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C O N T E N T S

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THE Victorians have been blamed for a good many things, some of them undeservedly, but there is one field in which their influence was malign and far reaching. We refer to colour. The Victorian house owner thought of his home in much the same terms as someone has spoken of Frank Lloyd Wright. He did not go home in order to look out on nature, but rather like an animal to its lair. He entered a cave from which, with the closing of the front door, the outer world was shut out. Inside, wood trim and panelling were dark, wall papers of the most effective light-absorbing colours lined the walls, and heavy curtains and portieres insulated and isolated the family as in a tomb. A new generation, with a new broom, has transformed the few mausolea of the period that remain and, for the connoisseur, the only examples left to contemplate are to be found in men's clubs. It is a curious fact that the better and more exclusive the club, the more forbidding and dreary is the interior. For the student of the history of taste, Toronto provides many excellent clubs with those peculiarities, but Toronto has no monopoly in them. Montreal, Hamilton, Ottawa, Winnipeg, Vancouver can all point with pride, and a certain awe, to dingy edifices where the food, usually, is as good as the surroundings are bad.

WE suppose that the schools and hospitals of the last century were as dismal as any of our public buildings. From the outside, they looked like the English work house, and the inside, usually, did justice to the exterior. It would seem as though school boards wished to impress on the inmates that they were receiving their education at public expense; and hospital patients, at any rate in the public wards, were always made conscious of the fact that they were a civic charge, or nearly so. For such persons the English work house and infirmary had set a standard of drabness that made it quite clear that the inmate was not to enjoy himself. This practice we followed, and across the land are schools and hospitals, still with chocolate brown or olive green dados and muddy coloured walls. It was considered an atmosphere in which one could study, or get well in, without distraction or a nervous breakdown.

TODAY, these notions are happily in the discard. In Toronto, always in the lead in the search for a gayer and fuller life, we have a civic hospital in which the wards are painted pastel shades that would not look amiss in a beauty parlour, and the mortality statistics have not been noticeably affected. The Tubercular Sanitorium, in Waukegan, is an excellent example of colour, scientifically used to produce a most cheerful and restful atmosphere. In *Time*, we read of similar experiments in New York Schools. There, experiments have been carried on since 1943, and this year the tested ideal classroom colour of peach and rose was announced. Chalk board walls are light or dark in colour as a focal centre, and glare is minimized by painting window walls brighter than side walls.

IN every field of human endeavour, the same interest in colour is being shown, and we hope that some day, soon, a large paint manufacturer will produce a colour catalogue that will be of use to the people who are using his paint. The colossal books that the architects have received during the war, and recently, are quite useless except to help some poor untutored, little woman to make the best of her bathroom or brighten up the kitchen. We can visualize a catalogue that hundreds of architects would cheerfully pay ten dollars for, but it is not yet in sight.

Editor.

DIVISION OF MECHANICAL ENGINEERING OF THE NATIONAL RESEARCH COUNCIL

By H. Gordon Hughes

Mr. H. Gordon Hughes, the son of Brigadier General H. T. Hughes, C.M.G., D.S.O., was born in Quebec City on November 23, 1902. His preparatory education was received at Lower Canada College, Montreal, and Palham House, Folkestone, Kent. He spent two years at the Royal Military College prior to entering the School of Architecture at McGill University.

Mr. Hughes worked for various architects in Montreal until 1930, when he spent a year in New York City. In 1932 he began private practice in the Ottawa Valley and in 1935 established an office in Ottawa. Among the buildings he has designed are the refinery extension to the Royal Canadian Mint and the aeronautical research buildings of the National Research Council on the Montreal Road. He has competed successfully on several occasions in architectural competitions sponsored by the government and private corporations. He is a member of the Royal Architectural Institute of Canada and a member associate of the Royal Institute of British Architects.

Since 1941 he served with the Royal Canadian Engineers and was discharged recently with the rank of major. He has just been appointed as head of the Hospital Design Division of the Department of National Health and Welfare. The new division will be responsible for the collection and tabulation of all the latest information on the design and construction of hospitals, public health and other clinics and similar buildings in this and other countries. He will be available for consultation not only by other departments of the federal government but also by the provinces, municipalities and various bodies interested in the construction of hospitals. Establishment of the division was recommended unanimously by the provincial deputy ministers of health at the Dominion Council of Health meeting last year.

IT was fortunate for Canada's war effort that men with vision decided, in 1938, to enlarge the facilities for mechanical Engineering Research in this country. In 1939 the work of planning such a project was undertaken by the National Research Council, and a site chosen was approximately four miles east of Ottawa. Because of the war, and the nature of the work to be undertaken in the laboratories, the project was necessarily veiled in secrecy until the end of hostilities. Now the veil is lifted, and the story can be told of some of the architectural problems encountered in the planning of buildings whose form was determined in large measure by the exacting but ever changing requirements of research engineers and the often extremely complicated equipment with which they work. Because of the many technical details that constantly required consideration, it was essential that architect and research engineer worked in the closest collaboration.

Some seventeen buildings have been constructed to date, and it is interesting to note that eight additions to buildings have already been added. Research is never stagnant and building requirements change with the constant revision of methods, equipment and ideas.

Even while completing the working drawings of the buildings the enthusiastic researchers were daily producing new suggestions, revisions and refinements. This must be borne with christian endurance by the architect who elects to work with them, for that is the character of the true research engineer, however such an association is very stimulating and thoroughly recommended by the writer. The problem of constant change dictated, in part, the general form of construction which was steel frame and cinder block walls, that permitted ease in alterations.

Because of the constant necessity of intercommunication between buildings, heating tunnels connecting them are large enough for personnel to walk through with ease during inclement weather. The decision to have such tunnels determined, in part, locations of the various buildings.

It is proposed now to give a short description of a few of the buildings and some of the architectural problems that were encountered.

Aerodynamics Building

This building contains three separate units: the first containing laboratories, library, seminar and executive offices; the second the horizontal wind tunnel and the third the vertical or spinning tunnel.

The horizontal tunnel itself is 135 feet long and 55 feet high. The 15 foot propellor is driven by a 2000 H.P. motor which generates an air speed over the test section of approximately 340 m.p.h. Unlike most wind tunnels it was decided to place this one with the working section above the large return duct which was to be below the floor, rather than on the side. This scheme gave more light and space about the working section and allowed the exposed portion of the tunnel to be contained in a pleasingly proportioned room. The problem of reducing the noise level to avoid a nuisance in the administration wing was overcome by sound insulation tile on the walls of the room and 4 inches of rock wool inserted between a double wall separating the wind tunnel room from the administration wing; doors in this wall were double with vestibules between.

The vertical wind tunnel for spinning tests is 80 feet high with a working section 15 feet in diameter. Air is circulated by means of a 275 H.P. motor suspended from the roof. The outer shell containing the tunnel was formed of welded ¼ inch steel plate with vertical channels and horizontal angles welded to it which act as bracing and support the cinder block and stucco exterior finish.

This tunnel is a splendid achievement which reflects great credit on the Canadian Engineers who designed it permitting as it does the testing of models twice the size of those tested heretofore in tunnels elsewhere.

It is perhaps of interest to note that in the laboratories metal base boards with removable fronts forming raceways for wiring were installed. These separate raceways were formed to take various types of circuits. Raceways are connected under door openings by pipe conduit, consequently considerable care is required in locating door openings prior to placing floor slabs.

The external character of this building, which was the first of the project constructed determined the pattern for those to follow. Horizontal and vertical emphasis was obtained by the use of dark green enamelled iron spandrels.

Instrument and Model Shop

This building houses instrument, mechanical, woodworking, sheet metal, blacksmith, paint and electrical shops as well as offices, washroom and lunch room. The principle adopted in the planning was that of a central tool crib and stores area which gave easy control and accessibility to all the various shops. Clear story lighting over the central portion plus large glass areas give ample light. Windows with a southern exposure contain heat retarding glass, except at the eye level.

Engine Listing Laboratory

This building embodied many novel features in plan, construction and equipment.

Because of vibration, construction was of heavy reinforced concrete. Test rooms were separated from other portions of the building by having two 12-inch concrete walls with 2 inches of cork between them in order to cut down noise and vibration. These rooms are used for testing aeroplane engines without a propellor. The engine works against a dynamometer and air is forced over the air cooled engine; one test room has a 700 H.P. fan to accomplish this. Double doors give access to these rooms, they are large steel refrigerator type with rubber gaskets surrounds set into the frames. Prior to placing concrete the frames with the doors fitted were set in place to assure accuracy and to avoid twisting of the frames. Observation windows from the control room were also set in place before concreting. These windows consisted of four sheets of plate glass set in steel frames with rubber, and silico gel troughs between glazing to absorb moisture. Fire hazard in these rooms is considerable and from 120 to 130 desobels of noise is generated here. This has been successfully overcome by lining the test rooms with 4 inches of "Calistone" on the walls (a sound absorbing stone made from iron ore slagg) and the use of stacks and steel directional vanes which turn the air flow and sound skyward. With further sound insulation in the control rooms this tremendous noise has been reduced to conversation level here so that operator fatigue is reduced with less likelihood of accidents. Electrically operated doors are located at the top of the stacks to save heat loss when the equipment is not in operation.

Throughout the building gasoline received special attention to reduce the fire and explosion hazard.

The hangar stand, which is a room that allows an aeroplane engine to be tested complete with its propellor, was a credit to skill of the contractor who built it.

