

Development of the Melbourne Engineerium

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SUMMARY The Melbourne Steam Traction Engine Club plans to establish a museum - The Melbourne Engineerium for the display of working examples of historic steam plant, internal combustion engines and associated equipment.

The museum will have a strong engineering orientation and there will be a logical historical progression to reflect significant developments in design and manufacture.

Installation of the engines and provision of services to enable them to be operated readily will necessitate a more sophisticated design than found in conventional museums.

Two sites in the Dandenong Valley Metropolitan Park are being discussed with the Melbourne and Metropolitan Board of Works. The larger site is preferred by the club as it will enable greater flexibility, engines could be displayed by type in separate buildings and ploughing and similar demonstrations could be conducted regularly.

1 INTRODUCTION

The Melbourne Steam Traction Engine Club Ltd. has been in existence for 21 years and its overall objective is the preservation and demonstration of steam and oil engines of historic interest. In recent years the need for permanent facilities in which to display both club and member owned exhibits has become pressing. Agreement in principle has been reached with the Melbourne and Metropolitan Board of Works for a permanent site within the Dandenong Valley Metropolitan Park. One of the sites with substantially different areas is likely to be made available to the Club and the two different museum designs which have been developed will be discussed.

The part of our engineering heritage which the Club will preserve and demonstrate and the manner in which the operating exhibits will be displayed in the museum to be called the Melbourne Engineerium will be described.

2 HISTORY OF THE CLUB

The Melbourne Steam Traction Engine Club was formed in 1963 by a small group of people, some of whom owned steam rollers and traction engines, which had become commercially redundant.

Membership grew steadily and much steam equipment was acquired by members in the next few years.

The club was fortunate enough to secure the use of a paddock at Wantirna in 1968 and conducted its first public rally there in November, followed by another the following March. This latter event has continued on the Labor Day weekend ever since.

The first rally saw the introduction of early internal combustion or "oil engines" and this activity has accelerated in recent years.

The club became incorporated in 1976 which gives

the members protection in a number of ways and allows the club to be officially recognised. The club seeks to foster interest in the preservation of examples of steam plant, internal combustion engines and associated equipment, the maintenance of historical data and the presentation of operating machinery during public exhibitions. At the discretion of the Committee, club owned engines are available for members to restore and or maintain and display as appropriate.

The club subscribes to a large number of journals and these are made available from its library.

Working parties are regularly held to upgrade and maintain existing facilities. A monthly Newsletter is produced on club owned equipment, and contribution to any part regarding editorial and production of the Newsletter is always welcome.

The "romance of steam" has almost universal appeal but as indicated more than this is captured within the club. All members have a particular appreciation for past power engineering. Not only are they concerned about preservation of equipment and records, they also want, as far as is practical to present dynamic exhibits which are both appealing and educational.

The club provides engineering fellowship and an opportunity for people from all backgrounds to be involved in a broad spectrum of related activities. Much of the equipment collected reflects a remarkably efficient use of limited materials and an elegance of design. Also, the club's collection of historical engines reveals substantial innovation as well as some quite original development. Involvement with the historical engines and plant found within the club develops an appreciation of past engineering skills. In turn, the club intends through the construction of the museum which will house working exhibits to bring a part of our engineering heritage alive and consequently to inform and educate.

3 THE CURRENT SITUATION

At present the club leases an area of some 4.5 hectares. Temporary club meeting and storage rooms together with a larger museum building which houses the stationary steam engines have been constructed. The museum is at present adequate for the display of the various stationary steam engines in a manner where they will not deteriorate and where they can be operated by steam, virtually on demand. The club now has a large number of additional stationary engines and mobile plant for which there is no suitable storage and it must therefore be stored outside, and in the long term this is unsatisfactory.

Virtually the entire site, including the museum area is flood prone and this precludes further development. In fact during the winter months much of the area is inaccessible and as there is really no working space undercover, restoration work at the site is virtually limited to the summertime. The net result is that most of the exhibits can only be displayed over the three days of the annual rally in March.

