

## **The development of Australian automotive design: General Motors- Holden 1923-1953**

*In 1948 Australia's own car, the 48-215 Holden was released. This paper explores the emergence of the Holden design team and its place in the Australian and international automotive design context. Located in Adelaide from 1923, Holden Motor Body Builders (HMBB) merged with General Motors Australia (GMA) in 1931 and not only established Australia's leading automotive company but also formalised automotive design in this country.*

*Holden's design section produced unique body styles, like the streamline styled All-Enclosed Coupé and provided solutions not only for dust sealing, ventilation and motor body strength but also solved complex engineering problems with innovative design during WWII. By the mid-1940s the GM-H design group were capable of producing a complete Australian car and this expertise elevated the Holden design team to a position of respect within the GM Corporation.*

*The initial designers were trained internally by one man, Herbert Wylie, who understood that good body design lay in precise drawings and not a chalkboard. The team he built, with American input, applied considerable knowledge and expertise to ensure the Holden car, when released in 1948, was exactly what the Australian market wanted. Design at GM-H evolved from American practice but by a small team who were provided the opportunity to be innovative and progressive.*

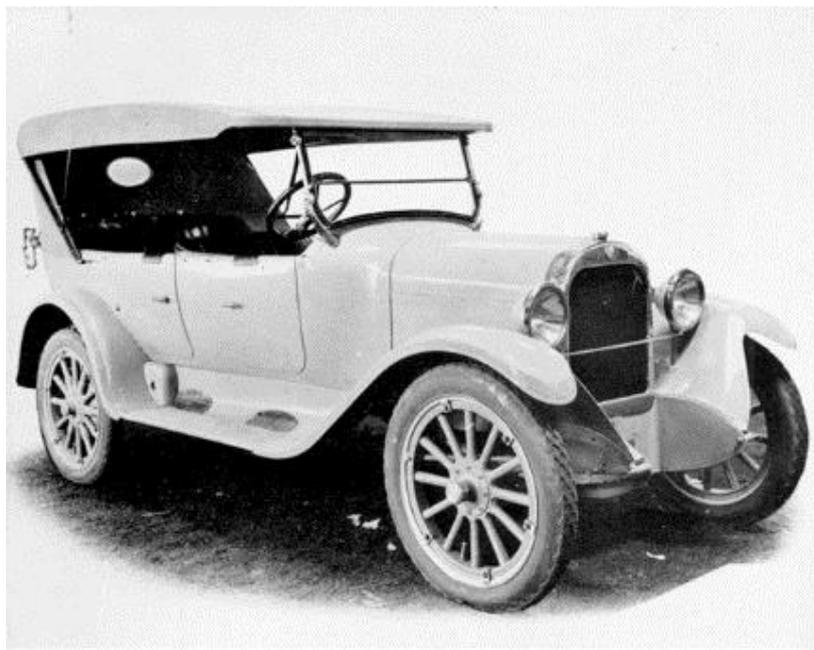
### **Early years 1917-1925**

The design of Holden motor bodies can be traced to 1917 when three men, Edward Holden, an engineer; Albert Cheney, a salesman; and Frederick Hack, a motor body builder came together to design Australia's first standardised motor body for a Dodge chassis.<sup>1</sup> This informal engineering effort, at the very creation of Holden Motor Body Builders, led directly to the establishment of a drawing office in 1923 at the firm's King William Street plant in Adelaide, South Australia.<sup>2</sup> The impetus for creating a body building industry in Australia can be traced to the Federal Government's decision to place an embargo on imported motor bodies, necessary to conserve valuable deck space on ships supplying munitions during WWI. A body industry had existed in Australia since Alex Smith established a motor body works in Melbourne in 1903. Holden's first body builder, Fred Hack, established his enterprise F T Hack & Co in Adelaide in 1905 and this firm provided machinery, men and expertise to the Holden family when they purchased Hack's firm in 1917.