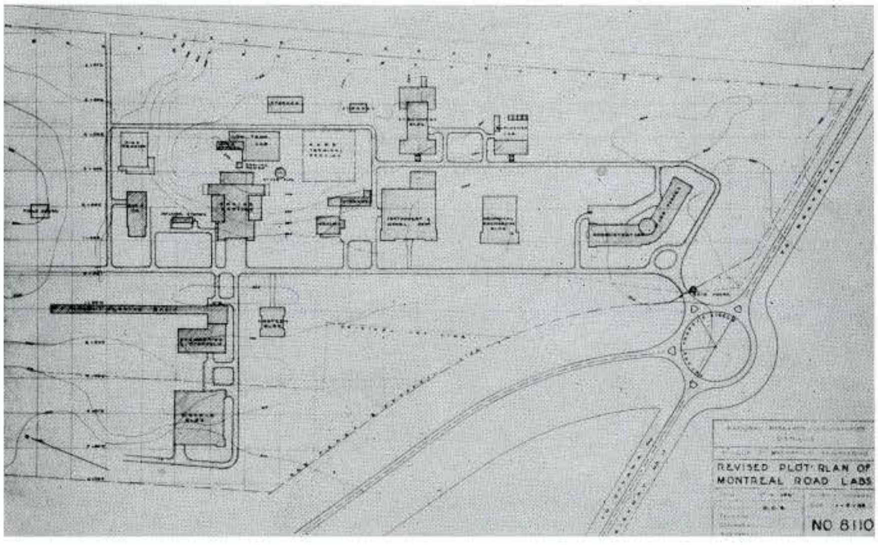
The engine is fastened to a drum suspended by two sets of triple cable suspensions at the circular section of the stand, which is 25 feet in diameter. Here an hydraulic lift is located that allows for inspection of the engine while running, lighting, observation window, control line covering, monorail, slots for holding reducing section and anchorage for the cable suspension all had to be located in the extremely complicated formwork. In order to reduce noise double grids of sound insulation material "Calistone" were used at both the intake and outlet of the stand. The inner grid at each end is 20 feet long. Then a 4-foot space and a 5-foot grid of similar stone is used. This gave a 40 d.b. reduction on the high frequencies and 18 d.b. on the low.

In conclusion it should be stated that the assistance the architect was able to give the engineer in producing a satisfactory structure of this type was primarily that of planning, where circulation, proper location of one area to another was paramount. It was also conceded that by a constant consideration of massing and with an eye to fenestration plus a few minor refinements an architect can be of great value in producing a building of this type, that is not too overbearingly functional in appearance.

Photos: National Film Board

A E R O D Y N A M I C S   B U I L D I N G   S E E N   T H R O U G H   T H E   E N T R A N C E   G A T E S

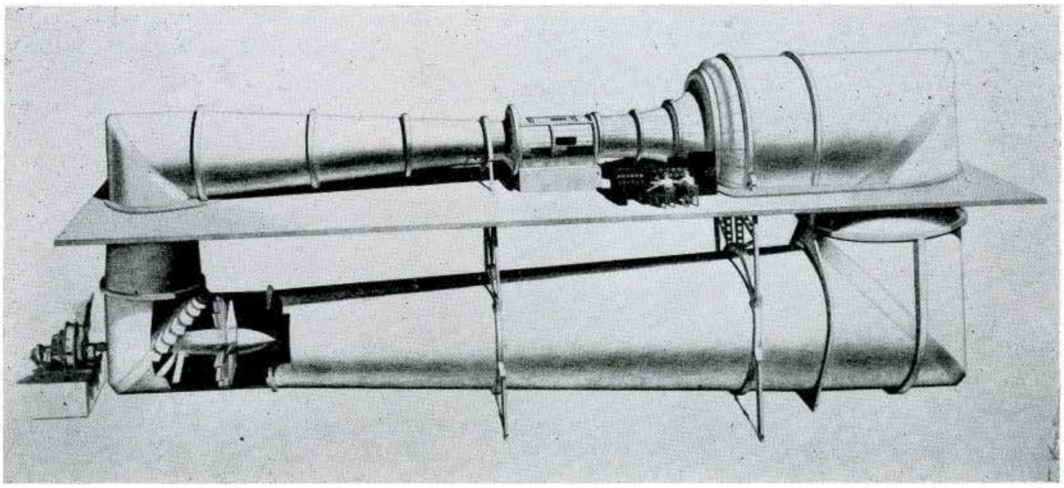
H. G O R D O N   H U G H E S ,   A R C H I T E C T



Revised Plot Plan of Montreal Road Laboratories.

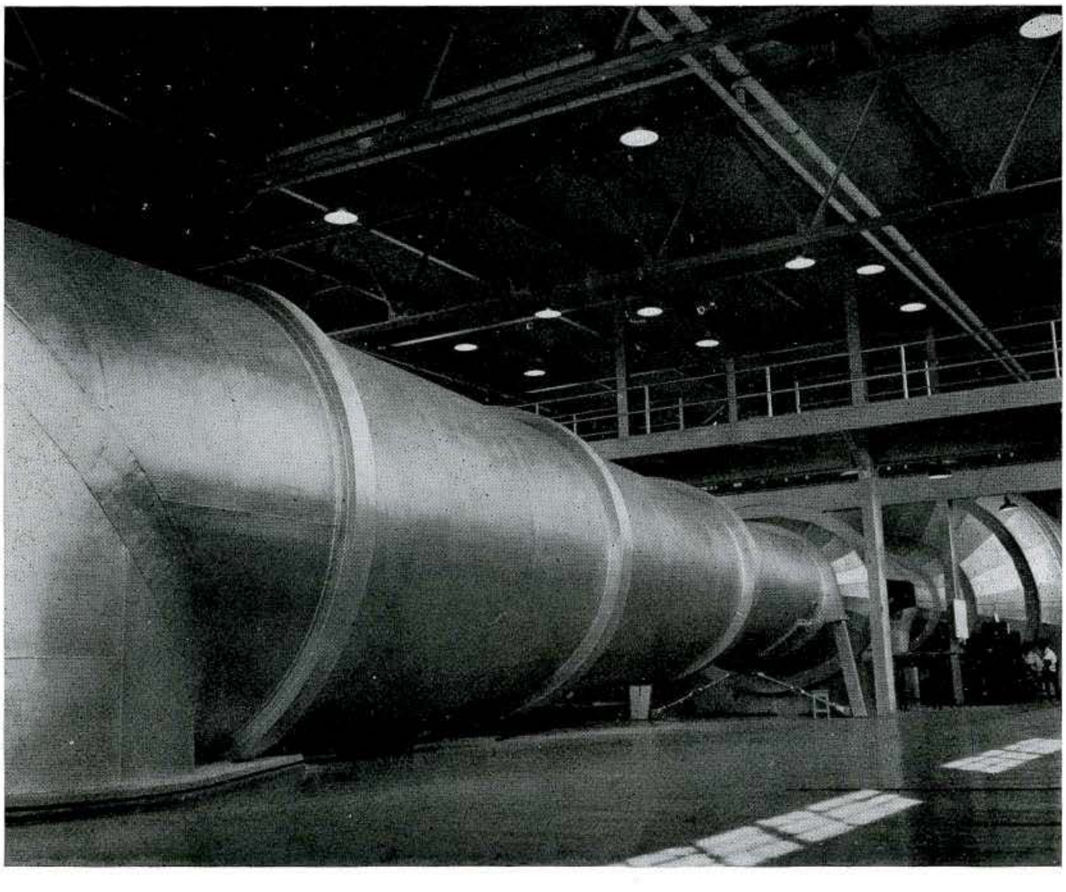
MAIN STAIR OF THE AERODYNAMICS BUILDING SHOWING ALUMINUM HANDRAIL

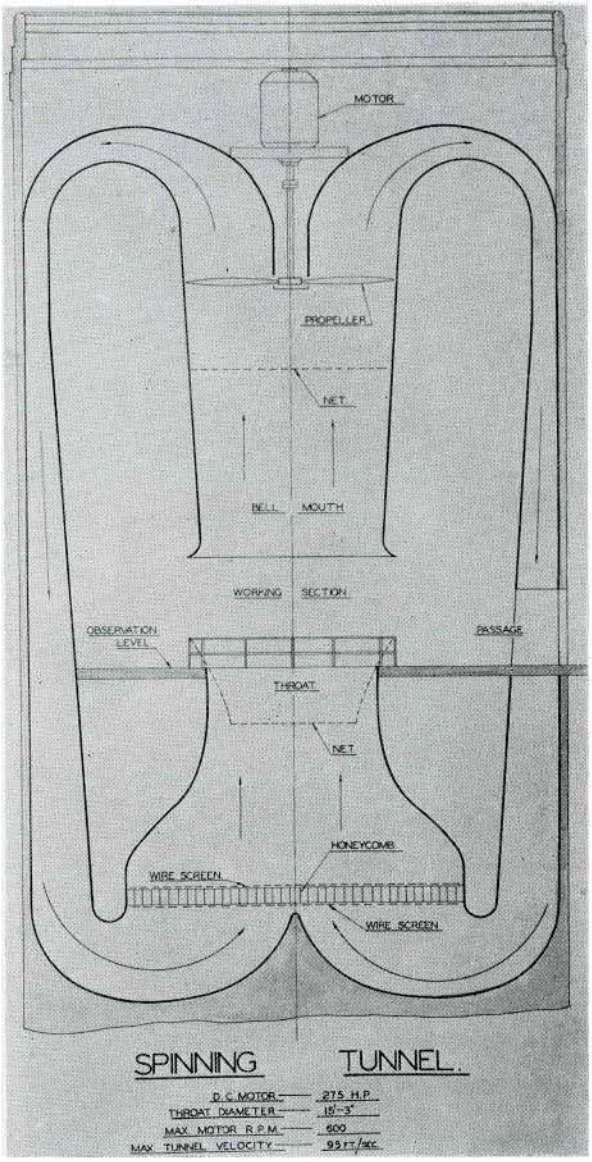
ENTRANCE LOBBY OF THE AERODYNAMICS BUILDING