Whenever possible, the Club accepts invitations to display select items of equipment at appropriate venues.

4 SIGNIFICANT EXHIBITS OWNED BY THE CLUB

The club owns sufficient items of engineering significance to establish a museum in its own right and these will be complemented and extended by additional items owned by club members. Some of the more significant of these, because of important engineering design or rarity, are listed below.

Buffalo Springfield quick-reversing hot asphalt 3-point roller, steam powered restored and operating. Believed one of only two existing in the world. Made in USA WT 12 ton.

Ronaldson Bros. & Tippett 3 H.P. single cylinder horizontal Hot Bulb engine. Made in Victoria. Restored and operating.

Buchanan & Brock compound tug engine marine type. Made in Melbourne. Restored and operating.

Marshall Compound Instructional horizontal steam engine. One of 2 built and only one existing. Restored and operating.

Robinson wooden beam overhead workshop gantry crane, manufactured in Melbourne, hand operated in good order, not erected.

John Fowler Ploughing Engine steam powered. Restored and operating. WT 27 ton.

Kelly & Lewis Bulldog agricultural tractor manufactured at Springvale. Restored and operating.

McDonald Diesel road roller, single cylinder manufactured at Richmond. Restored and operating.

Crossley single cylinder horizontal engine, convertible to distillate, petrol or gas fuel as required. Instructional engine restored and operating. WT 5 ton.

Johnston No. 4 portable steam engine. Made in Melbourne. Only one existing, under restoration 90% complete.

The following items have been lent to the Club in perpetuity :

Linde, 30 ton, horizontal ammonia compressor with nominally 6m, rope driven flywheel, complete but dismantled.

Willans open crank 'A' frame air blast injection diesel generating set, complete but dismantled.

5 MUSEUM OBJECTIVES

The museum's objectives were defined some years ago as a comprehensive long term future plan was seen as critical. The Engineerium is an apt single word title for the museum which unlike conventional ones or those of the pioneer, community or vintage transport type will feature only working examples of power engineering and related engineering principles. The objectives for the museum should ensure that it will not duplicate any other in Victoria and recommended 'museum ethics and practice' (McDonald et al, 1982) will be observed.

It is appropriate to place the Club's objectives for its museum in context. Basically it is expected to complement the relevant sections of the Museum Victoria by display or a more extensive and comprehensive range of generally larger operating exhibits. The museum will not be based on a historical site but rather very close to the demographic centre of Melbourne and therefore should be accessible to a large population. Education about the engineering principles embodied in the exhibits is considered most important and it is intended to cater for both specific interest groups and the general public.

The museum will incorporate the following :

5.1 Activities

- i Heat engines of all types and allied equipment as applied to commercial, industrial and local agricultural activities. (As a general rule, engine power will be less than 100 b.h.p. (75kw)).
- ii Self propelled road construction and agricultural prime movers.
- iii Period workshop.
- iv Maintenance of related documents.

5.2 Excluded Activities

Railway over 24" gauge, horse-harness, tramways, vintage cars and fire engines for example. Any societies representing these interests would of course be invited to rallies or other special events but there would be no allowance for permanent display of such exhibits in the museum.

5.3 Historical Time Period

Australian and Victorian built exhibits will be given emphasis. The time period will be to within 30 years of the present and will move forward so next year it will be for equipment built up to 1955.

5.4 Exhibits

All restored equipment will have safety fences to protect the public and will be on permanent display - even if not operating. Owners or custodians can operate mobile equipment when they wish and such

equipment must be displayed on special days such as rallies.

5.5 Opening Times

Initially, the museum will be open one weekend per month and within two years of completion of the complex it will be open daily.