Prior to 1917 motor body builders employed a master craftsman who both designed and oversaw the construction of a motor body. Most orders were single and were produced individually to suit a customer's tastes and needs. The first step was a rough sketch followed by a chalk outline, full size, on a blackboard or the floor. Patterns were taken, a wooden frame made, then the metal, steel or aluminium body, fixed to the frame. This process might take 2-3 months. A standardised body enabled one design to be manufactured in quantity and in Holden's case fit a variety of different motor chassis. By 1920 Holden were producing about 40 bodies per day which increased ten-fold by 1928.<sup>3</sup>

The design of Holden's first body was along traditional lines, the work performed by Hack who would have produced a full size working drawing (a cant) on paper. This approach served Holden well until detailed layout drawings began to arrive from the various GM divisions, Buick, Chevrolet and Oakland. In 1923 Holden had signed an agreement with GM to supply all their Australian body needs and this required Holden to produce bodies that resembled the American style. Fortunately for Holden they were able to secure the services of Herbert Wylie, an Australian, recently returned from the American Ford Company where he had been fully trained in layout drafting. Wylie had been a coach and motor body builder at Duncan & Fraser's works in Adelaide but following his wife's death in 1919 went to Canada to learn new skills. Wylie established Holden's first drawing office in the tool room, employing his son, Thomas and an apprentice, Charles Phillips, as trainee draftsmen. By 1925 a new purpose-built drawing office was operational with full size layout drafting tables and chalkboards. It was here Wylie and his young team, now numbering four, were

preparing working drawings using the Mercer 10-inch grid system.<sup>4</sup> This system enabled un-dimensioned drawings to be produced for many different chassis, quickly and accurately.



**Figure 1** Holden standardised body fitted to a 1923 Dodge Chassis.  
Holden Ltd image (from private collection)

### **Emergence of a Holden design team 1926-1934**

In 1926 Holden expanded by building a new facility in Woodville, Adelaide. This plant produced the total GM requirements and eventually replaced the King William street plant. A new larger drawing office, now part of a formalised engineering department (known as the Development Department) under Kingston (King) Stuart, was established at Woodville and by 1928 employed around ten men and women. Stuart had commenced in 1924 as a materials controller at Holden and in 1928 became the Assistant Manager of Development under Edward Holden. The drawing office at this time included additional trainees Hartley Chaplin, Valentine (Val) Stacey, Roy Rainsford and Reginald (Reg) Hall. All these men, except for Wylie who passed away suddenly in 1933, would play an increasingly important role in the design and development of Holden models, particularly the first Holden car in 1948.

Charles (Charlie) Phillips became the chief body draftsman, Hall the chief body engineer, Stacey headed the styling department, Rainsford became a body engineer before becoming Chrysler Australia's chief engineer, Chaplin became the CKD (Completely Knocked Down) body engineer and Thomas Wylie the chief production engineer at Woodville. Hall had started in Woodville as a 14 year old mail boy in 1928, then gained a position as a trainee draftsman under Wylie and with encouragement commenced a seven year night course in

engineering at the Adelaide School of Mines.<sup>5</sup> By 1933 Hall was a layout draftsman and by 1939 the chief draftsman. Hall had a skill of being able to visualise plan, side and end views on a layout drawing in 3-dimensions, he also worked rapidly. It is said that an American draftsman placed a bucket of water at the end of his drafting table, 'to cool his pencil' during the development of the first Holden.<sup>6</sup> Hall is also credited with developing 'paper drafting strips' as a fast and accurate method of transferring layout dimensions to detail drawings.<sup>7</sup> He was appointed assistant body engineer in 1947, then Assistant Chief Engineer, a position he held until his retirement in 1977.



**Figure 2** HMBB King William Street Drawing Office c1927.

Left to Right. Charlie Phillips, Val Stacey, Bert Wylie, Hartley Chaplin, Tom Wylie and Roy Rainsford.