HORIZONTAL WIND TUNNEL

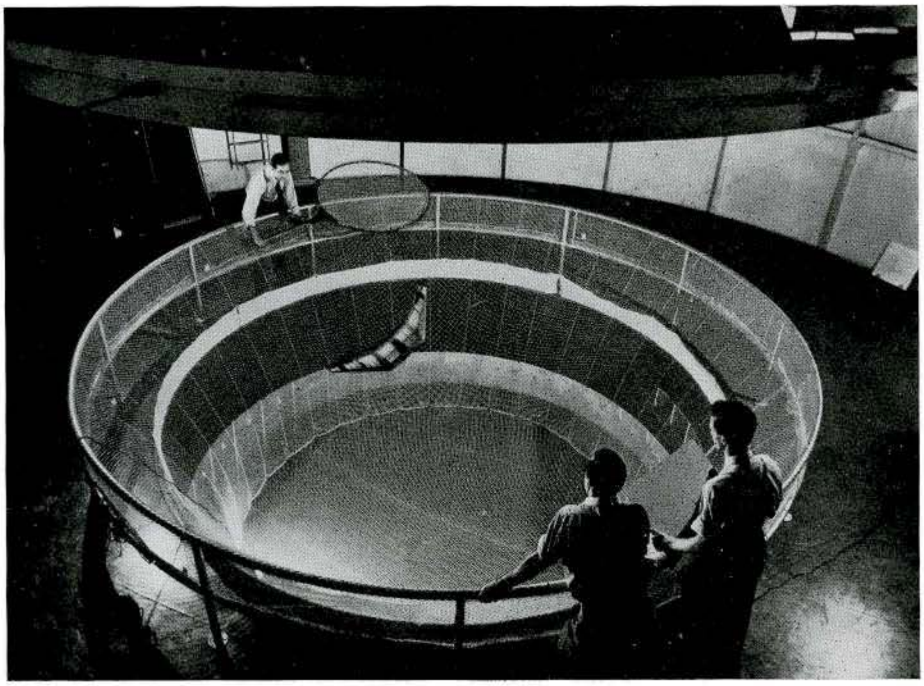
HORIZONTAL WIND TUNNEL, SHOWING CONTROL PANEL AND WORKING SECTION

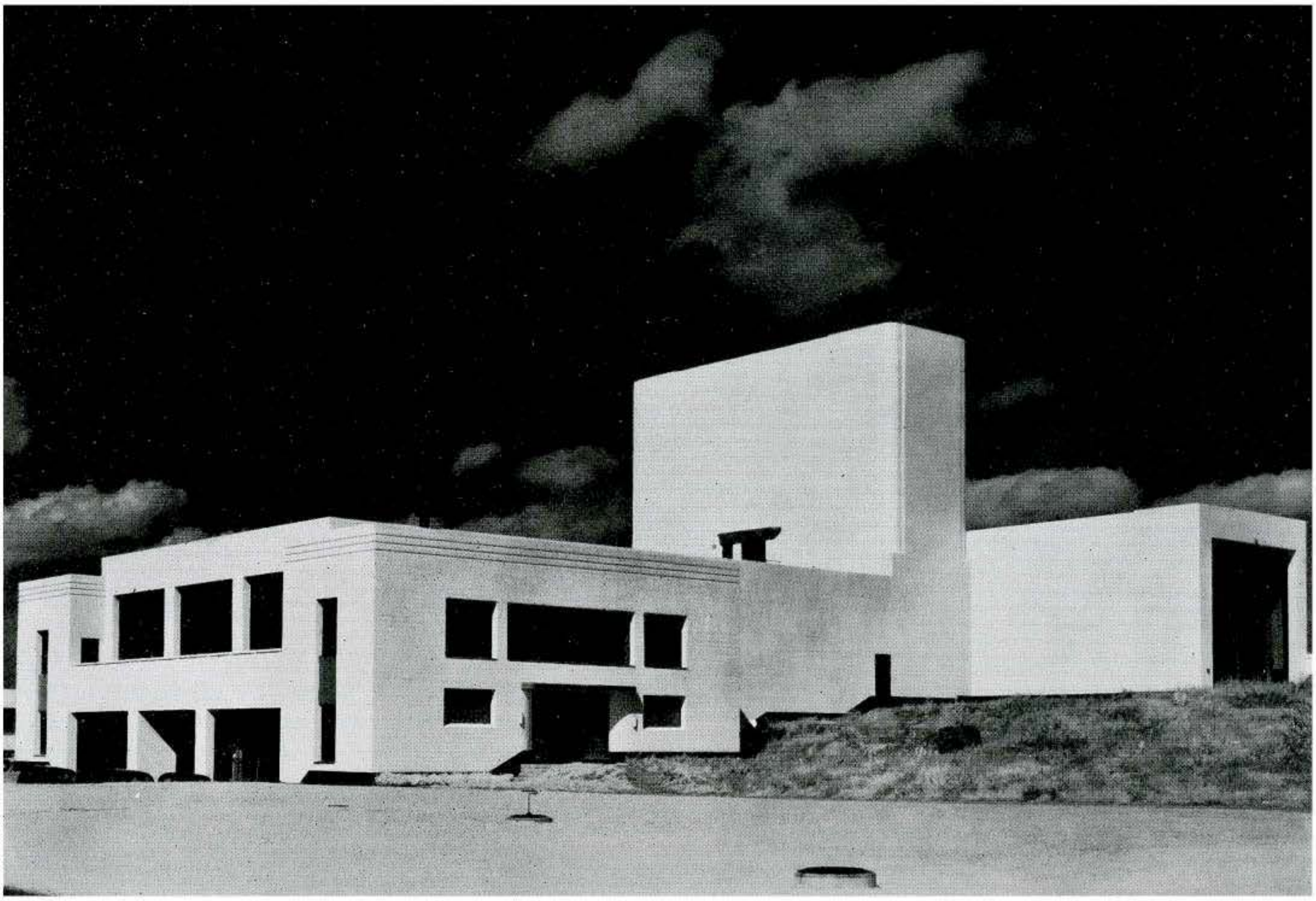




Section through Spinning tunnel. Centre section can be likened to a large hanging bee-hive.

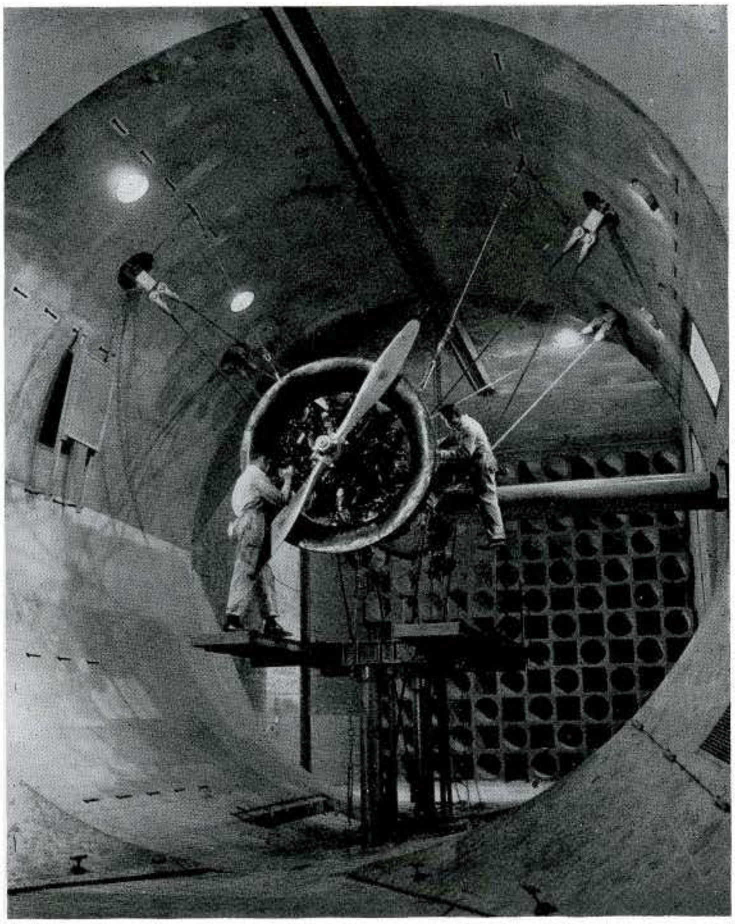
Working section of the Spinning tunnel, while a flying wing is being tested.