6 MUSEUM DESIGN

At this stage, the club has developed two alternative museum designs to suit the different sites. If the larger area is effectively to be permanently under the club's management then exhibits will be housed in a number of separate buildings as shown in Figure 1. Alternatively if the club has a smaller area only then all exhibits will be displayed within a single building as shown in Figure 2.

Either alternative is considered to be satisfactory but the Club does have a preference for control of the larger area as this would permit :

- more variety of permanent exhibits
- flexibility to develop earth moving and steam ploughing displays
- greater separation of different groups of exhibits
- storage of some "non display" equipment

There are of course advantages for the alternative in that the Club would not have to maintain such a large area, museum building construction costs would be lower and overall site management probably easier.

It is considered that the style of building construction will be very dependent on available funds. Ideally, building architecture will have a period flavour about it but in the case of the single large building it is thought that only modern construction methods will be economical. Interior finish of the display areas including arrangement of pipework and ductwork for example will be of an industrial standard in terms of design and finish.

With either museum design, a miniature railway will be a feature basically as an attraction to the general public and in view of the MMBW's longer term planning, the railway could provide intrapark transport. If the larger site is developed then it is hoped to incorporate a display of the internationally significant MMBW designed soft earth tunnel boring equipment, e.g. "moles".

6.1 Engineering Design for Presentation of Operating Exhibits

Unlike, in the majority of technical museums, it is planned to operate the engines as they would have been used originally. This represents a contrast to traditional static display or even having engines turned over by means of a small electric motor. A number of challenging design problems will have to be overcome to ensure ready, reliable operation of the equipment.

In the case of all stationary engines weighing over 500kg which are not mounted on wheeled sub-frames it will be necessary to provide suitable foundations. The Willans Diesel engine for example should be mounted on a block containing at

least 14 cubic metres of concrete.

Steam engines must not only be supplied with steam but manifolded to ventilate the exhaust steam and trains to remove the condensate will be necessary. Some experimentation will be needed but at this stage it is considered, in light of experience to date, that floor drains which are enclosed as far as practical and force ventilated will efficiently remove both steam and condensate.

Ventilation will be necessary for the exhaust from the numerous stationary internal combustion engines and for mobile equipment (of all types) on start up before moving outside.

Many of the early oil engines were quiet by modern standards and it is considered quite inappropriate to silence the internal combustion engines any more than originally. Therefore it is planned to isolate the internal combustion engines acoustically from the other exhibits. This will not be difficult if the engines are housed in a separate building but otherwise if there is one large building then the internal combustion engine "house" will have to be surrounded by walls and ceilings with a high transmission loss. In either case, increasing room absorption to reduce reverberant noise will be investigated.

6.2 Display of Engineering Exhibits

A rigorous and accurate presentation of exhibits is considered fundamental and together with the manner in which groups are conducted through the museum will cater for all requirements.

A library of texts related to the exhibits has been established and will continue to be expanded. Brochures and other printed material will be prepared so that the exhibits can be understood in terms of their historical relevance to engineering development and current technology.

Also, the role the equipment in Victorian material and economic development and the social implications will be discussed. A theatrette will be used to complement the physical exhibits.

The nature and engineering emphasis of the displays will be common to either museum design. Overall, there will be an historical development from early stationary steam engines and boilers through to internal combustion engines and selected plant built within thirty years of the present. Consequently engines and equipment will generally be grouped according to type and will be displayed as follows :

6.2.1 Stationary Steam Engines

The steam engine was of course the first fossil fuel fired source of mechanical power. A comprehensive collection of reciprocating engines will enable display of the engineering design developments from the crude open single cylinder through to the fully enclosed multicylindered expansion engine. The steam engine provides the opportunity for a study of mechanisms especially through valve gear actuation.

Various types of boilers will be utilised illustrating developments in heat transfer, metallurgy and pressure vessel design. Fuels will include wood, coal, oil, reclaimed oil and possibly gas. Total boiler capacity will only permit the demonstration of small steam turbines. It is expected

that as at present the boilers will be available for potential operators to gain experience with the most basic to ultimately, fully automatic design.