Holden Collection - Mortlock Library SA BRG213/1/3/114

In 1926 Holden faced a new challenge, colour. The employment of Harley Earl by General Motors (GM) introduced the concept of colour harmony, developed for GM by the Du Pont paint company and implemented by Earl's new art & colour section. Vibrant two-tone paintwork was developed for the 1927 American La Salle and Chevrolet models. Holden were expected to follow this new trend on the Australian Chevrolets. Barbara Sandford was employed by HMBB to 'take charge of the colour research department at the Woodville plant' becoming the company's first 'stylist'.<sup>8</sup> Sandford's work first appeared on the 1930 Chevrolet and Buick models that were released at the end of January 1930.<sup>9</sup> The Adelaide Register said the cars displayed 'complete harmony between the exterior paint work and the upholstery', and that the work was performed 'by noted English woman colour harmonist'.<sup>10</sup> It is unknown when Sandford joined Holden or if she had any art training but it was likely she prepared the Chevrolet two-tone paint schemes. Her standing in Adelaide's society was high

as she often appeared in the press, attending gala occasions and organising charity balls and other functions.

Holden did employ one art trained draftsman, Val Stacey, who studied at the SA School of Arts & Crafts from 1924 to 1926 and completed a design honours course at night school in 1929.<sup>11</sup> Stacey's role as a designer did not surface until 1935 when his name appears on the design of the all-enclosed coupé. Given his training it is likely he was involved in modifying the 1929 Vauxhall Hurlingham speedster body style to fit the 1931/32 Chevrolet chassis, thus creating an iconic Moonlight Speedster. Also released at this time was a Moonlight Coupé, a sporty 2-door model that showed several American styling keys such as a short boot, V-instrument panel and windscreen.

### **The Hartnett Years 1934-1940**

From 1923 General Motors Australia provided HMBB all manner of support. Experts like Ronald Evans arrived to facilitate the design and procurement of the company's first large panel press in 1926 and after GM purchased HMBB in 1931, Holden personnel began travelling to America to learn new techniques. Soon conflict arose between the joint Managing Directors, Edward Holden and American, Augustin Lawrence. The problem lay in Lawrence's insistence that each GM model body be the same as its American counterpart. This was impossible to achieve given some models, particularly roadster styles, had a production run of less than 50 bodies while American production runs by comparison numbered in the thousands.<sup>12</sup> The appointment in March 1934 of Laurence (Larry) Hartnett (later knighted), as the overriding managing director, defused the situation. Hartnett, a proven problem solver, was sent to Australia to either make GM-H viable or close it down. Fortunately for GM-H, Hartnett, an Englishman and a trained engineer, saw Holden's predicament and actually encouraged the designers to be inventive.

The merger of HMBB and GMA saw the creation of two Holden engineering departments, one at Woodville SA and a second in South Melbourne that had been created by GMA at their assembly plant. The South Melbourne engineering office was headed by English engineer, Clifford Kaye (1898-1989) and was responsible for special commercial body design. Kaye had been originally employed by the GM Export Office having previously been the chief draftsman at Dunlop Rubber and Principal at the Melbourne School of Mechanical Drafting.<sup>13</sup> Following the creation of GM-H the two engineering departments worked independently, Woodville responsible for all models produced in South Australia, and South Melbourne producing one-off or very low volume special purpose bodies. Both Kaye and

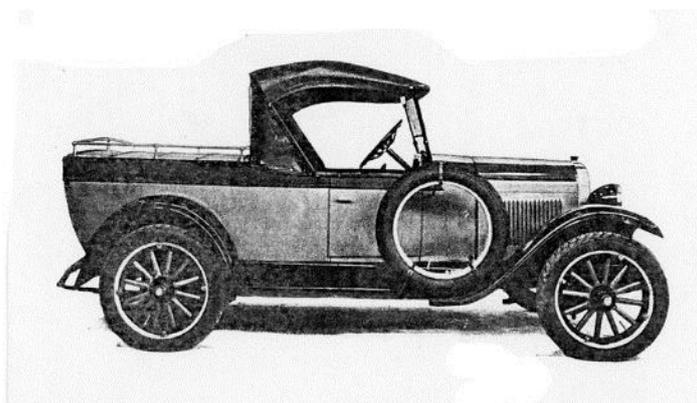
Stacey would accompany Hartnett to America in 1944 to sell the Australian car to the GM executive.

