, Leading Hand, Foreman
Wally Haddow	Foreman
Jack Joyce	Foreman
Joe Potts	Foreman
Frank Spilling	Inspector, Senior Inspector

Tool Room Productions over the life of the shop would range to perhaps millions of components manufactured for the three Armed Services and other Defence Establishments and in an attempt to categories in main groups, such groupings would be as follows:

1. Cutting Tools - Drills, Taps, Reamers, Broaches, Spade Drills and Boring Tools

2. Dies - Metal pressing/punch and dies, progressive die sets, lamination dies

3. Gauges - Plain, cylindrical, screw - to variable degrees of accuracy

4. Dies - Plastic Mouldings - Thermo setting and thermo plastic, and extrusion

5. Jigs and Fixtures

6. Precision Measurement of tools, gauges etc and of other components as requested by various workshops or authorities.

No 1 Machine Shop - Building No 46

In 1925 the building known as the Gun and Carriage Shop was erected and initially consisted of 2 bays only, two-thirds the present length of the shop. The Gun Shop (No 2 Bay) was under the supervision of Mr M.M. O'Loughlin, as Assistant Manager, and the Carriage Shop (No 1 Bay) was supervised by Mr F. Daley, Assistant Manager who was later Controller of the Ordnance Production Directorate. Mr R. Stanley, later Senior Engineer, Plate, Sheet Metal, Woodshop and Outworks, joined Mr O'Loughlin's staff as Engineer in September, 1927.

The personnel of the Gun Shop, under Mr C. Nicols, as Foreman, included Albert Woolley, T. Collier, S. Castleton and P. Chapman. The Carriage Shop personnel, under Mr J. Chalmers as Foreman, included F. Norris, L. D'Altera, R. Lamont, with G. Wheram as Storeman.

During 1926, work was started in the Gun Shop on the first 18-pdr ordnance parts to be manufactured in Australia. Work on the first 18-pdr. carriage parts commenced in August, 1927, but with the advent of the world-wide depression, instructions were received to stop further work on 18-pdr. field guns, and it was, therefore, necessary to seek work from public departments and private industry. The first order was the manufacture of parts for mail handling equipment for use in the Sydney GPO and was handled by both gun and carriage shops. The volume of these orders was such that it was found necessary to steadily increase the shop personnel. An unusual order was then received by the Carriage Shop to build a Celostat for Mt Stromlo Observatory at Canberra. This was a very fine piece of equipment, and was installed at Mt Stromlo by Mr S Swift, later with Army Inspection Branch.

Orders from private industry comprised the manufacture of car and truck parts for General Motors Pty Ltd, such as axles, driving shafts, oil pump units, shock absorbers, etc. For the PMG's Department thousands of terminal boxes were manufactured. The manufacture of 8 in. practice shell, also 4 in. star shell, was initiated in Machine Shop No 1. A variety of most unusual work was undertaken for Spaldings Pty Ltd., such as moulds for golf ball manufacture, cricket bat grips, tennis ball moulds, and golf ball trimming machines.

An increasing influx of orders of QMG Navy and Air Force spare parts followed, and it is interesting to observe that the first components in sheet metal for air craft were undertaken in the Gun and Carriage Shop, where Mr C.O. Kinross, first commenced his association with the factory. The first serious attempt at complete gun manufacture was undertaken when work on a number of 3 in. 20-cwt. AA guns, complete with mobile carriages, commenced in 1936, and was completed in 1939.

Further considerable expansion of the Gun and Carriage Shop later known as No 1 Machine Shop became imperative, and the original two bays were lengthened and floor space increased to five bays and an annexe in 1938. A considerable number of modern machine tools were installed, notably the 16 ft 6 in Stirk-Hilo electrically controlled planer, 25 ft. Churchill grinder, Rapidan gear generator, 10 ft. Richards vertical borer, No 6 Richards horizontal borers, auto frettage plant for gun barrels, and later on, Australian-built machines for gun turning and boring, which have proved most successful.

The light machining section was placed under the supervision of Mr J. Chalmers, whilst the heavy machining and fitting sections were under the supervision of Mr T. Collier. Subsequently, in 1941, Mr Chalmers assumed complete control of the new Machine Shop No 2, and Mr Collier supervised the whole of Machine Shop No 1. Then, in 1942, Mr P. Shafto was appointed Senior Foreman when Mr Collier transferred to Ordnance Factory Bendigo.

Considerable progress was made with the production of ordnance of many kinds, ranging from anti-aircraft and naval guns to small trench mortars, and it is with justifiable pride we remember that just prior to World War 2, and starting from the receipt of the initial drawings, the factory produced and delivered the first 3.7 inch AA gun in the remarkably short space of time of 10 months. Several of our first 3.7 in. guns were sent to England and occasioned very favourable comment on the quality of materials and workmanship. The Machine Shop was equipped with a special annexe off the southern end of Bay No 5 where the "auto frettaging" of gun barrels was performed. It is also interesting to recall that the first few of our large order for 25-pdr ordnance were produced in Machine Shop No 1 in December, 1940.

By 1943, the original small staff had expanded to a total of 1,165 men and women on two-shift works, and the output of vital munitions, particularly 3.7 inch AA guns and 4 inch naval ordnance, had reached the expected targets.

Of the "Old Hands" still in service at this time included J (Blitz) Blythe, Foreman, and A. Wood, Foreman, V. Dunphy, Leading Hand, Alan Matthew, Alf Nuttal, Tom Kempster, and "Old Lew" Nathan the Belt Man. It is gratifying to observe that a large number of the foremen and leading hands required to staff the newly commissioned shops on the area and the country ordnance factories, were drawn from the tradesmen staff in the Machine Shop No 1, also that considerable help and advice were freely given to private engineering firms when they were called upon to play their part in the manufacture of guns.

Every credit must be given to the tradesmen personnel, also the large number of men allotted to Machine Shop No 1 from the local dilution scheme and trained in gun production, for their efforts in producing guns and associated equipment to an exacting standard of accuracy. Credit is due to the girls working in this machine shop, particularly those handling the 5 and 10 ton overhead electric cranes.

The production engineers connected with Machine Shop No 1 also played an essential part in planning and assisting to complete successfully the many and varied jobs handled.

Despite the depression of 1930's in munitions production our factory built up such a sound reputation that other Government directorates did not hesitate in allotting additional new manufacturing projects to the factory. Machine Shop No 1 manufactured heavy machine tools such as large planers and slotters to be used in the ship building industry. A considerable number of orders for aircraft components was completed. Another very important project was the competitive manufacture of 200 H.P. Marine Diesel Engines for the Small Craft Directorate.

No 1 Machine Shop played an important part in the manufacture, assembly, and testing of these engines, and with such a record of part performance behind it will maintain its reputation for efficient and rapid production in competition with private industry.

During No 1 Machine Shop's greatest period of activity that is in the World War Two period, late 1939 to 1946 the following notable persons in the classifications of Engineers and Foreman who were responsible for great development an innovations in engineering design and production are as follows:

Divisional Manager

Mr M. M. O'Loughlin

Managers in succession

Mr M. M. O'Loughlin, Mr J. Simpson, Mr V. Parker

Assistant Managers

Mr Frank Barr, Mr Ray Campagnolo, Mr Ted Herbert

Engineers

Mr A. Hickey, Mr I.L.H. Scott, Mr Bob Moss, Mr Stewart Clarke, Mr Len Fryer, Mr Jimmy Morphett, Mr Jack Hutson, Mr Eric Curwood and Mr Eric Johnson

Assistant Engineers

Mr Ken Coates, Mr Harry Bullows and Mr Les McLean

Foreman

Mr Jim Chalmers	Light Machining, later Senior Foreman Grade A, later Shift Superintendent, 1943
Mr Tom Collier	Heavy Machining, later Senior Foreman Grade A
Mr Percy Shafto	Foreman Grade C, B and later A
Mr Harry Reid	Light Milling and Drilling - Foreman Grade C, then B
Mr Dave Crothers	Light Milling and Drilling - Foreman Grade C
Mr Alex Wood	Heavy Machining - Foreman Grade C, then B
Mr Fred Collis	Heavy Machining - Foreman Grade C
Mr George Hocking	Heavy Machining - Foreman Grade C

Mr Jack Blythe	Light Machining - Foreman Grade C
Mr Jack Hood	Light Machining - Foreman Grade C
Mr Jack Gill	Gear Cutting - Leading Hand then Foreman Grade C
Mr Sid Conroy	Grinding - Foreman Grade C
Mr Val Dunphy	Light Lathes - Foreman Grade C
Mr Clary Trickey	Turrets & Capstan Lathes - Foreman Grade C
Mr Alex Moodie	Turrets & Capstan Lathes - Foreman Grade C
Mr Harold Burke	Fitting - Foreman Grade C, later Grade B
Mr Bill Essen	Fitting - Grade C
Mr Frank Tout	Fitting - Grade C
Mr Con Weikhardt	Fitting - Grade C
Mr Ossie O'Connor	Fitting - Grade C

Post war service products included Naval items such as triple barreled, variable patterned depth charge throwers with early versions labelled "Squid Mortars" and later versions known as "Limbo" and as Mortar Mark 10 and all assemblies included ammunition handling mechanisms to bring charges up from the ammunition storage and handling rooms in destroyers. Naval guns and ordnance were still produced in various calibres and a major item was multi tubed Torpedo Tube Mountings.