6.2.2 Internal Combustion (I.C.) Engines

The I.C. engines provide many examples of progressive engineering refinement together with the application of what were quite original principles. In the earliest oil engines, there was a very obvious relationship to the then basic mechanical design of steam engines. This was soon surpassed with improved alloys, lubrication and ignition which enabled the design of more compact enclosed higher speed engines. It will be possible to demonstrate working examples of all types of ignition systems from the early hot bulb through to various types of magnetos and spark plug systems. Compression ignition engines of various types including a very rare air blast injection diesel engine will be operated.

As appropriate, engines will run on a range of fuels including petrol, kerosene, diesel oil, vegetable oils, reclaimed oil and possibly various types of gas. Demonstration will show that these engines had virtually instantaneous starting in comparison with steam engines and boilers. Noise generation was, and still can be a problem, with internal combustion engines as discussed above and building design will be such as to prevent transmission to adjacent areas.

6.2.3 Electricity Generation

Various steam and I.C. generating sets of up to nominally 100kW capacity will be operated, ideally in a separate power house. This will provide an opportunity to study the performance of the different sets under load. Development of both D.C. generator and A.C. alternator designs of progressively higher voltage and associated switch gear and instrumentation will be displayed.

6.2.4 Mobile Equipment

The mobile equipment will feature engineering developments essentially in the areas of heavy road transport and agriculture. In the case of (three point) road rollers, the Club's extensive collection will show very little difference in fundamental design from the turn of the century until recent times. For ploughing however only with the advent of the I.C. powered tractor was it possible in Australia to apply mechanised direct traction to the plough and replace the cable system as powered by the Club's steam ploughing engine.

It is a policy that all of the mobile equipment will be demonstrated in motion which should set the museum apart from almost any other. There will be the opportunity to study transmission development and even at the most basic level there will be many examples of wheel development in heavy transport. For example, vehicles will include those with solid wooden wheels, fabricated all steel wheels, cast wheels with solid rubber tyres and the more conventional steel wheels fitted with pneumatic tyres.

6.2.5 Period Workshop

A workshop will be established basically to contain the equipment necessary to restore and maintain the exhibits. As far as is practical the

workshop machinery will be of the same period of the exhibits. This will enable an appreciation of past maintenance techniques and machine tool developments.

6.2.6 Refrigeration Equipment

A very significant development occurred in 1879 with the first successful shipment of frozen meat from Australia to Great Britain (C. Singer et al). The successful export industry which developed was largely dependent on the application of the ammonia based refrigeration plant. The Club is very fortunate in having an extensive number of reciprocating ammonia compressors which will be integrated into a refrigeration system and small cool store. Various forms of design for rotating power transmission will be demonstrated, the most dramatic, and now almost completely redundant being the rope drive to the 6m diameter flywheel of the Linde single cylinder reciprocating compressor.

6.2.7 Models

The club is fortunate in either owning or having access to an extensive number of exhibits but certain items which would reflect significant relevant engineering developments no longer exist or are unobtainable. It is planned to use scale working models of engines and equipment to demonstrate or display these developments.

CONCLUSION

One of the two sites in the Dandenong Valley Metropolitan Park, may be available to the Melbourne Steam Traction Engine Club Ltd.

The larger is preferred as the Club will have greater flexibility, in organising the museum, engines could be displayed by type in separate buildings and ploughing and similar demonstrations could be conducted. A single large museum building on a smaller site would be successful but greater engineering design would be necessary for foundations and the provision of services to the engines to enable successful operation. It is considered that in either case, if the exhibits are selected and displayed in accordance with standard museum practice then this will satisfy the needs of groups with a specific interest as well as the general public.