With the appointment of Hartnett as MD, little did the GM-H board realise the turmoil he would cause. Holden's organisational structure was cumbersome and its chairman Edward Holden 'interfering', issues that the merger did not resolve. While Holden had often micro-managed company decisions, including vetoing the colour of floor mats, Hartnett let his designers get on with it. Woodville's engineering department was able to further commonise body design, for example, incorporating non-GM brands like Plymouth, Austin and Willys into a single motor body. As Hartnett summed up the Woodville design operation, 'the men at Holden performed miracles of improvisation. In fact, their whole operation was little short of miraculous. It was unbelievable that they could get advanced drawings in May and have the new design off the production line in time to meet the new chassis imports – after the following January'.<sup>14</sup> The continuation of two engineering departments may appear strange but Hartnett had a longer-term view. He recognised Melbourne offered more as a head office site and set about purchasing land at Fishermans Bend.<sup>1</sup> It would be here that a single engineering department would be built from the two existing departments in 1943.

Much has been written about the Australian coupé utility design, defined as a vehicle having the rear side panel running from the door edge to the tailgate and utilising the coupé roof. It is generally understood that Ford Australia's chief draftsman/designer, Lewis Bandt, designed the first 'Ute' following a farmer's request for a dual-purpose vehicle – one that would carry his produce and also be suitable for Sunday church. But was Bandt's design new? Ford Australia had been selling a roadster utility built by various small bodybuilders that used this exact side panel design but with a soft-top roof from the T-Ford Roadster. Even earlier (1926) the GMA South Melbourne plant had produced the same design on a Chevrolet chassis, thus raising the possibility that the Australian utility style was a GMA design. Prior to 1925 an engineer George Hamilton-Grapes published a design for a 'Utility Motor Body' that combined 'a chassis for general utility passenger and commercial motor vehicles'.<sup>15</sup> No evidence that this streamlined boat-tail body was built exists.

---

<sup>1</sup> Fishermans Bend spelling has been used as it is the accepted spelling today. Previously Fishermen's Bend, Fisherman's Bend and Fishermans Bend were common usage. GM-H previously favoured Fishermen's Bend.



**Figure 3** 1927 Chevrolet Roadster Utility  
Holden Ltd. From 1927 GMA sales brochure.

Holden's coupé utility, fitted to Chevrolet and Bedford chassis from September 1934, followed the Ford design closely and Holden have been accused of copying. In reality both vehicles were developed at the same time to meet the same market demand. Hartnett claims he had a role in the development but as he did not arrive in Australia until March 1934, there was little opportunity for him to play a part. Hartnett does suggest the design came from the South Melbourne plant, 'John Storey (went to our) body service depot and asked the chaps to design a utility with a modern sedan-type front end'.<sup>16</sup> Whoever made the first mock-up is by-the-way, as the design would have required exact drafting at Woodville in order to prepare the large press tools, as the coupé utility bodies were all produced at the South Australian plant.<sup>17</sup> The coupé utility design has been copied all over the world including in America and Britain.

One major hurdle for the Holden designers was that their body design was restricted to the body from the firewall rearwards. When HMBB first commenced building bodies they produced a complete unit from the front doors to the rear end panel. The grille, bonnet, cowl, fenders, valances and running boards all arrived from America as part of the chassis in a CKD pack. Once a press was installed with a large enough capacity (1924) the cowl was pressed locally. In 1939 GM-H were tooling up to produce rear fenders but war intervened.

The inability to design a complete motorcar body thus tempered Holden designers' imaginations. However, in 1935 some freedom was exercised with the release of the 6-cylinder sedan and all-enclosed coupé bodies. Trumpeted as 'Originality ... for Australia's Sake', in a 1936 article published by Holden entitled The story of Australia's growing industrial independence, the coupé design was described as a product of 'knowledge and cleverness'.<sup>18</sup>

The principal designers were Stuart, Phillips, Wylie and Stacey.<sup>19</sup> Stacey was the stylist, preparing a sketch of a two-door coupé with the roof sweeping in a streamlined curve to the rear bumper. A feature of the all-enclosed coupé was the patented rear-folding seat.<sup>20</sup> The seat back folded down and at the same time the seat cushion lifted up providing a level floor space into the boot. The aim of the model was to provide both a convenient commercial traveller's vehicle and an enclosed two-door model that reflected modern styling. To some extent the 6-cylinder sedan body followed the European 'Airline' style rather than the American 'Bustle-back' style. Holden used this patented idea on their first station wagon in 1955 and it was adopted by most producers of station wagons through the 1970s. The enclosed coupé was successful with over 2,800 bodies produced in 1935 and 1936 for Buick, Chevrolet, Oldsmobile and Pontiac chassis. Two versions were produced, one for 6-cylinder chassis and a longer version for 8-cylinder chassis.