Other major productions for the Army were the 105mm Recoiless Gun and Malkara Rocket Motors. The factory also produced components for Doxford and later Sulzer Marine Diesel Engines these engines being in the order of approximately 3000 HP. Components processed by the Machine Shop included twin opposed cylinders, pistons, connecting rods etc whilst the Plate Shop provided base plates, columns and entabulatures.

In the early post World War Two years No 1 Machine Shop produced many items or products for private industry. A comprehensive list of these items is shown in Section 12 of this Factory History.

In order to assist new Secondary Industries starting up in the early post war years the factory accepted perhaps the largest commercial order in its history and that was the production of 1000 complete sets of components to assemble "KL Tractors Ltd, new "Bulldog" tractor. The KL Tractor Factory included buildings for storage of components and an assembly line for production of tractors. Another large commercial order was for the manufacture of 15 Ton Ice Making plants for U.N.R.A.

In later years No 1 Machine Shop reached the "computer age" in machinery and earlier lathes and milling machines had peg board or programmed type controls and then the move was made to sophisticated numerical control on lathes and mills and the introduction of machining centres. This was supported by technicians operating computers capable of performing computations and programmes for complex geometry. Another later innovation was the introduction of 3 and 4 axis measuring machines.

No 2 Machine Shop - Building 79

The building commenced in 1940 and was completed in 1941. It was originally planned as a store house but with the need for additional gun manufacture it was expanded and became No 2 Machine Shop.

The shop was finally erected for the specific purpose of manufacturing the 25 pounder standard field gun (excluding carriage) and production encompassed nearly the whole of Australia's large output of 25 Pounder Ordnance pieces including spares during World War 2. The next large project was the production of 17 Pdr Ordnance. In addition and up to financial year 1944/45 the shop produced Bofors 40mm AA Guns and quantities are as follows:

- Army Mobile Guns - 136 No excluding spare barrels and other ordnance components

- Navy - Naval Mounting Type - 261 No Excluding spare barrels and other ordnance components.

- Navy - Naval Toadstool Type 35 No excluding spare barrels and other ordnance components.

An ancillary section within No 2 Machine Shop was the Predictor Section and its main purpose was to produce Vickers 3.7"AA Predictors No 1 Mk III. This Predictor has not been produced elsewhere in the Commonwealth outside Britain and nowhere in the USA or Britain has it been produced in an Ordnance Factory. This was a most difficult task entailing the highest degree of accuracy. As an adjunct to the Predictor Section within No 2 Machine shop an underground workshop for Fire Control Instruments was built just North of No 2 Machine Shop and it was used for predictor assembly and testing, reconditioning of rangefinders, for vacuum coating of lenses etc and the manufacture of a great range of fire control instruments.

After World War 2 the Machine Shop No 2 produced the following service equipment:

- 40mm Bofors AA No 11 and 12 Bristol Conversion
- 40mm single Bofors Mk 7 mounting

- S.T.A.A.G. (Stabilised Tachometric A.A. Gun) Twin Bofor Mountings Mk 2, 2m and 3

The Fire Control section produced the following Service Equipment:

- Plotter Fortress (Aust) No 101 - Modification to suit new location Fortress Converter No 104
- Plotter Fortress (Aust No 101)
- Plotter Fortress (Aust No 102)
- Range Finder Depression (Aust) Mk 1
- Range Finder Depression (Eng) Mk VI
- Elevation Range Indicator (Aust) Mk 1
- Conversion of No 1 Predictor for Bofors 40mm gun

Commercial production included:

- Ruston & Hornsby 3 VCB 102 HP Diesel Engines fitted with Power Take Off
- Wood thicknessing machines
- Microscopes (less optics)
- Victor 16mm sound and silent Projectors with Projector and Speaker Case
- Parkinson 4.5" Centre Lathes
- Wiltshire File Cutting Machines
- Wiltshire Cutlery Grinding Machines
- Seamaster Outboard Motors
- Variable Pitch Extruder Screws
- KL Tractor Components
- Chamberlain Tractor Components
- Canberra A/C Jigs, British P.C. Reduction Gears, S.A.F. Sewing Machines
- Army Class Room Instructional Mountings
- Doxford Engine Components
- Parts for Fairway Scales etc.

War time (World War Two) Engineers employed in chronological order in No 2 Machine Shop were

Jack Dixon - Head of Section
Phil Ford - Head of Section
Eric Johnson

Bert Poyser
Frank Fay
Bob Roberts
Graeme Sutherland

Foremen employed early in World War Two were:

Val Dunphy	Grade C	25 Pdr Component
Val Richardson	Grade C	25 Pdr Component
Bill McDonald	Grade C	Bofors
Pat McCormick	Grade C	25 Pdr Barrels

Foremen employed on Shift Work, during World War Two were:

Shift 1	**Grade**	**Shift 2**	**Grade**
G McDonald	"A"	P B McCormick	"A"
J Hood	"B"	A Sonnberger	"B"
J Joyce	"C"	W Ashley	"C"
H Collier	"C"	A Ross	"C"
W McDonald	"C"	H Noy	"C"

Foremen employed after World War Two were:

Jim Robinson	Grade C	25 Pdr Components
Jim Cartwright	Grade C	25 Pdr
Frank Kerin	Grade C	Bofors
Joe Potts	Grade C	Bofors (Light Mills
Bill Towler	Grade C	Bofors (Bay 1 and Bay 2)
Noel Fisher	Grade C	Bofors (Bay 1)

Bert Poyser
Frank Fay
Bob Roberts
Graeme Sutherland

Foremen employed early in World War Two were:

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Val Richardson	Grade C	25 Pdr Component
Bill McDonald	Grade C	Bofors
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J Joyce	"C"	W Ashley	"C"
H Collier	"C"	A Ross	"C"
W McDonald	"C"	H Noy	"C"

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Jim Robinson	Grade C	25 Pdr Components
Jim Cartwright	Grade C	25 Pdr
Frank Kerin	Grade C	Bofors
Joe Potts	Grade C	Bofors (Light Mills
Bill Towler	Grade C	Bofors (Bay 1 and Bay 2)
Noel Fisher	Grade C	Bofors (Bay 1)

Fire Control Section - Building 126 and
Predictor Section - No 2 Machine Shop

As stated in the Notes on No 2 Machine Shop a Section to manufacture Vickers 3.7" AA Predictors was established in the North West corner of No 2 Machine Shop.

This type of Predictor had not been produced within the British Commonwealth outside Britain and nowhere in USA or Britain had it been produced in an Ordnance Factory. In this respect the Ordnance Factory had the unique experience of being the first establishment to make Predictors outside the Patentees factory and honour of being chosen as a manufacturing establishment able to work to extreme limits of accuracy on extremely small and precise components particularly in the field of gears, worm wheels, worms etc.

English Foremen on loan to pioneer the project were Messrs Waller & Pearce and Messrs George Ovens and Ted Murphy were the Ordnance Foremen appointed to pioneer the production under the guidance of the Englishmen.

The Tradesman originally involved in the production of predictors were Tom Abbot Leading Hand, Jimmy Robertson, Freddie Jones, Jim Neville, Alf Fisher, Jack Hobday, Ivan James, Jack Powlett and Laurie McKay and aprentices Laurie Ackland, Jack Lester and Wally Emmerson.

By 1945 Predictor production of 51 units was complete along with a supply of maintenance spares for the predictors. In addition an order for the conversion of ten No 1 Predictors for Bofors 40 mm guns had also been completed.

In 1943 as an adjunct to the Predictor Section in No 2 Machine Shop a two floored building, the first floor completely under ground and top floor at ground level with a lift well and an observation port for use when calibrating instruments such as range finders with sighting or target points up to 3 km away from the section and looking across the southern part of what is now Avondale Heights and to the west of the building. In this building optical, and instrument sections were located in controlled atmospheric conditions and provision was made for the vacuum coating of optical lenses.

In the general field of work in the Fire Control Section the following equipments and services were completed by the Section:

1. Repair of Field Instruments for Department of Army

2. Assistance to Department of Navy in the checking of alignment or realignment of Torpedo Tubes and sights on board R.A.N. ships. Assistance and advice regarding the control equipment for 4" MK XVI twin H.A. and L.A. Turrets on RAN 16,000 tons transport landing ships.

3. Manufacture of 204 No. Carrier Telescope Sighting No 2 with spares for use on the 6 pdr Gun.

4. Modification of Plotter Fortress (Aust) No 101.

5. Manufacture of Range Finder Depression (Aust) MK1, Range Finder Depression (Engl) MKVI and Elevation Range indicator (Aust) MK1.

6. Manufacture of Universal Fortress Converter No 104 and Plotter Fortresses (Aust) No 101 and 102.

In post World War two and later years the following persons became Leading hands, Foremen and in addition, one became a Technical Officer.

Leading Hands: T Abbot, T. Robertson and Jack Cross.

Foremen: L Ackland, Andy Bremner and Jack Begley.

Technical Officer: L McKay

Machine Tool Maintenance Shop & Millwrights - Building No 70

The shop was built in 1940 as a metal framed structure with a central gabled bay housing a 10 ton travelling crane. On the east side of the central gable was a skillion annexe and at the west side was a similar skillion annexe containing a narrow first floor office including drawing office space.

The shop was always used for the maintenance of machine tools, general maintenance and millwrighting and when maintenance work was at a low ebb the shop took on overflow work from either of the machine shops particularly as they had two large lathes capable of the order of 30" swing.