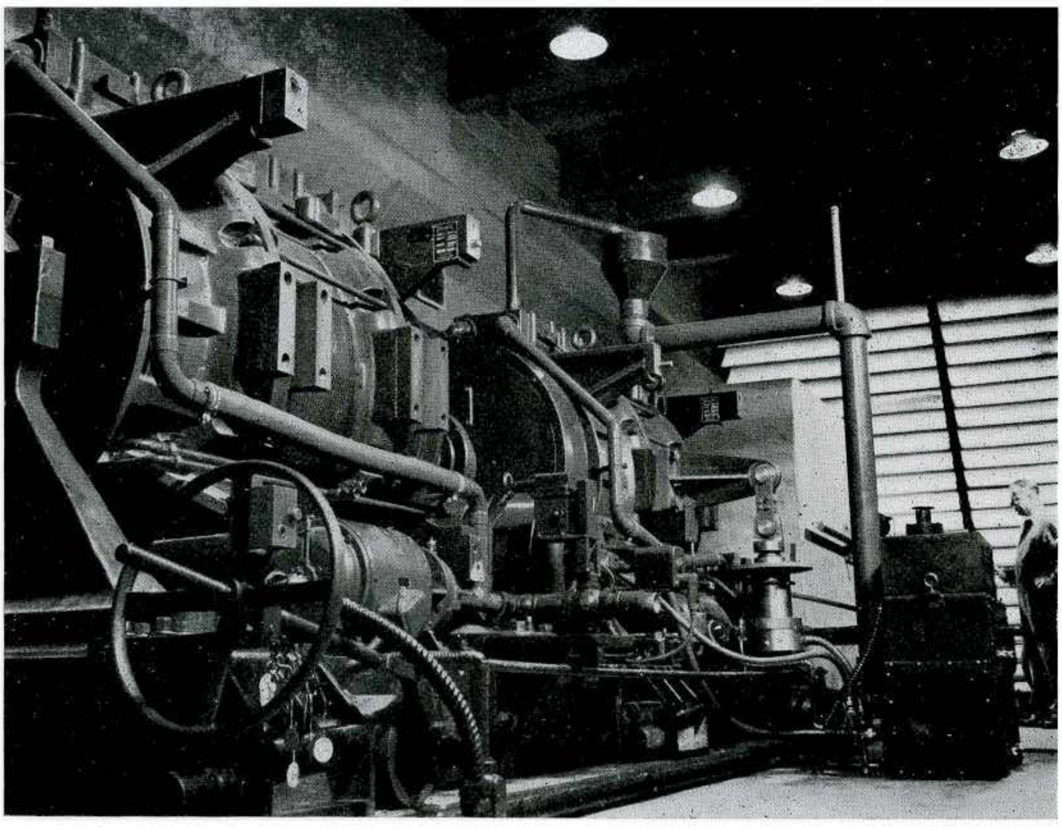
ENGINE TESTING LABORATORY

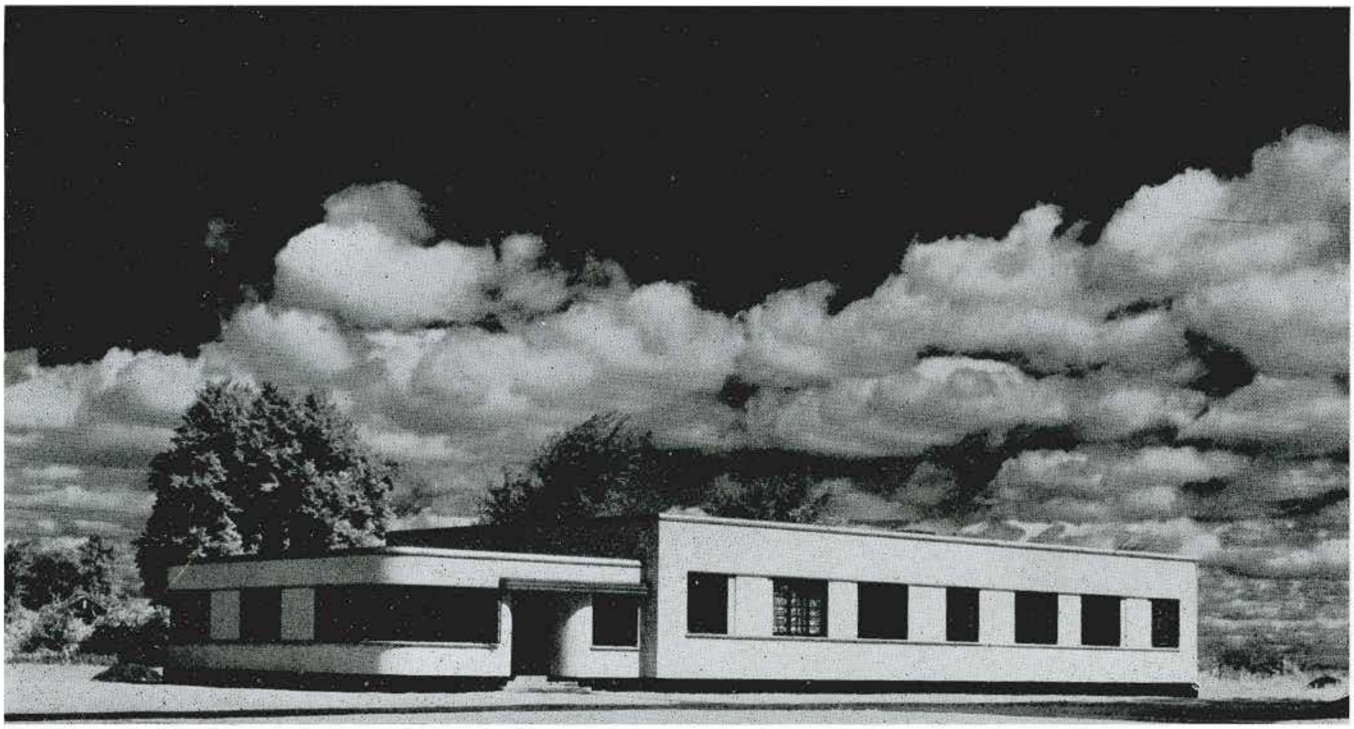
Air intakes are the two outer openings on the lower left. Air passes through dynamometer rooms and out the stacks. Door to hanger stand is seen at right rear of the building. Building is monolithic concrete.



Hanger Stand showing twenty-five foot diameter concrete working section. Sound insulation screen in rear.

Dynamometer Room. Dynamometer in foreground. Steel directional vanes in background turning air flow upwards. Note sound insulation stone on walls.





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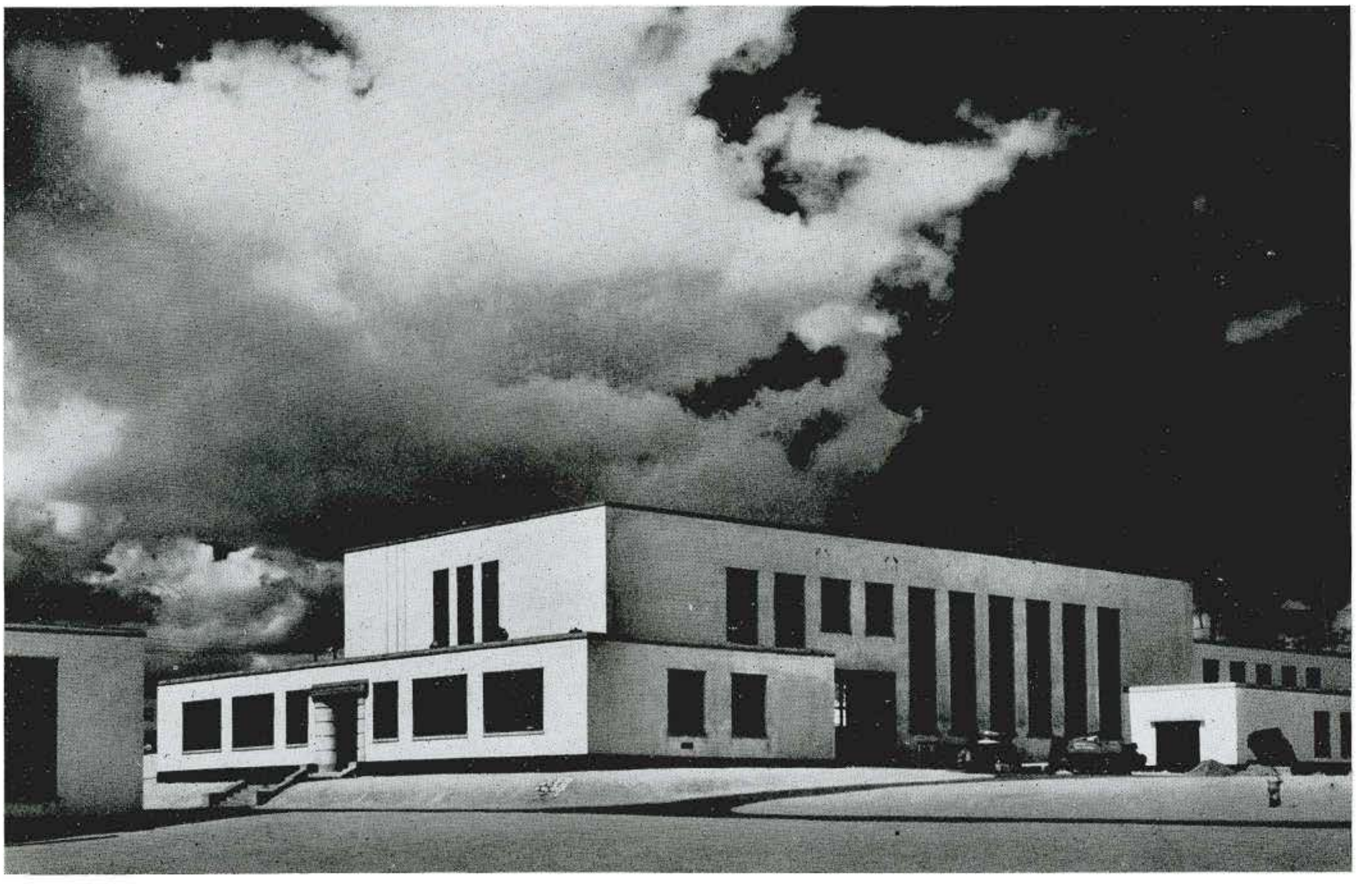