ACKNOWLEDGEMENT

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REFERENCES

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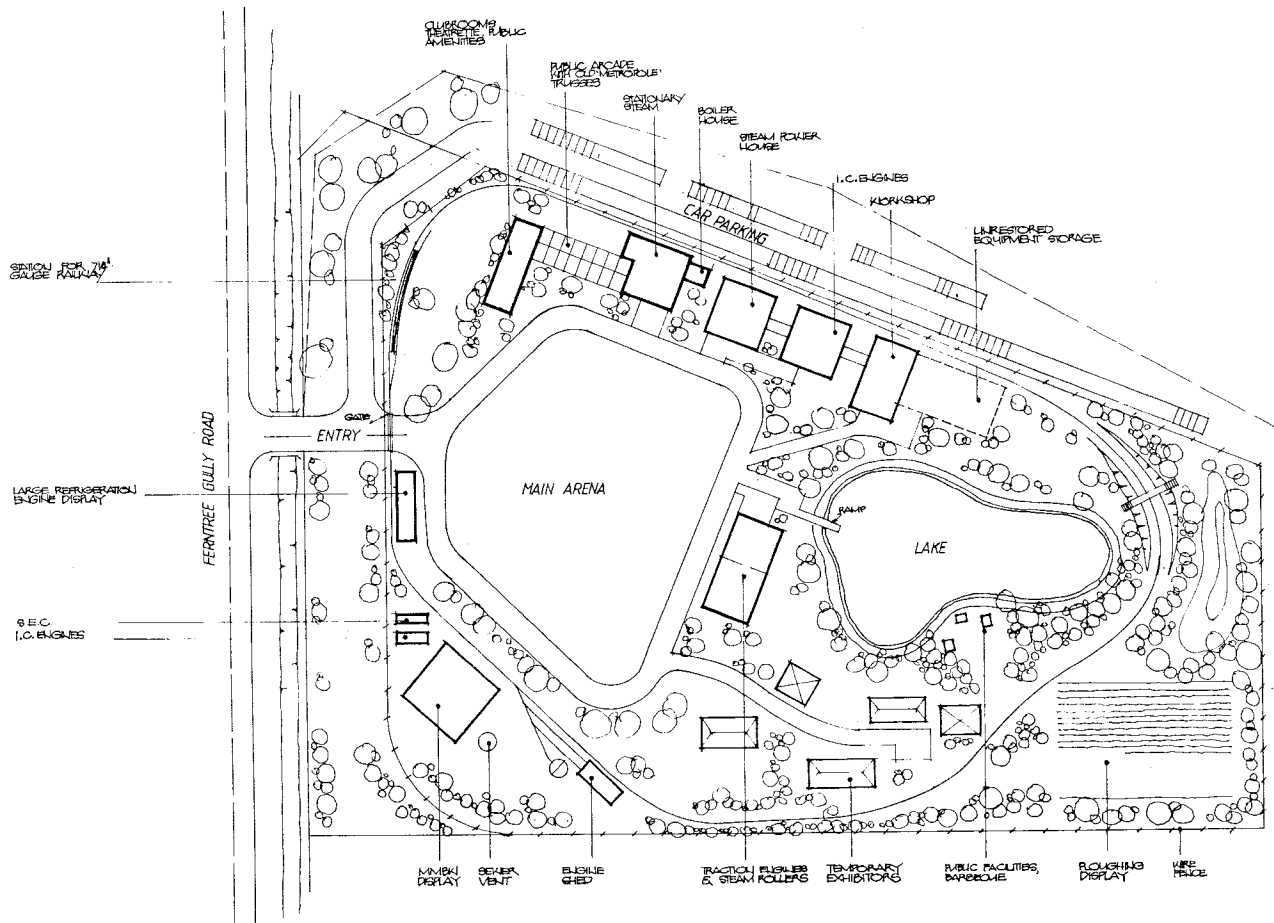