The staff was headed by a senior foreman, Mr M O'Connell who from early pre war times was an operative in the old shell shop and then a Foreman in No 1 Projectile Shop. He was assisted by two "C" grade Foremen, Mr Andrew Mann and Mr Perc Bullard. A later foreman was Mr Bill North.

No 1 Projectile Shop - Building No 65

The first projectile shop in Australia had a very humble beginning. It was located in a stable building previously used by the Royal Australian Field Artillery 18 Pdr Depot, and there commenced the machining of projectiles and shells. About 1931 the total staff was approximately 14 hands under Mr J. Galbraith, Foreman. Of these, Mr Hicks, Messrs Skinner, Cariss, Longley, McFee and Billing remained with the Section. Whilst A. Wood, C. Antonis and R. Wilson were employed in other Sections.

Plant at this time consisted of twenty-five lathes, a drilling machine, banding press, and sand blasting machine, a very modest outfit compared with the machine tools and equipment of today. 2 Pdr. H E, 18 Pdr. H E, Shrapnel 4.5" HE and 6 Pdr, Shot were the first projectiles in production.

During 1932 an annexe was added to the converted stables to allow for production of a new shell. Up to this time, some 5 or 6 different types of shell had been manufactured.

For a few years several different sizes of shells were manufactured, shell bottling and shell banding being performed in the Forge Shop. Prominent at that time were Mr M.M. O'Loughlin, Mr Daley, Assistant Engineers, Messrs H. Carriss, H. Longley, A. Wooley, B. Pennycook and T. Barlow and there were several additions to Shop personnel, Messrs J.R. Hicks, J. Skinner, A. McFee, A. Wood and a few others must of whom now rank a Foremen or Engineers. Mr J. Statton was Sub-Manager in charge of the Factory, with Mr R. Stanley as his assistant in the Shell Shop.

In 1934, the south end of the present building was under construction, and installation of plant commenced about the end of the year. Mr J. Norman, was transferred from Lithgow Small Arms Factory as Assistant to Mr J. Galbraith. It was about this time that a "Three Year Plan" of munitions manufacture was undertaken, and 17 different types of shells and projectiles were on order, from 2 Pdr. C.N.F. Mk. IV to 8" projectile practice Mk IV.B., this latter order being transferred from the then Carriage Shop. Approximately 50 men were then employed in the shop. This number increased to nearly 100, early in 1935, and at that time the first night shift commenced. Incidentally, a night shift continued with the exception of about 2 months in 1940 until September, 1945, a period of nearly 10 years.

No 1 Projectile Shop was ready for occupation in January 1935, and extended to the North in 1938, the initial floor space being then more than doubled.

In 1935, Tungsten Carbide tips were first used as general practice in rough machining shell forgings on three modern Lang Lathes. Mr G. Seale, later Works Manager of Rutherford Ammunition Factory, was Projectile Shop Engineer from 1935-1940. During those years a considerable expansion in plant, and extension to the building in 1938, and of course, shop personnel, took place.

Assisting Mr Seale from 1939 to 1940 was Mr F.J. Malone. In 1938, a number of employees were promoted to Leading Hands, and after war broke out, some of these men were promoted to Foremen, and Engineers. Their close contact with the men in the shop and their practical knowledge of shell machining gained over a number of years, was the foundation of the large production personnel built up and trained during the critical war years.

In 1939 and order for half a million 2 Pdr. Shells was received. Messrs Seale, Malone and Norman prepared a machine lay-out and schedule of operations and it proved to be a good model for similar large orders received later. In 1940, three eight-hour shifts were arranged for. Again a number of employees were promoted to Leading Hands and Foremen. These men were ably tutored by Messrs. Seale and Malone on the Engineering staff, and Messrs Norman, Hicks and Bennett on the Foreman's staff. About this time Mr Seale left for America, and Mr Malone took charge assisted by Mr L. Fryer.

Increased demands for a variety of shells, including 6" Howitzer, were made in the shop, and machine layouts and methods were drafted and re-drafted, in an endeavour to cope with quantity and variety required. Several young Engineers joined the staff including V. Gough and I. Arnold, on materials. Owing to the shortage of skilled tradesmen a number of semi-skilled men were taught the rudiments of tool setting and promoted as toolsetters.

In 1941 plans for No 2 Projectile Shop were being considered and Mr W.A. Miller joined the Projectile Shop Engineering staff. Still more orders came pouring in, and continual revision and planning of machine lay-outs,

dovetailing of similar operations on different shells, and allied work of progress data and tool life data brought more young men into the Engineers office and to the shop supervisory staff. Mr J.R. Hicks was promoted to the Engineering staff to assist with the layout and production of the 250 lb. S.A.F. Bomb. Mr A. McRae, later Grade 2 Engineer at Echuca, was also promoted to the Engineering staff where his ability in devising shell handling equipment and ideas for special time saving devices was put to good use. Mr L. McGeady was promoted from toolsetter to the Engineering Staff, and quickly adapted himself to tool and drawing control.

The No 1 Shop went on to two 12-hour shifts in 1941, and by the end of the year, a number of men were transferred to No 2 Projectile Shop, together with a number of Foremen and Leading Hands.

In 1942, with more men transferred to No 2 Projectile, it became necessary to employ women. In a short time three shifts for women were engaged. It became necessary again to promote Foremen, Leading Hands and Toolsetters, and these were promoted from the shop personnel. One or two Foremen were promoted from the ranks of Leading Hands in the No 1 Machine Shop.

Three shifts for women were abolished towards the end of 1942, and a two shift system was adopted. This was maintained until the present time and the work performed by the women, in general, was a high standard, reflecting credit on the team spirit fostered by, Mr M M O'Loughlin Divisional Manager, and Works Manager, Mr J L Simpson.

In 1942, several Shell Annexes were started in the Wimmera district. Plant was set up and tested and personnel were trained in No 1 Projectile Shop. Several Engineers and Foremen were transferred from the No 1 Projectile Shop and Mr G. Ditchburn was appointed Manager of the Wimmera Factories. Again the team spirit surmounted the usual obstacles met with in any new venture, and the Wimmera Annexes gave a good account of themselves. Bendigo Ordnance Factory opened in 1942 and a small number of workers from the Projectile Shops transferred to this factory.

No 3 Projectile Shop was planned and plant layouts prepared for 17 Pdr. AP Shot. In 1943, Mr J.R. Hicks took over this project, and Mr J. Myall was

promoted to "A" Grade Foreman in charge. A number of women and toolsetters trained in Projectile No 1 were transferred to give the shop a start. The machining of the Shot proved successful.

In August 1943, Mr Malone transferred to Echuca, and a re-arrangement of Senior Engineers brought Mr R. Campagnolo as Head of all Heat Treatment, Forging and Shell Shops. A gradual re-arrangement of duties for Sectional Engineers was devised, knitting together, yet with sufficient flexibility the heavy shell machining, the light shell forging and machining, and heat treatment shops.

In 1944, Mr G. Ditchburn resigned from Ordnance Factory, Maribyrnong, and his duties in charge of the Wimmera Annexes were taken over by Mr E. Herbert, Assistant Manager, whose office, on his departure for England in September 1944, was temporarily taken over by Mr R. Campagnolo.

No 1 Projectile Shop's peak manning in 1945, was 1,100 Employees, 9 Engineers and Assistants, 12 Foreman, 26 Leading Hands, and 52 added Tradesmen Toolsetters.

The combined total of machines in the three Projectile Shops, capable of machining shells and projectiles from 20 mm to 9.2" was 477. The first projectile shop reached a total of 25 machines in 1931, most of them old fashioned belt driven machines used in England in 1916.

Of the "old hands", in service, if not age, space permits mention of a few only. M. O'Connell, later foreman in Machine Tool Section; J. Robinson, later foreman in No 2 Machine Shop; D. Larter, J. Titheridge, A. Corbett, H. Hickenbotham, H. Kerslake, E. Silk, toolsetters and S. Billing, W. Harrington. The pioneers of the fair sex in the shell shop include Monitress E. Elmar, Monitress M. MacKenzie, Monitress N. Rogers, Monitress V. Glover, Monitress D. Bonney, Monitress H. Williams, and operators L. Taylor, S. Eddy, M. Nelson, S. Malcott, V. Miller, M. Archbold and A. Beach.

Of the executive staff, Mr R. Stanley, Senior Engineer in charge of Plate, Sheetmetal Wood shop and Outworks, was the first Engineer. Then came Mr Seale, Manager of Rutherford Ammunition Factory; Mr F. J. Malone, Manager of Echuca Ball Bearing Factory, and later Mr R. Campagnolo, who also was Senior Executive of Nos 1 and 2 Forge Shops and Nos 1, 2 and

3 Project Shops, with Mr W. Miller as his assistant on Shell and Projectile manufacture.

No 2 Projectile Shop - Building No 86

Projectile Shop No 2, erected for the purpose of machining 250 lb SAP bombs and was completed by December, 1941.

Practically all the machine tools for this project mainly 13" turning and boring lathes, were Australian made, the majority being manufactured by Ford Co. Geelong, and others by Melbourne and Sydney engineering firms.

By June of the following year 1942, the shop was fully staffed and producing finished machined bombs at the target production rate of 250 per week and working two twelve-hour shifts per day. Other production included 500 lb. SAP Bombs, 9.2" Shells for coastal defence guns and 8" HE Naval Shells.