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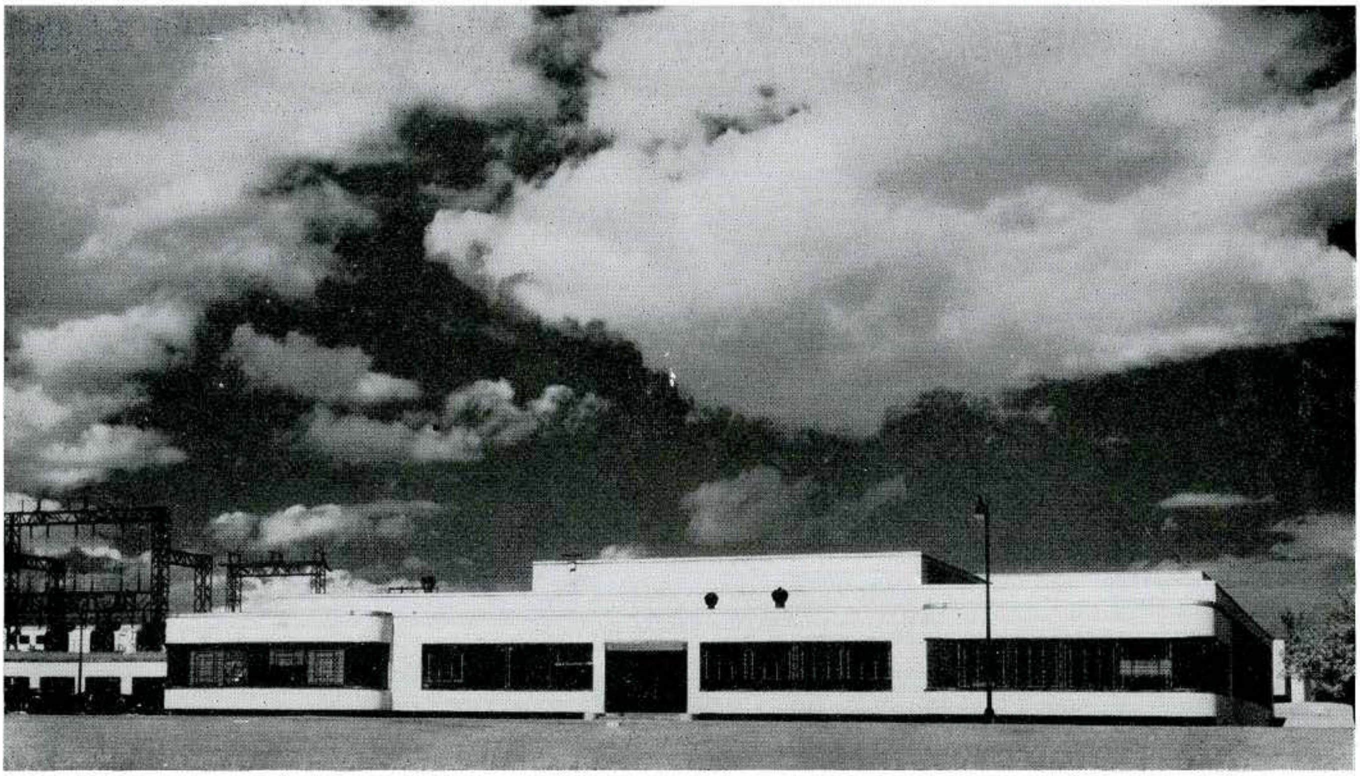
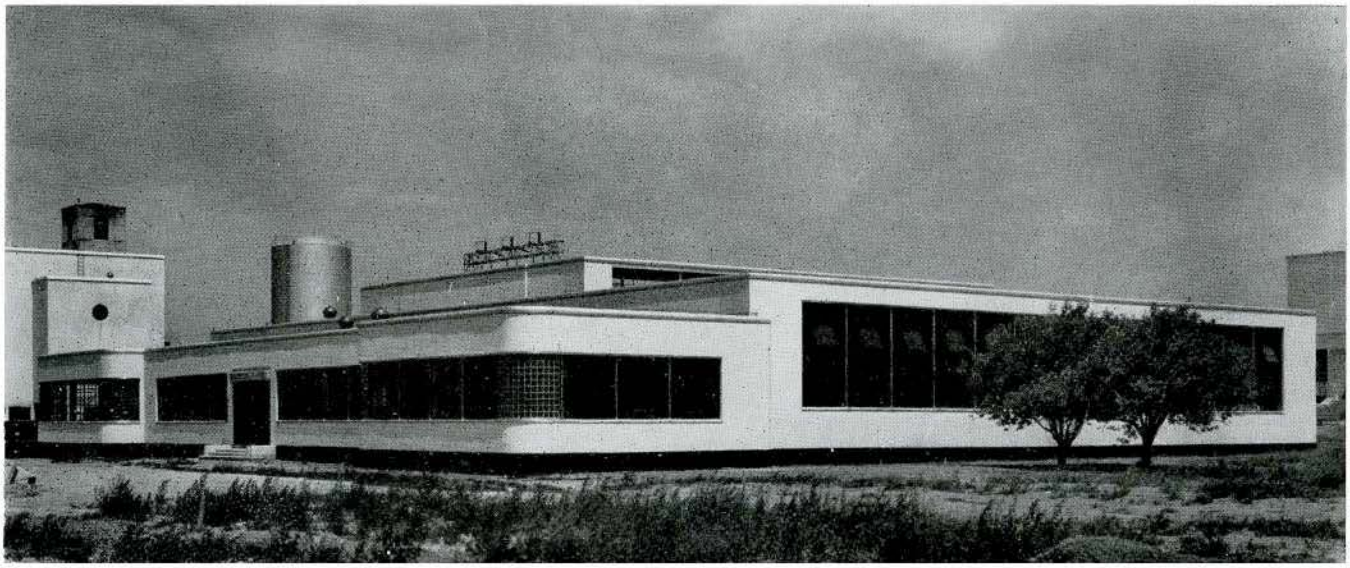


INSTRUMENT AND MODEL SHOP



INSTRUMENT AND MODEL SHOP

WOODWORKING SHOP AND INSTRUMENT AND MODEL SHOP

MACHINE SHOP AND INSTRUMENT AND MODEL SHOP

COLOUR CONDITIONING

By WILFRED D. SINCLAIR

Wilfred D. Sinclair is Colour Advisory Supervisor for the Paint and Varnish Division of Canadian Industries Limited. He has been associated with the Construction Industry for a number of years, and is thoroughly familiar with the painting problems peculiar to that industry and to maintenance painting in general.

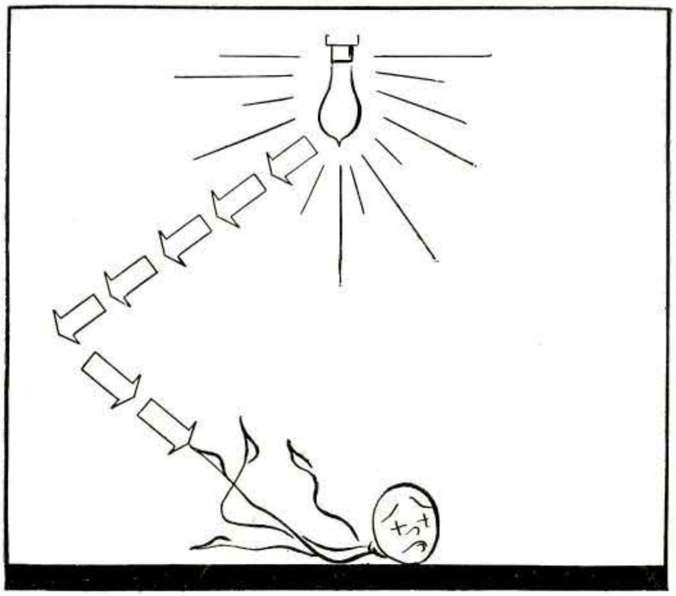
COLOUR is a positive force that affects the human nervous system. Every person with normal or near normal eyesight is aware of its stimulating influence on the senses. This would be a drab world if its colours were only sombre greys. Instead, each hue creates its separate individual impression, to the extent that even animals and insects have their own marked preferences and show this in their behaviour. Colour has a noticeable effect upon a person's disposition, and some people not only look happier under the influence of certain colours, but they feel better. An extreme instance of this effect would be found in the psychopatic and therapeutic treatment of nervous and brain disorders. Colour is a maker of moods, a shaper of character, and a creator of tastes and preferences; but its natural occurrence and lavish abundance encourage its being taken for granted like life, language, health and many other blessings freely enjoyed; and thus is overlooked the necessity of learning what colour is and how it should be used. It is easier to respond to a colour stimulus than it is to create one. This becomes apparent in all interior decoration, and it has for years been a problem in the maintenance of industrial plants where the characteristics and whims of the many employees must be considered as well as the structural features of the building, the size and shape of the rooms, and the type of operations carried on.

In an effort to solve this problem and to supply a simple, practical and adequate basis of procedure, "Colour Conditioning" has been developed as a design for plant maintenance, using a new concept of colour which subordinates the desire for decoration to the more practical purpose of putting colour to work so that it performs definite functions in the same sense as any other tool or mechanism. Colour should be used with good sense and a knowledge of values; it should be an investment that pays dividends in improved labour relations, more efficient production and the reduction of lost time by accidents. An efficient plan for maintenance painting, such as Colour Conditioning, makes it possible to keep a high standard of appearance in the plant, maintain good visibility, keep the use of colour under reasonable control, and prevent loss of time by the painting crew by eliminating fussy and unnecessary details.

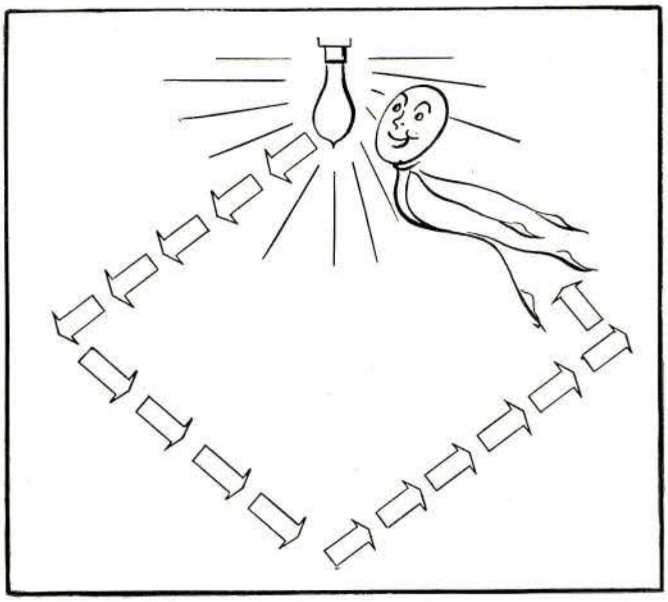
The whole concept of Colour Conditioning would be incomplete if it failed to take into consideration the established relationship between colour and light as partners in creating a seeing situation.

A seeing situation is made up of three closely related factors, namely Colour, Light and Sight. Seeing is impossible without light and sight, but these two are incomplete without colour. The eye is a seeing machine, and through it full eighty-five per cent. of all human knowledge is acquired. It functions like a camera, and receives visual impressions in an intricate maze of nerves, and these impressions are transmitted through the optic nerve to the brain and thence to the entire body itself, thus making seeing a performance of the whole human mechanism. In the process of seeing, the eye gives a clear perception of form, detail, brightness, perspective and motion. This delicate instrument is intimately associated with the general condition of the human body itself, and likewise when subjected to adverse conditions that cause eyestrain, it in turn affects the brain and nervous system and causes rapid fatigue, headaches, nausea, general irriation and "jitters". Prolonged abuse may also render the nerves of the retina less sensitive to brightness and motion, not only impairing the skill of the workman but actually exposing him to hazards. The causes of eyestrain are numerous, but the mention of only a few of them will suffice for the present consideration. The common causes and those most easily corrected are: poor visibility which is due to insufficient illumination and faulty contrast; glare from lamps, windows, columns and walls; constant effort to see at near and far distances; extreme contrasts within the range of vision; critical work demanding prolonged convergence of the eyes; and distracting factors such as moving parts, possibly only seen out of the corner of the eye, unshielded light sources and areas of brilliant, meaningless colour.