Figure 1 Plan of Museum Facilities - Large Site

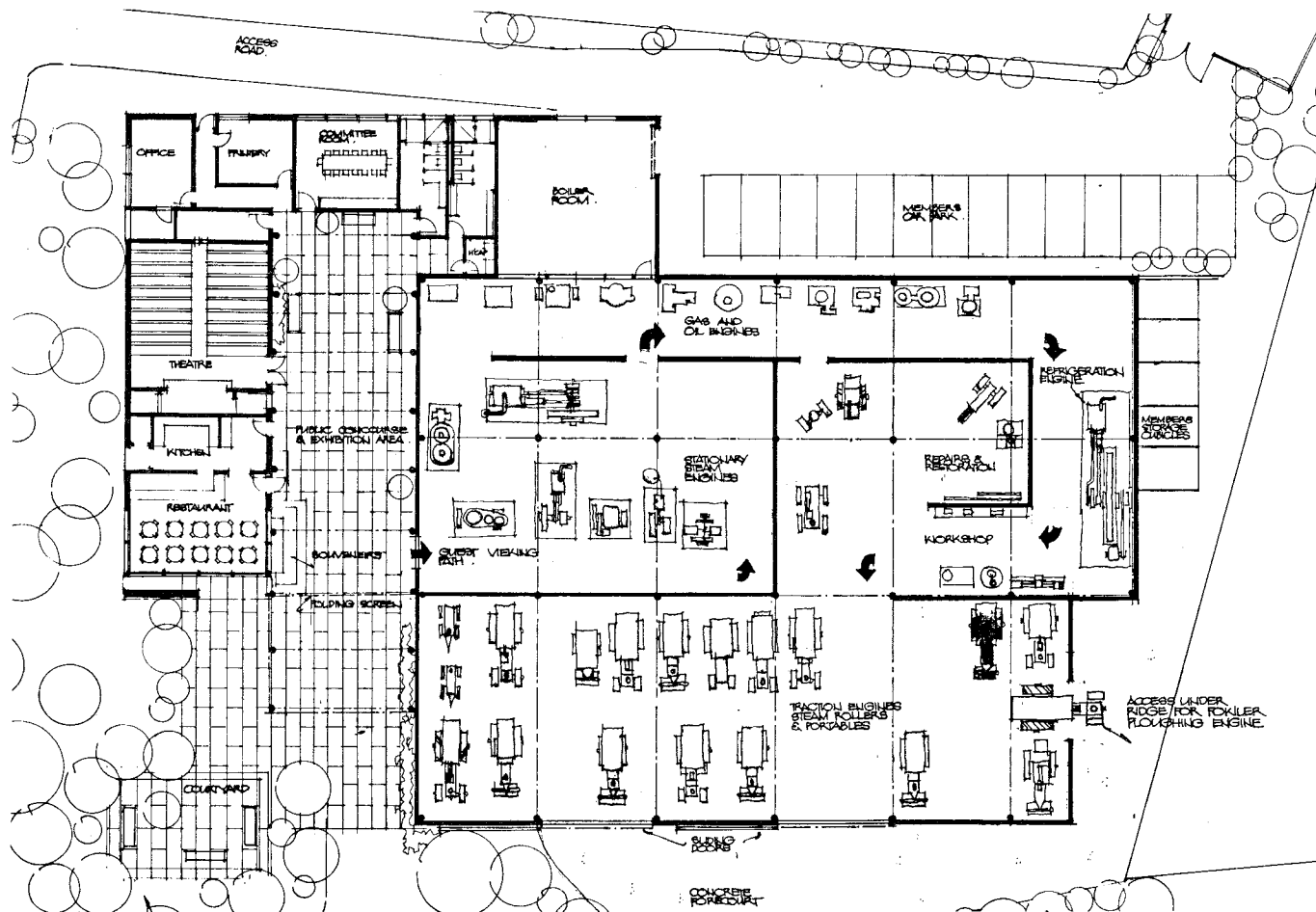


Figure 2 - Floor Plan for Main Museum Building - Small Site