This section was originally the responsibility of Mr G. Seale, who was later transferred to New South Wales, as Manager of the Rutherford Ordnance Factory. Its guidance and control was then entrusted to Mr F.J. Malone, Engineer in charge of Projectile Shops with Mr J.R. Hicks as Section Engineer and Mr I. Cameron, Senior Foreman.

No 3 Projectile Shop - Building No 135

This shop, Building No 135, was spacious and modern. The shop was planned for the machining of 500 lb SAP bombs. Planning and building took place in 1943 and the shop was ready for service in January 1944.

A change of programme necessitated concentration of the production of 17 Pdr QF Shot APC Mk VIII

The latter part of March 1944 saw the installation of suitable plant and a small staff of female operator under the supervision of Mr Jack Myall Senior Foreman Grade "A". Both female operators and toolsetters were transferred from No 1 Projectile Shop and the machining of shot proved successful. Mr J.R. Hicks was the Shop Engineer for this project.

Later in the post war period No 3 Projectile Shop became redundant and was taken over by the Electrical Section and remained as Electrical Shop until the end of OFM/ADI productive life.

No 1 Forge Shop and H.T. Section - Building No 49

The original northern half of the shop was finished during 1927, and extended to its present length during 1937-38.

Plant installation was commenced during the latter end of 1927. Forging operations in the Forge Shop may be stated to have commenced in August 1928 when the original 8-ton furnace was lit, and steam was raised in two boilers for the trial run of the 1,500-ton Davy Forging Press.

The first shells forged in Australia were 18-pdrs. and were produced on the Shaw Presses at the northern end of the Shop during 1929. It is interesting to note, that these Presses are still in production for forging small orders and odd components.

The first large order received in the Shop was in 1930, for several thousand Stay Bolts for locomotive boilers for the Commonwealth Railways. This work brought the Drop Hammers into operation for the first time.

Later, orders were received for motor car axles, transmission parts and shock absorber components, and during 1931 the Davy Press was first brought into operation for production work forging 8" Shells.

The first forging squad consisted of Jock Robertson, Dan Doolan, George Dunn, J. Vale, J. (Peggy) O'Neill and Harry Allsopp, and it is interesting to note that three of this team were still in the Forge in November 1943. Dan Doolan in charge of one the Forging Squads - Harry Allsopp as Leading Hand Furnaceman and J. O'Neill as one of the Crane Drivers at the big Press - all three part of our forging team.

The first briquette fired Heat Treatment Furnace was installed about this time, and later in a second larger unit was added. These two furnaces being first attended by H. Allsop, and later by Harry Smale. Many thousands of shells, bomb and gun components have since been heat treated in these furnaces.

Work was very scarce during the depression years, a few replacement gun components and motor car parts keeping the shop going.

May, 1935, might be said to have seen the birth of large ordnance forgings was then that the first major gun components were forged for 3" 20cwt. A.A. Guns from blooms received from overseas.

The first Australian made bloom of gun steel arrived at the Ordnance Factory for forging in May 1937, and was followed in March, 1938, by the first Australian gun barrel, which was successfully heat-treated in the Forge Shop.

It is gratifying to note that from this date Australia has been self-supporting in steel for ordnance items.

As mentioned earlier, the shop was doubled in length during 1938, and the first of our battery of modern Birlec Electric Heat Treatment Furnaces were installed, and put into operation in January, 1939.

The combined vertical hydraulic Shell Forging Press at the south end of the Shop was also installed during 1939, and has since been in continuous use.

The war years saw great changes take place in the Forge Shop with tremendous increases in plant and the number of employees and the variety of work handled.

Hollow forging, handling large ingots up to 13 tons in weight, the forging of bars up to 50 feet long, and large gun barrels and liners up to 40 feet long and 8.5 tons in weight have now become commonplaces, and local steels are being heat treated to the highest specifications to rival anything done elsewhere in the world.

The men of the Forge did a great job, and apart from one or two with previous experience in ordnance work, all had to earn the job from the ground upwards and many difficulties had to be overcome.

The following men were among the earliest employees who worked in the shop:

Blacksmiths - Horrie Andrews, Jim Neikle, G E Roberts, Jock Robertson - a barrel chested Scotch Champion wrestler who wrestled the Great Hackenschmidt under the name of Jim Campbell (Jock was also a champion Blacksmith).

Fitters - Ben Pennycook, Alf Taylor, Bill Irving, Lew Smith, Tom Harvey.

Others were: Enoch Adams, Tom Kempster, J O'Neill, Harry Allsopp, J Grieves (the first Crane Driver and later in the Welding Section), Harry Smale, Bob Galloway, Dan Doolan, Geo Dunn, P Lockington, Alf Stanton, Big Jack Whelan, Geo Vass, J McCallum.

In later years the following personnel were employed as Foreman in progressive order:

FORGING

Ern Roberts
Fred Heaviside
George (Shorty) Thompson
Phil McInnes
Lachlan Robertson
Bill Ponslow
Len Buxton

HEAT TREATMENT

Jack Moore
Hugh Schroder
Bill Harris

No 2 Forge Shop - Building No 87

The buildings were erected in 1941 and the installation of plant was commenced in July 1941, comprising Boilers, Hydraulic pumps and Accumulators, Air Compressors, Gas Producers, 800 ton and 1,000 ton Forging Presses, 3 mechanically driven "Baldwin Omes" Forging Units; 6 Shell Forging Furnaces, and 7 Gas Fired Annealing Furnaces, together with the necessary equipment for Machining and Heading Shell and Bomb.

The forging of 250 lb. S.A.P. Bombs was commenced in January 1942, on the 800 ton Davy Shell Forging press in No 1 Bay, and the first bomb was headed about a month later. This job presented many difficulties in the initial stages, but it was carried through very successfully, and of a total of 23,600 bombs forged and headed, only 44 bombs were scrapped in these stages.

Production of 25 Pdr. Shell was commenced in April, 1942, on the Baldwin Omes press in No 4 Bay, almost 340,000 of these shell being forged and rough machined in the section, and 9.2" HE and practice Shell were forged in No 1 Bay at the end of the year.

In October 1943, the first 500 lb. bomb was forged, and at the end of the year forging and machining of 5.5" H.H. Shell was in progress. At the beginning of 1944 the forging and machining of 3" Mortar Bombs was commenced, and in May of that year, the first 8" H.E. Naval Shell was forged. This shell was pierced to a finished cavity and many difficulties had to be overcome in the initial stages. However, over 10,000 shell were forged and headed successfully with only a small number of rejects. The experimental forging of the 9.2" AP shell was successfully carried out at the end of 1944, and the experimental forging of the 9.2" AP Caps was also successful early in 1945.

Personnel

Senior Engineers - Mr E. Herbert and later Mr R. Campagnolo and Mr W. Miller

Section Engineers - Messrs A. Phair and B. Pennycook

Section Foremen - Messrs T. Irving and T. Chapman

Engineering Staff - Messrs R.I. Moss, E. Siggs, K. Robeson, J. O'Callaghan, D. Jones, G. Ditchburn, R. Hanson, W. Wallace, L. Amos, A. Cooley.

Few skilled tradesmen were available at the commencement of this project and trainee labour was used for the installation and operation of this large plant. Women were employed machining 25 Pdr. Shell and 3" Mortar Bombs and other small shell handled by this Section.

Maximum number of employees - male, 225 and female, 38.

Plate Shop - Building No 50

The Plate Shop was originally formed as a section within No 1 Forge Shop in 1932 and it remained there until 1942. The new Plate Shop, Building No 50 was completed and occupied in 1942 and is adjacent to the West Side of No 2 Machine Shop. Whilst located in the Forge the Plate Shop produced the first two armoured cars built in Australian and made available for the 1934 Centenary Tattoo. Later six all welded Reconnaisance Armoured Cars were built on Ford V8 chassis.

Another large project was for two box girder bridges for the Army with a working load of 8 tons and tested with a proof load of 21 tons.

The section also produced the mountings for the 3"20 cwt HA AA Gun, (mobile) and later mountings for the 3.7" AA gun (static).

During World War 2 the Plate Shop produced 40mm Bofor Gun mountings, platforms and pedestals.

A major projects was the construction of 11 No all welded steel lighters for the United States Army. The 65 ton vessels were transported by road and launched in the Yarra River, North Wharf by the Melbourne Harbour Trusts crane. Later the fitting out with engines, pumps, cabins etc of the 11 No lighters plus 7 which were launched but not completed prior to the 11 No, was carried out by Ordnance Factory staff at Gem Pier Williamstown.

Many other large items including 240 No Pontoons T.6. measuring 7'long x 5' wide x 5' deep produced for the Army.

As an experiment a 3 cylinder Ruston & Hornsby Housing was made from mild steel plate all welded construction to offset the delay in the delivery of Housing Castings. The experiment was successful and reduced the weight considerably, viz: casting 23 cwt, fabrication 18 cwt.

In post World War Two period the shop produced many large items such as components for Doxford Marine Diesel Engines. These components included Bedplates, Columns and Entablatures and similar items for the Sulzer Marine Diesel Engines assembled by the Commonwealth Government Marine Engine Works at Port Melbourne. Later L.O.X. Tanks, Decompression Chambers and Pontoons etc were built.