Light is essential to seeing, and a lighting system should be installed only by competent engineers, because the object of a modern lighting system is to establish a brightness level which provides high visibility, ease of seeing and good seeing conditions. Such brightness levels are attained by the selection of lighting



When a lumen strikes a dark surface, it is quickly "blotted up" or absorbed, thus ending its useful life and causing a considerable waste of valuable light.



If all surfaces are painted with reflecting finishes, the lumen will "bounce" from one surface to another, increasing the illumination with no increase in wattage.

fixtures suitable and adequate to the results expected from them. The type of production carried on, the structural features of the rooms, the area to be illuminated, and many other related factors are all carefully considered by the lighting engineer when he designs a lighting installation. His task is made much more difficult if he has faulty or unsatisfactory painting to contend with. Dark colours on ceilings, walls, floors and machinery swallow up his light and rob it of its effectiveness. They cause severe brightness contrasts that are hard on the eyes. Another unsatisfactory condition often encountered, and one that is equally bad, is that in which equipment finished in dark colours is placed against a bright wall. In looking from the dark equipment to the bright wall, the eyes and eye muscles are severely taxed. Uniformity of brightness throughout the whole field of vision is the responsibility of the lighting engineer.

Colour and paint are aids to illumination. Brightness levels are attained through the use of paint as a reflecting finish on all surfaces in the plant. A brightness level consists of the amount of illumination entering by way of the fixtures, combined with the amount of light reflected by all surfaces. Light colours reflect light; dark colours absorb it. Furthermore, although upper walls and ceilings may be light in value, deep colours on dadoes, floors, machines and equipment may reduce the efficiency of the lighting source Full utilization of light, or Salvaging Waste Light, requires careful planning, and the problem is to effect an ideal balance between the light itself and all areas illuminated. White ceilings, pale upper walls, medium tones on dado, floors, machinery and equipment – all scientifically planned to get the most out of illumination – assure ease of seeing.

White has the maximum efficiency in the reflection of light, and it therefore does the best job in getting the most out of existing illumination sources, but it is inclined to be too bright when used directly within the worker's view. Where the machine, or the material being processed, may be fairly deep in colour (such as metal) white walls may be too sharp a contrast and may, over a period of time, make the worker's vision uncertain. White, therefore is most suitable and effective on ceilings, high bays and high wall areas, where it produces the maximum distribution of light from above and aids in the reduction of shadows. It minimizes the contrast between the lighting fixtures and their surroundings, hence reducing eyestrain, and it presents a clean, bright appearance. Colours on ceilings are to be avoided both to prevent visual distractions and to salvage all possible light from the fixtures, windows and other light sources. It would seem advisable, while trying to determine the places where the use of white is most desirable, to point out that besides those already mentioned, there are some time-established uses of white that justify their continuance, such as equipment and rooms where spotlessness is essential: food machinery and equipment, medical examination rooms and dispensaries, kitchens and storage rooms. White is suitable in such instances because it makes dirt conspicuous and warns against negligence. For much the same reasons it is used on floors to whiten a corner and discourage littering, on floors near waste receptacles to invite neatness, and on baseboards to make sure the maintenance staff sweeps out all the dirt. It is used to mark traffic lines on floors to regulate traffic and stock piling. It is recommended for bins and shelving.

Colour should be used on walls, dadoes, floors and equipment to improve visibility by means of reflection and by supplying a suitable contrast background for the work being done. The choice of colour for contrast background is particularly important where employees are working, because it may be used to reduce any excessive difference between the machine and its background as well as that which might exist between the material and its background. Wall colours should be soft in tone to establish brightness ratios within the field of vision and yet durable enough to withstand soiling and abuse. A general environment should be created which becomes integral with the worker's seeing effort and in which his attention is directed to his work, not away from it, and in which there is the atmosphere of friendliness and comfort. Certain psychological effects of colour should be known in order that an intelligent selection be made for a balanced scheme. Some colours have the quality of "warmth" or "coolness". Tones of yellow, ivory and peach are associated with sunlight and heat radiation, and they are ideal for use in rooms that are for the most part chilly, vaulty or deprived of natural sunlight. Green and blue, conversely, tend to lower the temperature psychologically, and they may be used to advantage in rooms regarded as psychologically warm. In general, the warm colours have a tendency to excite, whereas the cool colours — blue and green — are soothing. Large areas of any bright colour tend to irritate, and it is therefore wise to confine bright colours to small areas. All these facts confirm the importance of making colour functional. Colours must be practical enough to withstand abuse and answer average factory conditions. They should not be stimulating colours that distract and cause visual competition. The colour plan must be simple as well as economical.

Colour Conditioning is, therefore, a scientific design for plant maintenance based on years of research in colour knowledge, painting practice, lighting engineering, psychological data and ophthalmology. With a full recognition of the problems it sets out to solve, it provides a complete and satisfactory plan for maintenance painting on a large or small scale for public buildings, hospitals, hotels, schools, office buildings and industrial plants. In this article the discussion is confined to plants, and it will be shown that it brings a bright and likeable environment into the plant at the same time that it gives direction and control in the use of colour.

The first step necessary in adopting a Colour Conditioning programme would be to make a complete survey of the plant in order to become familiar with the structure and its floor plans. However, for the purpose of quickly visualizing such a well-designed programme, a few examples of areas and their problems common to the average plant have been selected for analysis here, beginning with the plant offices.

For almost every type of office, white is recommended for ceilings, because of its high light reflection and non-distracting qualities. White focuses undivided attention to side wall colours and hence does not disrupt the employee's visual field. Where ceilings are exceptionally high, it is desirable to carry the ceiling white down the side walls to a point about two feet above the door frame. The height of the ceiling will be lowered optically and more light reflected to the seeing task.

In selecting side wall colours for a series of offices, care should be taken that these are not brilliant, lively colours that emphasize contrast and cause eye fatigue. They should be light in tone and in a finish that diffuses light without glare or surface harshness, and they should be selected with a recognition of the following considerations:

(a) The type, or types, of personnel using the offices.

(b) The architectural construction and general layout of each room, either by itself or as part of a series.

(c) The relationship and activity amongst the units of the series.

For both physical and mental comfort, rooms with northern or western exposure and which have a naturally cool atmosphere should be finished in the warmer colours, such as ivory, peach or yellow. Conversely, rooms having a southern or eastern exposure, naturally warm, should be in the cooler colours such as blue, green or grey. Although exposure and availability of light — natural and artificial — play an important role in colour selection, there may still be other influences to be considered. For instances, steam pipes passing through a room, or proximity to the processing department of the plant, may create the impression that a room is always hot, and here a cool colour scheme is naturally desirable.

Smaller offices are frequently crowded with both personnel and equipment, and are apt to give the occupants a "hemmed-in" feeling. A light colour such as ivory will increase the apparent dimensions of such rooms and will reflect light more completely to all its corners.

More scope is found in large, well-lighted executive offices where individual taste can be considered. Greys, greens and blues are favoured because they create an impressive appearance and they contribute to a cheerful and refreshing atmosphere. Green, for instance, is a subtle tone lacking in monotony—it will appear yellowish under artificial light and bluish under natural light. Therefore, it is appropriate for interiors occupied for long periods of time. A tip for those who want to look their best — certain greens also happen to be the direct complement of human flesh, and tend to enhance the normal tint of human complexion.

Dimensional changes can be effected through the use of colour. The length of a long, narrow office can be reduced by painting either one or both end walls in a darker colour, and the painting of the trim in the same colour will unify the room. This same idea can be used in an executive's office. The executive can be made the focal point in the room by painting the wall back of his desk in a colour that is in contrast to the other three walls.

In every general office can be found much that could be listed as eye distractions: tables, desks, chairs, radiators, file cabinets, door frames, baseboards, picture mouldings, ornaments and many such appurtenances. Get your beauty from the wall colour and promote uniform seeing conditions by painting all these other items in the wall colour or a slightly deeper tone.

Of the other rooms common to a series of plant offices, it is only necessary to say that the same ideas apply in painting them as in the general plan.

Reception rooms and lounges should be in cheerful and restful colours conducive to relaxation for those who may have to wait for irregular periods. Ivory side walls with tan, grey or natural wood trim are suitable.

File rooms are usually drab places. The upper walls should be painted in a light, stimulating colour. Usually equipment is non-uniform in shape, size and character. This should all be painted in a light but serviceable colour. If this is not possible, a dado on the walls in a colour that is similar to that of the majority of the equipment, and as high as the top of the equipment, will serve as a camouflage.

In selecting colours for rest rooms and wash rooms, merchandising statistics are a reliable guide, and these show that women's preferences are for colours like rose, pink and peach, whereas men favour blue, blue-green or blue-grey. Such rooms may be painted in pleasing combinations of colours that promote cleanliness and sanitation.

Halls and stairways are places of activity. They can be made lighter by the use of bright yellow tones on the upper walls. Stimulating colours are permissible in such areas because they are traffic ways, somewhat noisy, and bright colours have directional value.

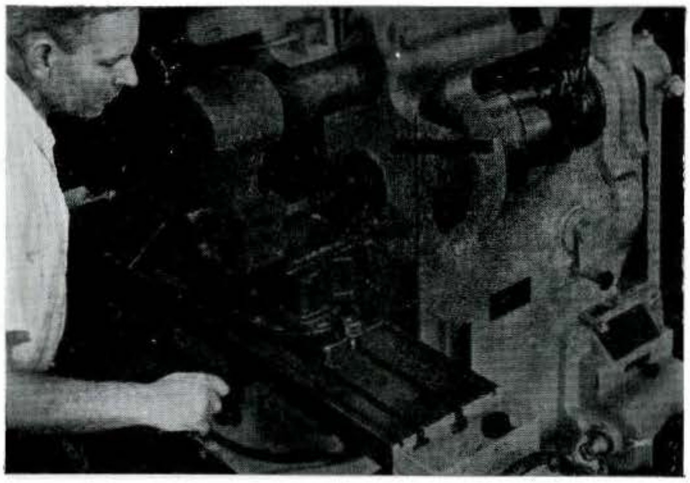
Cafeterias should be finished in colours that are considered "appetizing". Peach is a favourite colour; so also are beige, rust and tans.