In 1937 the body was totally restyled in line with Holden's move to all-steel body construction. The new method of construction enabled the pillars to be thinned down and the roof turret to be smoothed out creating a more streamlined body. 'The first effort was styled by a draftsman, the second by a stylist', commented Leo Pruneau, Holden's chief stylist from 1974 to 1986.<sup>21</sup> Again two versions were initially produced on the same chassis line up; however, the Vauxhall 25 chassis was also used and in 1940 six convertible top versions were produced for the Vauxhall. These featured a folding island canvas roof that ran from the driver's seat to behind the rear seat. The enclosed coupé style was also adopted by Chrysler in Australia for both Dodge and De Soto chassis in 1937 and by Ford Australia on their V8 chassis in 1939.



**Figure 4** All-Enclosed Coupé body on a 1938 Buick chassis  
Holden Ltd (from a Buick sales brochure)

The 1930s saw Holden's design group move from two small teams of draftsmen to a functioning engineering office that embraced both body engineering and styling. After the depression Holden began to recruit drafting juniors under Charlie Phillips. In 1934 GM-H Woodville hired mechanical engineer, Norman Pointer, a development engineer with Forward Downs, an agriculture machinery company where Pointer had designed and

overseen the construction of Holden's first large panel press in 1925. In 1935 Pointer became the technical engineer on the GM-H Fishermans Bend construction team and during the war oversaw the Gray Marine Diesel project at Pagewood NSW. He joined the Holden team in America in 1943, returning to Fishermans Bend as chief engineer in November that year. Pointer would then act as Hartnett's change agent to merge the SA engineering group into the Victorian one.

By 1935 the Holden designers had developed the capacity to make an all-steel body for Chrysler, producing over 2,000 Chrysler C6 and Plymouth PJ sedan bodies. Body builder T J Richards held the majority of Chrysler bodywork but could not provide all Chrysler's needs. In 1937 the first all-steel body for GM was produced but it differed from that designed by Fisher Body in America. The installation of a large Hamilton press to stamp out the single roof panel also enabled the designers to produce a single side frame. This approach eliminated eight weld joints and provided an accurate door opening space. The result was vastly improved dust sealing, door fitment and alignment. A further advance was made in 1938 when the 'single-unit' body was built for the Vauxhall Wyvern. This unitary construction design was first used by GM at Opel (GM subsidiary in Germany) in 1935 but had its origins at the Lancia company as early as 1922. The unitary constructed body eliminated a need for a chassis by structurally adding extensions onto the body shell that held the power plant and suspension. In an unusual move Holden fitted this body to a chassis, defeating its design purpose, possibly to simplify manufacture as the commercial Vauxhalls required a chassis. It was these design features; all-steel bodies, single side frame and unitary body, coupled with many years' experience of producing rugged bodies to suit Australia's rural road conditions that placed the Holden body designers in an excellent position to produce the 48-215 Holden car in 1948.

### **The Holden Car**

Following the untimely death of Wylie in 1933, Phillips continued the in-house training of automobile draftsmen. Training in layout drafting had only been available at the Working Men's College (now RMIT University) in Melbourne up until the mid-1930s, after which it was offered at the Gordon Institute in Geelong and at the Richmond Technical School. Experienced GM-H and Ford draftsmen taught night classes well into the 1970s when computer graphics made an entrance.<sup>22</sup>

As the 1930s ended Hartnett began discussing complete car manufacture, a proposal 'Car Manufacturing Study' was completed in April 1940 by the Fishermans Bend Engineering department.<sup>23</sup> This proposal marked a shift in engineering and design at GM-H. To produce a complete car, mechanical engineers were required and in 1939 few were employed. W J