Over the life of the Plate Shop, engineers included R. Stanley, J. Simpson, J. Kerin, B. Downes and Foremen were headed by R. Barker, Foreman Grade A and assisted by J. Lewis, E. Fraser and Ern Stewart as "C" Grade Foremen.

The shops equipment and plant included the automatic electric and submerged arc and argon arc welding and also a large annealing furnace, guillotines, rolls, presses and an electron beam welding machine.

Original Welding Shop - Building No 76

Built in 1940 as a metal framed corrugated iron clad structure as an annexe to the Plate, Boilermaking and Millwrighting Section incorporated in the southern end of the Forge it allowed the Welding Section to be withdrawn from Forge 1 and thus relieved the cramped working conditions. It provided canvas enclosed welding bays and an open space for construction of large assemblies. In later years it was used to house miscellaneous stores and equipment and finally ended its working life as a Paint Shop.

Sheet Metal Shop - Building 69

Sheet Metal components were originally produced in the Gun and Carriage Shop, (later No 1 Machine Shop) - and then transferred to the No 1 Forge Shop in 1931/32 and on vacation of the Shell Shop (originally the R.A.F.A. Eastern Stables) and movement of that shop to the new Projectile Shop in December 1934, the Sheet Metal Section occupied Building No 25. The Shop was divided into two sections one for the construction of Aircraft and the other general sheetmetal work.

In the Aircraft Section six De Haviland Moth Fuselages were completed (see photographs in the OFM photo album) and thousands of metal components were produced for Moth, Bulldog, Wapiti, Avro and other types of aircraft being assembled in R.A.A.F. Workshops of that period.

At the end of 1939 a new brick building No 69 was being constructed and completed in 1940 (west side of No 1 Forge) and the Sheet Metal Section moved into this its permanent home.

As time progressed Mr Kinross became "A" Grade Foreman with Mr Jock Morris Foreman Grade "B" with Messrs Ian Pennycook and Dick Vaughan as Foreman "C".

Mr Allan McCann was Foreman Grade "C" in charge of the Tool and Diemaking Section within the Sheet Metal Shop. During the early World War 2 years Mr Kinross left the Sheet Metal Shop on appointment as a Shift Superintendent and after conclusion of World War 2 he returned to the Sheet Metal shop as "A" Grade Foreman.

This new Workshop was in two sections, one for the production of charger Clips for .303" Service Rifles and metallic Machine Gun Belt Links for Vickers and Browning Machine Guns. The components were produced in multi stage or progressive dies and as an adjunct a small toolmaking section was incorporated to produce new dies and maintain old die sets.

The other section of the shop produced a large range of general service products and maintenance items. These included Linings and Diaphragms for Ammunition Boxes, Tails for Mortar and Aerial Bombs, Demolition Charge 6" Beehive and a great range of small fittings and clips etc for ammunition boxes.

Wartime (World War Two) personalities:

Mr R. Stanley was the first Engineer.

In 1946 Mr J. Simpson a shop engineer was appointed Works Manager of the factory and later was transferred to the position of Head of Section, Sheet Metal and Plate.

Mr C. Kinross, a marine engineer and aircraft mechanic joined Ordnance Factory in 1930 and as a tradesman he produced sheet metal components in the original Gun and Carriage Workshop. The section moved to No 1 Forge Shop in 1931/32 and on transfer of the Sheet Metal Section to a new home in Building 69 Mr Kinross was appointed as Shop Foreman.

Wood Shop - Building No 44

On occupation of the R.A.F.A. training depot in 1923/24 the first section to go into production was the Woodshop which was located in a corrugated iron building between the Western Stables and was what was later the first section of the General Store. This first shop had two tradesmen equipped with a band saw, circular saw, planer and drilling machine.

In 1926 designs were completed for a large Woodworking workshop which incorporated the latest principles of submerged drives to machines where the necessary motors and drive mechanisms were located below the shop floor. Later similar arrangements were made for sawdust and chips to be extracted under the floor and taken up above shop level by a "cyclone". The shop design incorporated a large general woodworking section, a wheel section, a paint section and provision of space for Pattern Making, saw and cutter sharpening and balancing and additional provision for an inspection and bond section. In 1937/38 due once again to lack of space temporary use was made of the old Tool Room Building (Western Stables). During 1938/39 approval for a further extension was approved and the extension was commenced and completed in June 1939. The old Paint Shop was utilised as a Pattern 'Store and the old box assembly area was converted to a mess room.

The original Woodshop Engineer in the 1927 on to the '30's period was a Mr Frank Howarth. He was followed by Engineers Ray Campagnolo and Eric Siggs with Ken Dunphy as Assistant Engineer and later Mr K Dunphy became the Woodshop Head of Section. He originally joined No 1 Machine Shop as a Lad in the light milling section from December 1933 to December 1935. He then transferred to the Pattern Shop as the 2nd Pattern Making Apprentice period 1935 to 1939 after which he transferred as assistant engineer to Mr Eric Siggs. After Mr Dunphy later shop controllers were Mr Allan Richardson, Mr Ian Beazley and Mr Jack Cross as STO's or equivalent. Senior Shop Foremen in order were Messrs Tom Drinan, Lees Hayward, Bill Atkinson, Arthur Bergstrom, Frank Pallet, Harold Blyth and Jim Roberts. Pattern Shop Foreman was Mr Paddy Burling.

Woodshop production until 1946 included the following components:

Army	Ammunition boxes and crates, artillery and camps equipment including spokes felloes, targets, tent poles,

cases for monoculars, diaphragms, miniature artillery ranges, pegs, lances, scotches, hand spikes etc.

Air Force — Components for De Haviland Moth, Waipitis, Avro and Hawker Demons including struts interplane, skid planes, spinner air screw, respirator cases, drums film drying etc. Repair of a Seagull type Supermarine Flying Boat.

Navy — Ammunition and projectile boxes, cases cordite, cartridges drill, boxes various, boxes small arms, form turned oars, rocket sticks, plugs etc.

General Vehicle Construction

Ambulance bodies fitted to Ford V8 chassis
Ambulance bodies fitted to British Bedford chassis
Cabs on Bedford Trucks
Cabs and Body on Chevrolet Trucks

Electrical Shop - Building 135

The shop was originally located in the R.A.F.A. Feed (Forage) and Chaff Cutting Buildings. Buildings No 32 and 34.

The shop moved to Building 25 in 1939 when the building was vacated by the Sheet Metal Section.

The Electrical Shop then moved from Building 25 to Building 135 on its vacation as former No 3 Projectile Shop in the 1950's.

Building 135 was of 3 bays - one bay for Electro Plating and 2 Bays for Electrical Mechanics and Fitters.

On vacation of Building No 88 - (originally No 2 Forge Heat Treatment Shop and then later a Material Store), in 1966 the Electro Plating Section moved out of Building No 135 (one bay only) to Building 88 and became the Plating and Surface Treatment Shop for the rest of its working life. Electrical, Mechanics and Electrical Fitters then occupied most of Building 135 and a new smaller section dealing with Electronics then expanded within the shop.

Staff and Personnel

Mr O Lovell was the first Engineer In Charge and later became Principal Electrical Officer for Commonwealth Government.

Mr C Seebeck was the first Shop Foremen.

First Apprentice was a Master J Buzza who completed three months only of his apprenticeship then left to join a family business.

First apprentice to complete his time and remain as a tradesman was Master James Giles - he commenced 1st August 1927. Jim later became "C" and then "A" Grade Foreman of the Fitting Section and finally a Technical Officer 1 in 1966.

Engineers in progressive order were

Messrs Barker and Walker ex industry were appointed in early war time and they returned to industry at the conclusion of World War 2.

Mr Buchan ex Explosives Factory then took over as Shop Engineer when Mr Lovell was appointed Principal Electrical Officer for the Commonwealth Government.

Following Mr Buchanan were Messrs Ian Miller, Alex Culvenor and Kevin Wyatt. Messrs Miller and Wyatt later became 'Head of Section' in succession and Mr A. Culvenor moved to a higher position within Defence.

Mr G. Sutherland was recruited from No 2 Machine Shop and at a later period Mr T. Moroney was appointed as an Engineer.

Mr Sutherland moved to Ordnance Factory Bendigo as an Engineer Grade 3 and Mr Moroney became Head of Section Electrical.

Foremen

Mr J. Giles	Foreman Grade "C" and the Foremen "A" on transfer of Mr Seebeck
Mr W. Perce	Foreman Grade "C"
Mr J. Hoys	Foreman Gr "C" -
Mr A. Skews	Foreman Grade "C" who later transferred to the Drawing office.
Mr W. Lunt	Foreman Grade "A"
Mr F. Carter	Foreman Grade "C"
Mr S. Thompson	(ex Electrical Apprentice) was appointed Foreman Grade "C" Electronics including S.T.A.A.G. Radar.

Original Metallurgical Laboratory - Building No 108

This was erected as a timber and asbestos cement building for use as No. 2 Forge Engineer's office and it later housed the original metallurgical laboratory.

The laboratory later moved to a brick building which was attached to the new Sheet Metal shop Building No 69 and its range of work and associated equipment expanded greatly in the post World War Two period.

Metallurgists included K. Hartnell, later Head of Section, Factory Inspection, Ian Scott, Laboratory Assistant, R. Pascoe, Cadet Metallurgist and J. Newland, Chemist. In the 1950s period, K. Bailey followed as Head of Section.