Storerooms are places of irregular and infrequent traffic. Brightness and visibility can best be obtained there with white walls and a dado of tan or grey.

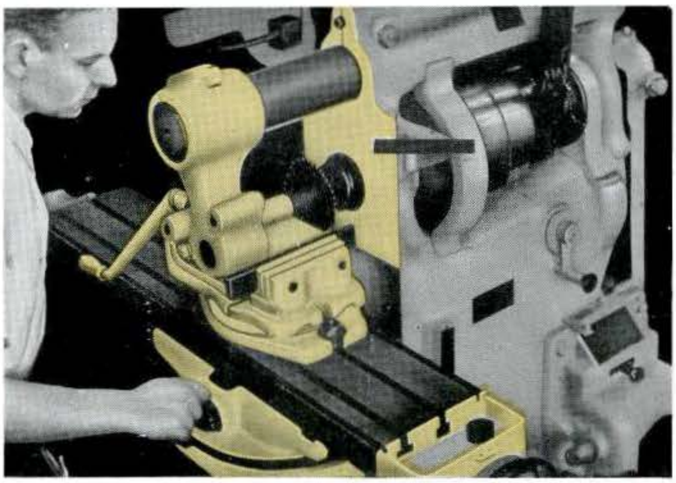
This brings to a conclusion the Colour Conditioning recommendations for the office section of a modern industrial plant. It is evident that it makes possible the introduction of a practical and consistent colour plan, free from the whims of executives and employees, which nevertheless provides a working environment in which any employee would be content. There is no extravagant use of colours, and repainting can therefore be carried out when necessary without confusion or uncertainty. While the colours are selected for their light reflection value, they are nevertheless serviceable and represent no maintenance problem.

So far only plant offices have been discussed, but when plant shops are considered, it is at once apparent that the same principles apply to the painting of the ceilings, walls, floors and equipment that have been followed in the offices. The workmen in the shops are doing exacting visual tasks in which they require ideal seeing conditions based on the relationship of colour and light.

Therefore, the same recommendations here apply. All ceilings should be painted white. The upper walls should be painted in high light-reflecting colours that have been "greyed" so that they are non-stimulating. Workers that are concentrating for long periods at tasks that require close attention and extreme accuracy do not want to be distracted by stimulating colours. The dado should be serviceable but light-reflecting, and it should combine with the upper walls to present a contrast background both for the machines and the work being done. It is at once apparent that structural colours in different industries, and even in different departments in the same industries, may have to be varied, and in fact it is desirable, in order to avoid monotony in a large plant, that various departments be painted in different colour schemes so that workmen may get a change of colour when they move throughout the plant.



BEFORE being given a "Three-Dimensional Seeing" treatment, this machine was the same drab, dull colour as the material being worked. This "camouflage" delays production . . . and results in mistakes and personal injuries.



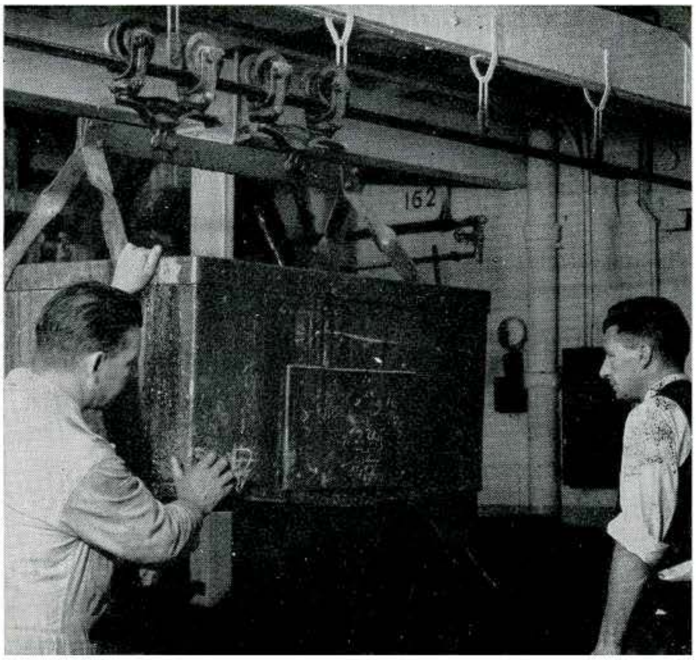
AFTER the body of the machine is painted with Horizon Grey and the working surfaces with the contrasting hue, Spotlight Buff, the "camouflage" is removed and the material being fabricated, stands out in sharp contrast.

Floors should be painted in light reflecting colours. The vast expanse of space in any large plant makes floors an important light-reflecting surface for improving the brightness level. In most plants, floors are allowed to become light robbers. If nothing better can be done, at least the area immediately beneath each machine should be finished in a light-reflecting floor enamel, so that light is reflected upwards to the under parts of the machine and thus facilitates its operation. Good housekeeping and safety are a natural result from this improvement, because the workman will keep the machine and its vicinity clean and tidy.

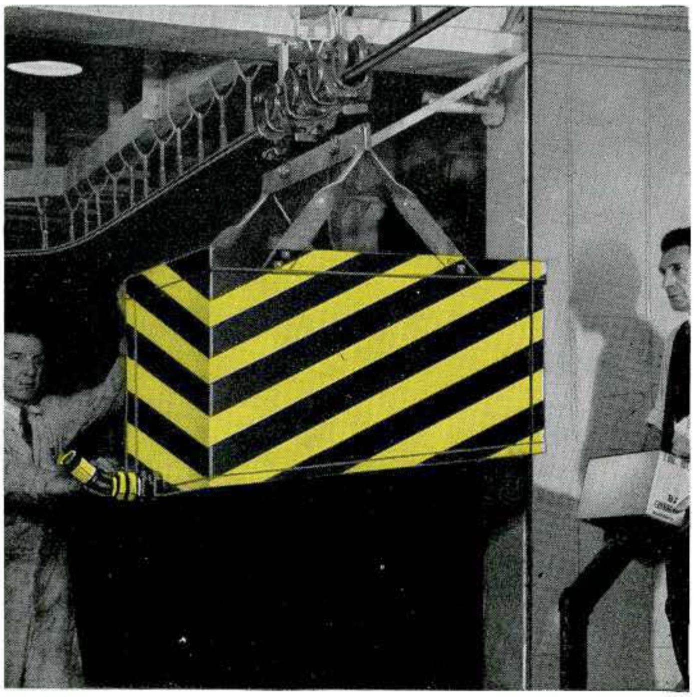
Even the machinery must be used as a light reflecting surface to contribute to the general seeing conditions. Here the principles of brightness engineering are used in the recommendations of *"Three Dimensional Seeing."* A mistake to be avoided in painting machinery is that of overdoing it. There is a tendency to overlook the cardinal fact that a machine is a production tool, and to paint it in fancy colours is to give it a misleading appearance and an excessive brightness which may discourage the worker entirely. At the same time, any parts exposed to constant soiling and abuse may soon appear shoddy if the colour treatment is too delicate. Too many colours used to identify working parts create confusion and defeat the functional purpose of colour. Time study and reaction tests were therefore made to determine what were the two best colours to use on machinery, and it was found that a medium grey and a light buff made a pleasing combination and offered the sharpest desirable contrast. These two colours wre adopted as the "Three Dimensional Colours" and became known as Horizon Grey and Spotlight Buff. It was decided to use Horizon Grey on the main structure of the machine and highlight the working area and working parts with Spotlight Buff. Actual tests have proved that Horizon Grey improved the appearance of the machine and enabled the machine to make its contribution to light reflection; and Spotlight Buff separated the working area from the rest of the machine and exposed the danger points, it increased the visibility at the working level, and supplied a contrasting background for the material being processed. This makes it easier for the workman to see more accurately and quickly, it reduces eyestrain, loss of time, and material loss through spoilage.

When the machine is finished in the "Three Dimensional Colours", with a light reflecting floor, and is clearly visible against a contrasting wall colour, then the workman does think in three dimensions — colour, light and safety.

Colour Conditioning also includes the Safety Colour Code. In every industrial plant there are conditions that are unusual and unexpected that cause injuries to new employees or to workmen who are lacking in alertness through illness, fatigue or worries. There are also times when repairs are undertaken and there is no certainty that all the staff know of them or their whereabouts. There is always emergency equipment that should be instantaneously recognized. The Safety Colour Code assigns a colour to each of six purposes, and suggests that if each of these colours can become identified in the minds of workmen with the purpose assigned to it, then the colours will become signals for safety at all times. The more widely and generally they are used, the more widespread will be their effectiveness. Briefly, the colours and their uses are as follows:



INCOMPLETE
Typical of the many "bump against" hazards is this bucket, dangerously blending into its dull grey background.



CORRECTED
Now Yellow on Black quickly spots this overhead travelling equipment as a definite hazard.

High Visibility Yellow — To indicate striking, stumbling or tripping hazards. For instance, an electric pick-up truck, the flying hooks of an overhead crane, a protruding beam, stairway approaches, or a deceptive step, should be painted in this colour and striped with black.

Alert Orange — To mark parts of machines that might cut, crush or otherwise injure a workman. Exposed parts of pulleys, gears, rollers and cutting devices should be finished in this colour, also interior surfaces of fuse boxes and machinery guards.

Safety Green — To identify First Aid equipment, dispensaries, and the location of safety devices such as gas masks and respirator containers. The Green Cross replaces the red cross.