(Jack) Rawnsley completed his engineering studies at South Melbourne Tech and joined Holden in 1938 as a draftsman, Geoff Roper studied at the South Australian School of Mines and followed Pointer from the Forward Downs company, joining GMA in 1926 and arriving at Fishermans Bend in 1935 to become part of the plant construction team. Robert Abbot (1913-1995) was educated in engineering at Melbourne University and would become the GM-H chassis engineer before joining British Motor Corporation (BMC) as the chief product engineer in 1958 and then CEO of the Commonwealth Aircraft Corporation in 1969.<sup>24</sup> After 1939 additional mechanical engineers joined GM-H, men like Frederick James, who grew up in Western Australia, graduating with honours in engineering at the University of Western Australia in 1938.<sup>25</sup> James was a keen motor racing enthusiast, building his own cars, as well as developing other racers' cars like the 1939 Grand Prix winning MGTA.<sup>26</sup> In 1939 James joined Vauxhall Motors engineering department in England where he became part of the development of the Churchill 12-cylinder tank engine program but he returned to Australia to join Holden's Fishermans Bend engineering group where in 1944 he was given the responsibility of developing the mechanical specification for Hartnett's proposed Australian car.<sup>27</sup> This led to a stint in Detroit with the Australian design team on the Holden 48-215 design project. On return to Australia, James worked in the engine development group rising to become Holden's engine engineer and in 1962 worked on the new 6-cylinder 'Red' engine followed by the design of Holden's V8 in 1966-68.



**Figure 5** 48-215 Holden body showing unitary (front frame) members bolted to the body. Left to right. Tom Wylie, L Boland, B Newland, King Stuart and Reg Hall  
Holden Ltd image (From private collection)

Another engineer to join GM-H during wartime was Charles Paterson. Paterson originally worked for the family civil engineering company, Paterson Bros Pty Ltd, spent five years with Howard and Consultants, design engineers, before joining Holden's Pagewood plant Gray Marine Diesel project in 1943. In 1945 he transferred to Fishermans Bend, assigned to the Australian Car project, went to Detroit the following year to learn experimental testing

procedures, returning to become Holden's experimental engineer. These men, coupled with the body designers, came together in 1943 under Hartnett's direction to produce a design for an Australian car.<sup>28</sup>

### **A styling department emerges**

With the exception of the appointment of Sandford around 1927, Holden had no formal styling group. In 1938 a young GM Stylist was despatched to Australia. Hartnett had agreed to Franklin Q. Hershey's trip, which he believed would assist GM-H to adopt the American approach to new model development, presentation and approval. Hershey (1907-1997) was a born artist who found work in 1928 with Walter M Murphy & Co, then Hudson and GM's Pontiac division where he restyled the 1933 models. In 1936 Hershey was appointed the chief stylist for General Motors Overseas Operations (GMOO). His first task was the styling of the new unitary construction design Opel Kapitän. Hershey then spent two years visiting Vauxhall, Opel and Holden as the GMOO styling supervisor. His trip to Australia took place from April to November 1938 and was to 'help organise a small styling staff there. I trained the design staff and also helped them pick colours and fabrics and make models'.<sup>29</sup>

Almost immediately afterwards Holden employed international stylist, Charles Beauvais who had immigrated to Melbourne in early 1937, joining a small Melbourne firm, Terdich Bros Body Works.<sup>30</sup> In 1938 he joined General Motors-Holden at Fishermans Bend as a stylist/designer in the special body design engineering section. This group was responsible for low volume body design and during the late 1930s produced unique styles for a mail coach, parlour coaches, a Governor General's convertible and fire tenders.<sup>31</sup> In late 1940 Beauvais joined the Argus as staff artist-engineer and in 1948 established the Industrial Styling Company in Sydney. He claimed he was 'capable of reshaping things into forms attractive to the eye without transgressing mechanical laws or upsetting practical requirements'.<sup>32</sup>

Further appointments were made in South Australia where Frank (Gill) Mathwin, Horace Alfred (Alf) Payze and Jack Burgan came together to form an art studio under Phillips, then the Woodville body design engineer. Phillips reported to Rainsford, Woodville chief engineer who in turn reported to Pointer, GMH chief engineer at Fishermans Bend. Former engineering personnel, King Stuart and Tom Wylie moved to the production side of engineering, Stuart becoming the production engineer and Wylie the planning & tooling engineer. As the Australian car project started up in 1945 Hartnett moved Rainsford and his Woodville group to Fishermans Bend with Rainsford responsible for styling and body design.<sup>33</sup> Phillips took on administration, Mathwin styling, Hall body design and Roper

drafting. This was short-lived as an American engineering team, headed by Russell Begg, arrived in 1946.