Administrative Building - Building No 101

The new administration building was erected in 1940/41 and engineering staff who were housed in the old R.A.F.A. single mens barracks were then transferred across to the new building.

The building is of three floors, and the original layout of the new building was as follows, the ground floor containing the Manager, Assistant Manager Administration, Accountant, Registry, Personnel Section and Pay Office.

The first floor contained the engineering staff, assistant managers, heads of sections and engineers for No 1 Machine Shop, No 2 Machine Shop, Plate Shop and Forge Shop, Electrical Section, Woodshop, Planning Section and Toolroom Superintendent. The second floor contained the Cost section, Stores Section, Budget Controls Production and Drawing Control, Technical Library and Drawing Office.

Casualty Rooms - Building No 58

There was no separate casualty building in R.A.F.A. Depot days but early in the occupancy of the area by the Ordnance Factory,a Casualty Room was built just north of the Guard Room and prior to 1939 the original building was extended, increasing the original building by twice its length.

General Store - Building No 4

Approval was sought and approved in 1925 for a General Store to hold a range of metal hardware items and equipment, cutting tools, oil, petrol, lubricant and cutting compounds and all the common use items required by Engineering, Forge, Woodworking and Welding, and Plate Shops. Also included were items of stationery for administrative and clerical functions.

The General Stores Building was completed in 1926 in the form of a high brick structure with first floor storage and platforms external to the building to hold liquid contained in metal drums.

Further approval for an extension to double the stores size and capacity was sought and received in 1938 and completed in 1939.

Clothing and furniture was held in other adjacent and older buildings of R.A.F.A. origin and as such buildings became vacant they were utilised for stores purposes.

Receipt and Despatch Store - Building No 102

Built in 1941 it was basically used as a holding store for smaller components and goods prior to despatch. Early in 1944/45 a small Tropic Proofing Section was set up for processing spares for despatch to tropical areas and the set up included hot dipping tanks.

Steel Store - Building No 27

After the old RAFA 18 Pdr training depot became Ordnance Factory, the Woodshop commenced in temporary buildings and later moved to a new woodshop. The timber store from Ammunition Factory Footscray was moved to OFM area as all woodworking was now centralised in this area. During World War 2 new stores buildings were erected on the east side of Wests Road and opposite the brick Married Quarters in Ordnance Reserve.

These buildings were then used for timber storage and Building No 27 then became the steel store for bright and black steel and non ferrous bars whilst heavy steel sections were stored in the steel gantry located opposite and on the west side of a road adjacent to the Plate Shop

Main Steel Gantry

This gantry was erected in 1942 and contained heavy metal bars, sections and plate whilst smaller bright and black steel sections and non ferrous bars were contained in the steel store at the east end of the area and adjacent to the wood shop.

Boiler House - Building No 124

A boiler house with fuel storage facilities was erected at the western end of the OFM area, adjacent to the Plate Shop. The need for this facility arose because with the rapid expansion of EFM in World War 2, their central boiler house could not supply all steam requirements and the OFM boiler house provided for OFM area and boosted steam supplied to MSL and EFMs southern areas.

Staff Garage - Building No 30

Originally this building was the R.A.F.A.'s gun park and mobilisation store, then on the change to Ordnance Factory it became a motor repair garage and battery truck maintenance area and was manned by a popular and experienced motor mechanic - Bert Cook.

The building extended to the north in 1945 to become an ancillary furniture store.

For the past 30 or more years the building has been allocated as a "Staff Garage".

Motor Cycle and Bicycle Shed - Building No 47

These buildings were erected early in World War Two to cope with motor cycle and bicycle storage whilst across Wests Road there were Allied Works Council and Civil Construction Corps camps and Air Raid Shelters. As each camp became redundant part of the areas were turned into factory car parks.

Army and Navy Bond - Building No 83

This brick building was completed in 1940/41 and it was the major bond for the inspection of assembled Army and Navy Guns - each machine shop had smaller army and navy inspection bonds for the detailed inspection of components.

SECTION 8

Building Programmes
Ordnance Factory Maribyrnong

1913	RAFA 18 Pdr Depot
1923/24	Building 40 - Temporary Wood Shop
	Building 25 - Conversion of Eastern Stable to Shell Shop
	Building 36 - Conversion of Western Stable to Tool Room
	Building 28 - Drawing Office and Army Inspection occupied part of the Single Mens Barracks
	Building 35 - Administration and Engineering occupied part of the Single Mens Barracks
1925	Gun and Carriage Shop completed (2/3 of ultimate length), Building 46.
	General Store completed (1/2 of ultimate size) Building 43
1927/28	No 1 Forge complete (2/3 of ultimate length) Building 49
1926/27	Woodshop complete (1/2 of ultimate size) Building 44
1929	Original Casualty Building - Building 58
1935	No 1 Projectile Shop (1/2 of ultimate size) Building 65
1935/36	Tool Room Complete Building 67
1936	Extension to Casualty Building - Building 58
1936/37	Gun and Carriage shop extended to full length, renamed at this time as No 1 Machine Shop - Building 46
1937	No 1 Forge Shop extended to full length - Building 49
1938	No 1 Machine Shop extended by 3 Bays - Building 46
1938	No 1 Projectile Completed (Northern Half finished) Building 65
1938	Wood Shop extended to full width - Building 44
1938	Central Drawing Office completed - Building 71
1938	Timber Shed Extended - Building 27
1938	Bicycle and Motor Cycle Shed - Building 47
1939	Tool Room extended to the south - Building 67
1939/40	Sheet Metal Shop completed - Building 69
1938/39	General Store completed to full length - Building 43
1939/40	Later Metallurgical Laboratory occupied an existing brick building - Building 69 extension
1940/41	New Administration Building Constructed - Building 101
1940/41	No 2 Machine Shop completed - Building 79
1940/41	Army and later Army/Navy Bond Store - Building 83
1941	No 2 Projectile Shop completed - Building 86

1941	Machine Tool and Millwrights Shop - Building 70
1941	Original separated Welding Shop - Building 76, the Plate Shop remaining in No 1 Forge
1941	Receipt and Despatch Store - Building 102
1941/42	No 2 Forge Completed - Buildings 87
1941/42	No 2 Forge Heat Treatment Shop - Building 88
1941/42	Plate Shop Completed - Building 50
1941/42	Original Metallurgical Office and Laboratory - Building 108
1942	Bulk Steel Gantry - Building 156
1942	Boiler House - Building 124
1942	Eastern Mess Room - Admin etc. - Building 110
1942	Northern Mess Rooms - No 2 Machine Shop Etc.Buildings 118 and 158
1942	Western Mess Room - No 2 Forge etc. - Building 85
1944	No 3 Projectile Shop Completed - Short life - converted to Electrical Shop - Building 135
1944	Electricians occupied - Building 135 (originally No 3 Projectile Shop)

SECTION 9

Ordnance Factory Maribyrnong

Building Histories

Blg No	Original & Intermediate uses	Ultimate Use
1	Commandants Residence R.A.F.A.	OFM/ADI Staff Residences
2	2nd in Com'd Residence R.A.F.A.	OFM/ADI Staff Residences
3	Single Officers Residence R.A.F.A.	OFM/ADI Staff Residences
4-20	Married Soldiers Quarters RAFA	Employees Rented Residences
21	Quarter Masters Store R.A.F.A.	Temporary Store
22	Gymnasium and Band Hall R.A.F.A. OFM Staff Mess	Not in use
23	Commandants Office R.A.F.A. Orderly Room R.A.F.A. Telephone Exchange	Telephone Exchange OFM/ADI
24	Guard Room R.A.F.A.	Guard Room OFM/ADI
25	Eastern Stables R.A.F.A. Shell Shop Sheet Metal Shop Electrical Shop	ADI/EDE Workshops
26	Saddler & Wheelers Rooms R.A.F.A. Store	ADE/EDE Liquids & Metal Store
27	Timber Store	Steel and Metals Store
28	Single Mens Barracks No 1 Brigade R.A.F.A. Drawing Office and Army Inspection Office OFM	Training Centre
29	Weigh Bridge & Office OFM/ADI	Not in use
30	Gun & Limber Park & Mobilisation Store R.A.F.A. Motor Repair Garage & Battery Truck, Garage & Recharging Depot	OFM/ADI Staff Garage Shelter
31	Picquets Room R.A.F.A.	ADE/EDE Inspection & Metrology Rooms Not in use.
32/34	Forage Store, Hay Loft & Chaff Cutting Room R.A.F.A. Electrical Workshop	Department of Works & Housing Store & Workshops (D.A.S.)
33	Combined Kitchen R.A.F.A.	Not in use.
35	Single Mens Barracks No 2 Brigade R.A.F.A. Engineers & Staff Offices OFM	OFM/ADI Conference Rooms and Picture Theatre