Fire Protection Red — To point out Fire Protection equipment. Red should not be used in relation to First Aid, nor should it be used on waste pails, nor any equipment or surface that is not connected with the extinguishing of fire. Fire hose, fire hose, fire extinguishers, fire alarm stations and fire blankets should all be identified by this Fire Protection Red.

Precaution Blue — To warn workers against the use of equipment under repair, or machinery that should not be put into operation: ovens, vats, electrical controls, kilns and compressors.

Traffic White — To mark aisles, storage places, and waste receivers. Traffic lanes can be kept clear of carelessly piled materials through the use of Traffic White and production zones may be maintained.

Closely associated with the Safety Colour Code and somewhat similar to it in its recommendations is the Piping Identification System. Here the functional use of colour is designed to facilitate and speed identification of piping and valve systems so that at a glance a workman may know if it is safe for him to begin to work on any pipe or valve that requires repairs or attention. This is especially true in a case of emergency. The colours may be applied over the whole pipe, or in bands at established distances, or may be employed to write an identifying legend on the underside of the pipe.

The four major colours used are:

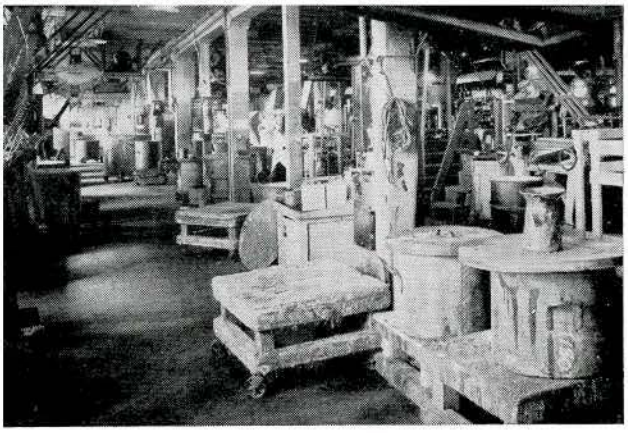
Yellow — for piping containing Dangerous materials.

Green — for piping containing Safe materials.

Blue — for piping containing Protective materials.

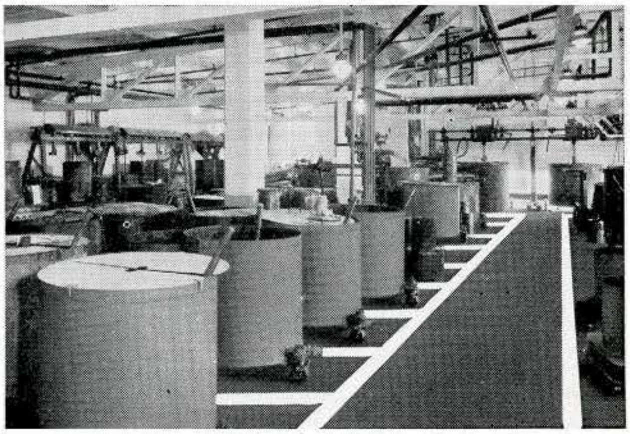
Purple — for piping containing Extra Valuable materials.

Additional colours such as Grey, Aluminum, Brown, White and Black may be used for purposes other than those listed under the four major headings.



CONFUSION

Aisles and storage spaces that are not properly designated and marked, cause confusion and poor arrangement.



GOOD HOUSEKEEPING

White lines identify storage space and aisles. Orderliness and good housekeeping is a natural result.

The importance of the Piping Identification System lies in the fact that it enables maintenance and repair crews to readily locate and trace piping and their contents with a minimum of delay and danger. It is at once obvious that it is essential that all plants should adopt the same colour signals.

In conclusion, it seems advisable to recall a previous statement that "Colour Conditioning" is a design for plant maintenace using colour more freely but with purpose, so that it justifies the expenditure required on the basis that it is an investment that will pay handsome dividends. The workman, who spends a large portion of his daily hours in the plant, enjoys his surroundings and he is bound to feel he is being treated as an individual and not as a unit of a machine. He is a satisfied employee and he reciprocates by helping to maintain the good appearance of the plant and by taking a pride in the organization. As a result, there will be a smaller labour turnover, fewer lost man-hours, improved employee health and morale, simplified maintenance and increased and improved production.

THE INSTITUTE PAGE

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AEDIFICAVIT

CECIL SCOTT BURGESS

Cecil Scott Burgess was born in 1870 at Bombay, India. He received his education at the Royal High School, Edinburgh, Scotland, and was articled under Sir George Washington Brown of that City. He was an Instructor in Architecture at McGill University, Montreal, in 1910, and was later associated with Messrs. Nobbs & Hyde of Montreal in the design of the Arts & Science Building and the Medical Building for the University of Alberta.

He came west to Edmonton in 1913 and assumed the post of Instructor in Architecture at the University of Alberta the same year. This post he retained until his retirement in 1939, and his retirement marked the closing of the School of Architecture in Alberta.

Mr. Burgess has long been active in the affairs of the Alberta Association of Architects, holding many of the offices, including President. He has always championed the cause of the young architect and his sympathetic understanding of their problems in facing their profession has won him many friends. He has been very active in town planning work for the City of Edmonton and his efforts have been largely responsible for the progress made in that line. He holds the position of Honorary Town Planner on the Town Planning Commission for the City of Edmonton, and through his voluntary efforts has contributed largely to the betterment of civic planning in the face of many oppositions. Since his retirement he has almost solely devoted his skill and energy to town planning work and a recognition of his abilities in this regard is to be noted in his recent commission by the Dominion Government to the replanning of the town sites of Banff and Jasper in these famous National Parks.

Mr. Burgess is well known to readers of the *Journal* by his many contributions to the Provincial page and the articles appearing in this Architectural magazine. Mr. Burgess is a Fellow of the Royal Institute of British Architects and also of the Royal Architectural Institute of Canada. In his leisure moments he enjoys a game of golf or curling.

ONTARIO

Mr. Keith in the April number of the *Journal* refers quite properly to the disappointing appearance of Toronto's main commercial streets. That there is bad planning, bad architecture and too much smoke is obvious to the architect and to a rapidly growing proportion of the public. Only recently, however, has it been brought out that the dinginess of so much of the brickwork also has its part in contributing to the general dreariness.

At the last annual meeting of the Ontario Association, a Committee was appointed to investigate the brick situation both as to quantity and quality, and some interesting information has come to light.

The brick shortage can be blamed, in the most part, on lack of labour. Whether the need for this key industry for post-war reconstruction was properly anticipated or whether so much dislocation by wartime controls was necessary, is a matter of opinion. The fact is that work in a brick yard is not sufficiently attractive to appeal to enough young Canadians. If it were not for the use of Prisoner-of-War labour, it is doubtful if some plants now operating could function at all. The situation is serious and should be the subject of Government action.

The problem of quality is not nearly so easy to analyse. We are, of course, discussing face brick suitable for main commercial streets. It is not intended to convey the opinion that no good brick for any purpose is being manufactured because we know it is, but a high class brick suitable for important architecture is extremely limited. The present products of our brick plants are the result of the type of native clay, the method and type of equipment used in manufacture, and the market demand. All three of these factors seem to mitigate against the production of bricks in Ontario that will hold both their colour and durability under existing city conditions.

There is no fire clay or china clay in Southern Ontario. The local clay has a high content of iron and fuses at a relatively low temperature compared to the clays found south of the border. Good brick has been made in the past from this clay as evidenced by examples to be found over many parts of the Province. These were probably hand-made burnt in wood-fired kilns, whereas the present bick is burnt in coal-fired kilns. It is not unreasonable to expect that with proper research, a pleasant coloured and durable brick can still be made here.

The brick companies have had a pretty thin time and it is not likely that large expenses for new equipment would be at all popular, particularly at a time when their present output can be sold many months in advance.

This brings us around to the important part of this discussion—the manufacturers claim that over 60 per cent of their sales are made to speculative builders, that is, people building to sell and not to rent and maintain. These sales are more attractive to the manufacturer than are sales to architects' buildings because the requirements of the builders can be more accurately estimated annually in advance. The manufacturers also claim that insufficient tolerance is allowed as to shape and chipping by the architects. For certain types of bricks, we are inclined to agree with this claim and hope shortly to be able to advise the profession in detail on this matter. The fact remains that the greatest market from the sales point of view requires a brick that will help to make a quick sale. Appearance after a few years does not count and for the present—THE FANCIER THE BETTER!

So there we are.

F. H. Marani.

OBITUARY

J. GRAHAM JOHNSON, F.R.I.B.A., M.R.A.I.C.

J. Graham Johnson was born in London, England, in the year 1882. He was educated at St. Pauls School there and on his decision to become an architect was articled to the Church architects of Cutts, London. In 1909 he commenced practice in the new estate of Gerards Cross, Bucks., where he was particularly interested in house design.

In 1911 he came to Canada and settled in Calgary. When the first World War broke out he went overseas with the 16th Canadian Scottish, but was later invalided back to Canada where he supervised the construction of the Nova Scotia Sanatorium and various other institutions under the Military Hospitals Commission. He began private practice in Kentville, N.S., and there did a great deal of work until he came west for health reasons. He supervised the construction of the Banff Springs Hotel and the Empress Hotel in Victoria. Here he remained and practised, doing a great deal of fine work until his death on July 27th, 1945.

Graham Johnson's death was a great loss to the community and those who had the privilege to know him mourn the loss of a sterling friend and respected business man.

C. Dexter Stockdill.

☆

PROFESSIONAL COLUMN

Mr. Percy E. Nobbs, announces that, following the death two years ago of his partner, Mr. George T. Hyde, a new firm has been formed to carry on the business of Nobbs and Hyde, Architects, under the style of Nobbs and Valentine, as from March 1st at Room 459, Henry Birks Building, 1240 Phillips Square, Montreal. The partners are as follows: Percy E. Nobbs, Hugh A. I. Valentine, and Francis J. Nobbs.

☆

NOTICE

We are pleased to learn that Mr. E. B. McMaster, former Executive Secretary of the A.I.B.C., was honoured at the last Annual General Meeting of the Institute with an Honorary Life Membership in recognition of his many years of service as Executive Secretary.

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