The intervention of the American team has until recently obliterated the Australian contribution to the design of the 48-215. The Australian team who went to America and those who remained at Fishermans Bend in 1945 made a significant contribution. While the mechanical and chassis components were clearly of American origin, the body structure (apart from the unitary members- the front frame), packaging and trim development were almost exclusively Australian designed by Payze, Mathwin, Burgan, Kaye, Wylie, Abbott and Stacey.<sup>34</sup>

### **Expansion**

With the arrival of the prototype Holdens in 1947 along with Begg and his team of engineers, GM-H engineering doubled in size. In addition, draftsmen, experimental test drivers and fabricators were hired. A new engineering facility was erected to accommodate engineers, draftsmen, clerical staff, mechanics, machinists, panel workers, trimmers and painters. In 1952 the department again expanded, adding 50 new staff, additional equipment and an extended building. In February 1952 Charles Lewis replaced Begg as chief engineer, and by this time many American designers had returned home. Lewis had worked for Oldsmobile and gained experience in special styling projects before being assigned to the GM-H car project as a chassis engineer.<sup>35</sup>

As 1952 closed, the Holden design team was preparing for the next new model, the FE Holden. This featured a radical restyle of the body with essentially the same mechanicals as its predecessor – the FJ Holden. Phillips with assistant Hall did the body design with Mathwin and Payze providing the styling. The front frame assembly was all new and designed by Thomas Molnar, a young engineer who had joined GM-H in 1952.<sup>36</sup> GM by this time had assigned Glen A Smith as a GMOO liaison stylist to ensure the GM product round the world retained the same key themes. Smith would spend up to three months at Holden, Opel and Vauxhall advising and assisting.



**Figure 6** Holden 48-215 prototype in Michigan USA 1946.  
Holden Ltd - Private collection

### **Conclusions - Holden as a Design Centre**

The period 1917-1953 was one of both growth and development for Holden's designers. The original team of five trainee body draftsmen had developed their skills at Holden, overseas and at technical institutions, to become capable of designing Australia's top selling motor car by 1953. The five trainees would all leave their mark in the Australian automotive design field, they would also train and mentor the next round of engineers and stylists at Holden and other automotive companies. Holden's design team was successful as it had access to the GM Corporation expertise but was left to develop innovative solutions that suited the local environment. The high degree of design skill exhibited at HMBB was a factor in Edward Riley, GMOO chief, over-riding other suggestions in order to confer the name 'Holden' on the 1948 Australian GM car.

GM has fostered few design centres outside Detroit: Although Holden was the smallest, over time proved it was capable of producing world-class cars. The VB Commodore, VS Commodore and VE Commodore owe their success in large part to the heritage of innovative design that developed in the first 36 years. Today, Holden's design centre produces concepts and show models equal to any design centre for GM divisions round the world and despite the closure of Holden's manufacturing centre in 2017 will continue to do so.