36	Western Stables R.A.F.A., Tool Room & TR Heat Treatment Rooms Clothing Store	OFM/ADI Oil Store & Miscellaneous Items Store
37	Shoeing sheds R.A.F.A., Store OFM	OFM/ADI - Not in use
38	Pharmacy & Sick Boxes for Horses R.A.F.A. Commissary Office Welfare Office	OFM/ADI - Not in use
40	Temporary Wood Shop	Store Room
41	Parking Bay	Parking Bay
42	Saw Dust Extractor and Incinerator Control Room	Not in use
43	General Store	General Store & Erection Pit for Submarine Periscopes
44	Permanent Woodshop & Pattern Shop	Not in Use
46	Gun and Carriage Shop No 1 Machine Shop	Combined Workshop
47	Bicycle & Motor Cycle Shed	Bicycle & Motorcycle Shed
49	No 1 Forge Shop & Plate Shop	No 1 Forge Shop
50	Plate Shop	Not in use - Soil Dump
52	Sub Station No 1	Sub Station No 1
56	Central Drawing Office Maintenance Shop	Not in use
48	Casualty Rooms	Casualty Rooms
63	No 4 Sub Station	-
65	No 1 Projectile Shop	No 1 Projectile Shop & Production Store
67	Tool Room & TR Heat Treatment	Machine Shop Annexe
69	Sheet Metal Shop Apprentice Training Section	Not in Use
70	Millwrights & Machine Tool Maintenance Plant Engineering	Not in Use
71	Central Drawing Micrographic Service	Not in Use on loan to EDE
72	Army Inspection Equipment Information Section	Army Inspection Equipment Information Section
76	Welding Shop Storeroom	Painting Shop
77	Main Gate Guard Shelter	Non Existant
79	No 2 Machine Shop including Predictor Section and Apprentice Training Section	Sheet Metal, Special Welding Gen. Test Area, Vehicle and Assembly Area, Metal Store
83	Army & Navy Bond Store	Gun Assembly
86	No 2 Projectile Shop	No 2 Projectile Shop
87	No 2 Forge Shop	No 2 Forge Shop
88	No 2 Forge Heat Treatment Shop	Surface Treatment Shop
91	External Meeting House	Not in use
95	No 3 Mess Room	Not in use

97	Southern Guard Room	Southern Guard Room ADI/IDD
101	Administrative Building	Administrative Building
103	Instrument Bond & Test Room	
108	Metallurgical Laboratory Electrical Section Office	Not in use Administrative Offices ADI/IDD
110	No 1 Mess Room	No 1 Mess Room
117	Timber Store	Not in Use
118	Furniture Store No 2 Mess Room	Furniture Store
124	Boiler & Power House	Not In Use
128	Underground Fire Control Section	Instrument Test Building
134	Sub Station No 6	-
135	No 3 Projectile Shop	Electrical Shop
136	Salvage Building	Not in use
141	Stores Officer's Building	Padres Office

SECTION 10

Major Service Orders/Equipments Produced From 1924-1993 in chronological Sequence as far as can be Approximated

Army	18Pdr Field Gun Components
Army	4'5" Howitzer Components
Army	Armoured Cars
Army	Armoured Reconnaissance Cars
Air Force	Ambulances
Army	3"20cwt H.A. Anti Aircraft Guns
Army	3.7" Anti Air Craft Guns
Army	Vickers Predictors
Navy	Depth Charge Throwers (Single)
Navy	Reconditioning of 12 and 18 Pdr Merchant Navy Guns
Navy	4" Naval Ordnance
Navy	4.5" Naval Ordnance
Navy	4.7" Naval Ordnance
Army	Pontoons
Army	Churchill Tank Bridging Equipment
US Army	Supply Barges (Lighters) for S.E. Pacific Theatre of War
US Army	Tug Boats for Supply Barges (Fitted out by OFM at Gem Pier Williamstown)
SC Dir	Ruston & Hornsby 3VCBM and 6VCBM Marine Diesel Engines with power take offs etc.
Army	3" Mortar Barrels
Army	2 Pdr Anti Tank Gun Evaluation
Army	17 Pdr Anti Tank Guns
Army	25 Pdr Standard Ordnance
Army	25 Pdr Short Barreled Ordnance (Mountain Gun)
Army	40mm Bofor Guns (Mobile) Mk 3
Navy	40mm Bofor Guns, Static Mountings, fitted to Battleship HMS Howe (30 guns) MK3
Navy	40mm Bofor MK7 Mounting
Navy	S.T.A.A.G. MK 2 (Stablised Tachometric Anti-Aircraft Gun) Twin Barrels
Navy	S.T.A.A.G. MK 2*
Navy	S.T.A.A.G. MK 3
Navy	Squid Motor) Patterned Depth Charge Throwers
Navy	Limbo)

Navy	A/S Mortar MK 10)	
Navy	Torpedo Tube Mountings - Australian Destroyers	
Army	120mm RCL Guns (Mobile Mounting)	
Army	81mm Mortars	
Army	Malkara Rocket Motors	
Navy	Murawa Rocket Motors	
Navy	Rodinga Rocket Motors	
Navy	Rocket Motors Winnin	
Exp. USA	Harpoon Booster Rocket	
Army	Rapier Rocket Launcher	
Army	1/2 ton trailers	
Army	20 ton trailers	
Army	60 ton trank transporters	
Navy	2 ton Fire Fighting Vehicles	
Navy	5 ton Fire Fighting Vehicles	
Army	76mm Ordnance - Light Armoured Vehicles	
Army	Vehicle Alternators	
Navy	10 Man Recompression Chambers	
Navy	6 Man Portable Aluminium Recompression chamber	
W.R.E.	Liquid Oxygen Tanks - Blue Streak Rocket Project	
Army	105mm Light Field Guns (Hammel)	
Navy	Torpedo Ejection System Forgings	) Australian Submarine
Navy	Silent Pumps	) Corp. Pty Ltd - Adelaide
Navy	Firing Air System	)
Navy	76 mm Gun Barrels Oto Melara	
Army	105 mm Gun Barrels for Tanks	

SECTION 11

Types of Shells, Projectiles and Bombs Produced From 1924 - 1993

20 MM HE
20 MM Ball
20 MM SAP
40 MM HE
40 MM Tracer
76 MM HE
105 MM HE
105 MM Practice
155 MM HE
3" Mortar Bomb
3" Shrapnel
3" HE
3.5" Rocket Anti Tank
3.7" HE
3.7" Shrapnel
4" STAR
4" HE
4.5" HE
4.5" STAR
5" HE
5.5" HE
6" Proof Shot
6" Cast Iron Shot
6" Howitzer
8" Practice
8" AP
8" HE (Naval Shells)
9.2" APC
9.2" Practice Shell
9.2" HE
2 Pdr CNF Mk IV
2 Pdr Shell
6 Pdr Shot
6 Pdr HE Mark IV
17 Pdr QF Shot APC MK VIII

17 Pdr HE
18 Pdr HE
18 Pdr Shrapnel
20 Pdr HE/T
20 Pdr Smoke
25 Pdr HE
25 Pdr HE Streamline
25 Pdr Smoke
60 Pdr C.I. Shot
250 Lb HE Bomb SAP
500 Lb HE Bomb
Projectile A/S Mk VI

Shell Markings or Descriptions

HE (High Explosive)
A.P. (Armour Piercing)
Smoke
S.A.P. (Semi Armour Piercing)
A.P. Discarding Sabot Shot
APC (Ballistic Capped Shot)
Cannister Shot
Illuminating
Star Shell
White Marker
SU (Surface)
RE/X (Radar Echo)
Practice
Shot Proof
Shrapnel
Tracer
Ball

SECTION 12

List of Commercial Products Manufactured on Behalf of Private Industry in Post War Years to 1957

It should be noted that although the final production of completed items in general was carried out in the No 1 or No 2 Machine Shops, the other Workshops such as Woodshop, Plate Shop, Sheet Metal Shop, Forge etc, contributed to the finished products and had their own specific productions.

No 1 Machine Shop

1. Two Colour Press for Argus Newspaper
2. U.N.N.R.A. 15 Ton Ice Making Plants including Compressors
3. Wood Thicknessing Machines
4. Parkinson 4.5" Centre Lathes
5. KL Bulldog Tractor Components - 1000 sets
6. Jam Filling Machines
7. Golf Ball Core Winding Machines
8. Magnet Frames 73"
9. Magnet Frames for Tramways Motors
10. Banbury Mixers and Steam Chests.
11. Tennis Ball Moulds
12. Malcolm Moore Road Rollers and Wheels
13. Kelly and Lewis Gear Boxes
14. Canberra Aircraft Jigs
15. Chamberlain Tractor Components
16. Westminster Carpet Making Machinery (including Self Aligning Roller Races
17. Westminster Carpet Inserting Mechanism and Cam Shafts
18. Mill Housings, Ammunition Factory Footscray
19. Double Acting Hydraulic Presses C.A.C.
20. Power Press Frames Goetz
21. Roller Conveyor
22. Turntables for Power Shovels
23. Aluminium Moulds for Rubber Mattress
24. Cyclotron Components
25. V.S.O. Refrigerated Ice Receivers
26. Olympic Tyre Moulds

27. McGrath Trailer Turntables
28. Various Press Columns and Cylinders
29. Hydraulic Cylinders and Rams
30. Printers Roller Moulds
31. Extension Cone Mt Stromelo Observatory
32. D.S.L. Glass Ball Grinding Machine
33. A.R.L. 3500 HP Reduction Gear Box
34. M.H.T. Luffing Screws and Winches
35. A.C.I. Compressor Cylinders
36. Jolting Machines for Explosives Testing
37. Army Class Room Instructional Mountings
38. Components for Doxford Marine Engines
39. Marcy Rod Mill Components
40. Tractor Blade Lift Arms

No. 2 Machine Shop

1. U.N.N.R.A. Ice Making Plants including compressors
2. Microscopes Less Optics (Fire Control Section)
3. Victor 16mm Sound and Silent Projectors with Projector and Speaker Cases (Fire Control Section)
4. Parkinson 4.5" Centre Lathes
5. KL Bulldog Tractor Components
6. Wiltshire File Cutting Machines
7. Wiltshire Cutlery Grinding Machines
8. Tennis Ball Moulds
9. Malcolm Moore Road Rollers and Wheels
10. Wind Tunnel Components - including Suspension Nozzle, Nozzle Box etc.
11. Reconditioning various Diesel Engine Crankshafts.
12. Chamberlain Tractor Components.
13. Die Sets, Various
14. Seamaster Outboard Motors
15. British P.C. Reduction Gears
16. Steam Ironer Beds up to 33" x 108"
17. Power Press Frames - Goetz
18. Roller Conveyor
19. Aluminium Moulds for Rubber Mattress
20. Cyclotron Components
21. Olympic Tyre Moulds

22. McGrath Trailer Turntables
23. Variable Pitch Extruder Screws
24. Drill Chucks (Fire Control Section)
25. Machining S.C.O.A. Boxpok Locomotive Wheels
26. Werner Compressor Crank Cases
27. A.C.I. Compressor Cylinders
28. Repair of S.E.C. Turbine Rotors
29. Repair of S.E.C. Turbine Couplings
30. Components for Doxford Marine Diesel Engines
31. A.R.L. Variable Pressure Wind Tunnel, Fan and Casing
32. Parts for Fairway Scales
33. Shackles and Turn Buckles etc.
34. Acetylene Burners for Lighthouse Service
35. Long Nosed Pliers
36. Oleo Legs for Spitfire Aircraft.

Various Workshops

1. Electric Fires - Electrical Shop
2. Electric Toasters - Electrical Shop
3. G.A.F. Servo Motors - Electrical Shop
4. Deutsher Egg Beater Components - Sheet Metal Shop
5. Forgings for Propeller Shafts - No 1 Forge Shop
6. Electric Motor Lamination Dies - Toolroom
7. Die Line Gauges for Avon Engine - Toolroom
8. Radio Cabinet and Telephone Moulds - Toolroom
9. Folding Tables, Migration Dept - Woodshop
10. Furniture Containers S.&.T. - Woodshop
11. Beehive Frames - Woodshop
12. Acid Bottle Boxes - Woodshop
13. SAF Sewing Machine Patterns - Woodshop
14. Exhibits and Floats for Various Exhibitions - Woodshop
15. EFM Sewage Distributor - Plate Shop
16. Pontoons - Plate Shop
17. Collar Studs - Projectile Shop
18. Induction Hardening of Hammer Heads and Automobile Components _ Toolroom HT

SECTION 13

Personality Portraits

The factory history would not be complete without a picture of some of the World War Two personalities who, in the supervisory field as foremen or superintendents assisted, directed, controlled and in general dealt with a large mass of working men and women, secured their co-operation and achieved the required production targets in a time of crisis. Four such persons are listed and described as follows:

1. MR JAMES CHALMERS

Jim was born in Glascow on 2nd December 1889 and he served an engineering apprenticeship with the Singer Manufacturing Company on the Clydebank. With his apprenticeship completed Jim obtained his first job as a journeyman in the Clydebank shipyards and helped to build the first H.M.A.S. Australia. He then joined Harland and Woolfe's Diesel Marine Engine Works at Glasgow and then sunny Australia beckoned. By this time Jim had married Christina Munro and they had two sons James and Charles. The family migrated to Australia and arrived in Melbourne - on a wet day - in December 1926 and at this time James was 10 years old and Charles 8 years old. In later years James obtained work in private enterprise and joined the A.I.F. and served on 3.7 inch Mobile Anti Aircraft Guns, whilst Charles served an apprenticeship with Ordnance Factory Maribyrnong and became a Draftsman drawing 3.7 inch Gun components whilst older brother operated the guns. Jim's employment record with Ordnance Factory Maribyrnong is as follows:

13/5/1927	Appointed 1st Class Machinist in the Gun and Carriage Shop
24/11/1927	Appointed as a Leading Hand Machinist, G&C Shop
9/5/1929	Appointed Assistant Foreman under Mr Tom Hamilton, G&C Shop
17/6/1930	Appointed Temporary Foreman Grade "B" - G&C Shop
1/7/1935	Appointed Temporary Foreman Grade "A" - No 1 Machine Shop
7/3/1938	Appointed Permanent Foreman Grade "A" No 1 Machine Shop
3/11/1941	Appointed Senior Foreman Grade "A" No 2 Machine Shop
27/5/1943	Appointed as one of two Shift Superintendents controlling all of the factory trade-force at this peak period

1950's Appointed as Engineer Grade 3 in Charge of Factory Inspection and continued until retirement

Jim Chalmers was a very experienced and wise personality with a gift for arbitration and just decisions and he was very highly respected by all tradespeople, foremen, engineers and administrative staff within the factory.

2. MR CHARLES KINROSS

Charlie was born in Williamstown and the sea air may have been responsible for him serving an apprenticeship in marine engineering with the engineering firm of Robinson Brothers on the south bank of the Yarra River. During 1914-15 he worked on the fitting out of troop ships for World War One Service.

On completing his apprenticeship Charlie enlisted and left Australia during World War One, as a Corporal Mechanic in the 1st Squadron, A.F.C. and assisted in chasing the Turks back through the Sinai Dessert, Palestine and Syria.

He arrived back in Australia in June 1918 and returned to Robinson Brothers but left shortly after to work as an Aircraft Mechanic with C.J. Degaris. Incidentally Charlie was one of the first men to obtain a ground engineers licence in 1921.

In August 1930 he joined Ordnance Factory as a Sheet Metal Worker and he produced sheet metal aircraft components in the Gun and Carriage Shop.

In 1934 the Sheet Metal Section located at the southern end of No 1 Forge Shop was moved to Building No 25 which had then been vacated by Shell Shop Staff and Tradesman and Charlie was appointed as Foreman. The shop was divided into two sections, one being for general sheetmetal work and the other for the production of aircraft components and the construction of aircraft fuselages.

Six De Haviland Moth Fuselages were completed on behalf of the R.A.A.F. and components were produced for Waipiti, Avro, Bulldog and Moth Aircraft currently used by the R.A.A.F. at that time.

The Sheet Metal Section moved to a new brick building as its permanent home in 1939/40 and in May 1943 Charlie was appointed as the other Shift Superintendent along with Jim Chalmers.

In the post war period Charlie was the permanent Foreman Grade A, Sheet Metal Shop and he was supported by a "B" and four "C" grade foreman encompassed in both general sheetmetal work and die making for pressed metal components.

Charlie was also a proud father and justifiably so of a son who served overseas in the R.A.A.F. for a period of two years as a Spitfire Pilot.

3. MR PATRICK MC CORMICK

Pat was born in Toorak on 3rd March 1917 and spent his early years in Richmond and from 1933 to 1937 he served an apprenticeship as a Turner with Ruwolts Pty Ltd in Richmond and later he became a Journeyman producing Tyre Moulds as his specialty and he soon became the highest paid Turner at the company between 1938 and 1940.

In 1940 Pat joined the Royal Australian Navy for a full period of three days when it was discovered that he was a tradesman and was required to be in an essential industry and so he was despatched by the "manpower" people to O.F.M.

At O.F.M. he was interviewed by Engineer Arthur Hickey who closely questioned him as to the accuracy of tolerances to which he could work. Pat very quickly outstated Mr Hickey as to his work accuracies and was immediately employed in No 1 Machine Shop, Heavy Turning Section.

Pat's service record with Ordnance Factory Maribyrnong is as follows:

1940 Appointed as a Tradesman and later that year as a Leading Hand.

1941 Appointed as a Foreman Grade "C", 25 Pdr section, No 2 Machine Shop

1942 Appointed as a Foreman Grade "B" Bofors Section No 2 Machine Shop (Night Shift)

1943 Appointed as a Foreman Grade "A" Bofors Section - No 2 Machine Shop and at this stage he became the Commonwealth's youngest Foreman Grade "A" at the age of 24 years.

1945 - 1960

In the post war period in No 2 Machine Shop Pat dealt with 40mm Bofors, 17 pdr and 25 pdr ordnance and 4.5 inch Naval Ordnance and as Senior Foreman Grade "A" he fostered the production of Twin Bofors S.T.A.A.G. Mark 2, Mark 2* and Mark # Mountings for the Navy and another production was the Mark 7 Bofors, a conversion from the Army type travelling mounting to the fixed steel barbette mounting for the Navy.

In the early stages of his Foreman's career, Pat became Secretary of the Commonwealth Foremens Association and as Secretary he "stirred the possum" quite a deal. He was probably best known for his role as an innovator in both the post war Service and Commercial fields of production and a prime example was his machining set-up to produce variable pitch screws for the plastic moulding process.

1960's From the early 1960's he prevailed upon Mr Arthur Caldwell to agree that he should have a sub-professional appointment and upon a Public Service investigation he was appointed as a Senior Technical Officer, Grade 1 in the No 2 Forge Shop and was then rapidly promoted to STO 2.

1960's From the mid 1960's Pat as STO.2 in charge of No 2 Forge, gave that shop a great boost in the forging and machining of bombs and shells and this was attributed to his ability to innovate and finally in 1973 he retired from factory life.