- 1 Albert Cheney, *From Horses to Horsepower*, (Adelaide, SA: Rigby, 1965) 150.
- 2 Thomas Wylie, *Correspondence to King Stewart, in private files of D K Wylie*. Adelaide SA, 1981).
- 3 *Body by Holden*, in *Motor Body Deliveries 1917-1949*. (Adelaide, SA: General Motors Holden's Ltd. 1949).
- 4 George J Mercer, *Motor body engineering; a treatise on the engineering of modern production methods in the American motor body industry*, (Philadelphia: Ware Bros. Co, 1928).
- 5 M Farr, "The Holden Boffin who beat Rolls Royce," *The Australian*, 1977, 4 April 1977.
- 6 Told to author by R Hall c1982 during research for *The History of Holden Since 1917* (1984)
- 7 Interview with Phil Zmood, Chief Stylist GMH, during research for *100 Years of GM in Australia* (2001)
- 8 "To select car colours," *The News* (Adelaide), 24 Dec 1929.
- 9 "Woman arrangers colour harmony of Chevrolet cars", *The Register* (Adelaide) 29 Jan 1930
- 10 "Woman arrangers colour harmony of Chevrolet cars", 29 Jan 1930
- 11 "School of Arts & Crafts Exam Results", *Observer* (Adelaide), 21 Dec 1929.
- 12 The 1927 Pontiac Standard Roadster 42, and Sports Roadster were 47.
- 13 "The first of many...", *GMH People*, (Fishermans Bend, Vic: GM-H, April 1951), 8.
- 14 Laurence Hartnett, *Big Wheels and Little Wheels*, (Boronia Vic: Wildgrass Books, 1981) 95-96.
- 15 George Hamilton-Grapes, "Utility Motor Body", *The Australian Motorist*, (Melbourne, Vic: Australian Motorist Newspaper Pty Ltd, June 1919), 360.
- 16 Hartnett, *Big Wheels and Little Wheels*, 95-96.
- 17 1934 Production 10 Chevrolets, 1935 496 Chevrolets and 58 Bedfords.
- 18 *The Changing Trend*, (Fishermans Bend Vic: General Motors-Holden's Ltd, 1936), 9.
- 19 Stuart, Wylie & Stacey named on All- Enclosed Coupé seat patent. Phillips name provided by George Wallis, Woodville draftsman who commenced in 1933.
- 20 Wylie, T., K. Stuart, and V. Stacey, *Reversible seat and squab*. 1935, Google Patents.
- 21 Norm Darwin, Interview with Leo Pruneau, Woodend, Vic, 2014.
- 22 Lewis Bandt, Ford's Chief designer taught at the Gordon part-time from 1934, Bill Mapleston, a GM-H draftsman taught at RMIT in 1935-37, T R Buchan of GM-H at Richmond TS in 1937-1938 and Norm Carroll taught at the Batman TAFE through the 1970s.
- 23 GM-H Engineering, *Car Manufacturing Study - Technical Aspects of the Australian Automobile Market*, (Fishermans Bend Vic: GM-H, 1940).
- 24 "R L Abbot", *GM-H People*, (Fishermans Bend, Vic: General Motors Holden's Ltd., February 1959).
- 25 Steve James, "Holden Engineering legend provided oomph", *The Age* (Melbourne), 8 August 2007.
- 26 Alan Tomlinson won the Australian Grand Prix in an MGTA at Lobethal on 2 Jan 1939
- 27 Chief Engineer, Roy Rainsford, Fred James and Reg Hall are the only engineers named on the Project 2000 report dated 5 June 1945
- 28 Laurence Hartnett, *Memorandum to GM-H Directors and Chief Engineer*, (Fishermans Bend Vic: GM-H, 9 Dec 1943).
- 29 J M Fenster, "Glory Days,.." *Automobile Quarterly*, (New York, USA: Automobile Quartley, 1989, Vol 27, No. 1) 23.
- 30 "Trade Notes", *The Coach and Motor Body Builder*, (Sydney, NSW: Bishop Bros, February 1937), 237.
- 31 Photographic Album, *Commercial Body Plant Photos*, (Fishermans Bend: General Motors- Holden: Fishermans Bend, 1938-40).
- 32 S Davidson, *Guide to the Charles Frederick Beauvais Archive*, (Sydney, NSW: Powerhouse Museum, 1998), 4.
- 33 GMH, *GM-H Organisation Chart*. (Fishermans Bend, Vic: General Motors Holden's Ltd, 1945).
- 34 Kaye and Stacey initially went to America in August 1944 but returned after 10 months and Wylie and Abbott arrived in the USA in February and returned after 5 months to work on the Australian program. See various documents at Mortlock Library in "The Holden Collection" BRG 213/65/1-10
- 35 *Chief Engineer appointed to Board of Directors*. People, 1953. March, Fishermans Bend, Vic : GM-H, 2
- 36 Thomas Molnar, *My 7 Years with General Motors-Holden's in My Second Life*, unpublished biography, (Port Macquarie NSW: Tom Molnar, 1988).