Building Metrication News

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This section appears in the fourth issue of 'Building' each month, and gives current news and information on metrication, as well as providing a forum in which the ramifications of the change to metric can be freely discussed. It is published in association with the Modular Society.

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METRIC MONTH

Metric Health Building

Following on the Ministry of Housing's circular giving details of its plans for going metric the Ministry of Health have now issued a circular, to Regional Hospital Board,* on its plans. These circulars are of particular importance because the change to metric is only mandatory in so far as Government departments require their building programmes to be in metric measurement. According to the circular, the Ministry is preparing a new Design Note (no. 5 Co-ordination of Components for Health Buildings) to succeed notes 1 and 2 which are in imperial measure. This note will give guidance on the use of the new co-ordinated components and is to be published as soon as possible.

Programme

The Ministry's programme of change follows the BSI programme as follows:

1 Projects programmed to start before 1 January 1970 should be in feet/inches; (If, exceptionally, the contract is expected to involve substantial building after 1972, the Ministry should be consulted);
2 Projects programmed to start after 31 December 1972 should be in metric terms, following the new preferred dimensions;
3 Projects programmed to start on or after 1 January 1970 and before 31 December 1972 should be reviewed individually and a decision reached whether to design to metric or feet/inches having regard to the national programme, the probable length of the construction period for the project, the stage of planning already reached and the amount of design work which would have to be redone. In the case of projects the estimated cost of which makes them subject to the Minister's approval, the Ministry should be consulted before the decision is taken. It will suffice for this purpose if all such projects are listed with the board's recommendation and a short summary of the reasons for adhering to feet/inches if that is the intention. The object of this consultation is to ensure a progressive build up of experience in design and the incorporation of components in metric terms, in conjunction with industry.

Where there may be special justification for the earlier submission of metric schemes prior agreement of the Ministry will be necessary in every case. This will be given only in special cases, and not until the metric dimensional framework has been officially promulgated.

* Circular HM(68)25

The Minister is concerned to ensure that all authorities make the fullest use of the opportunity provided by metrication for rationalising design, production and site operations by the use of standard components. In order to maintain progress a new section of the Compendium of Hospital Building Assemblies in metric terms will be published in 1968. The aim will be to promulgate metric British Standards for all components and to ensure that the new components are developed in accordance with such British Standards. The Minister considers it essential for the success of metrication that either the Compendium is used initially or, when a British Standard has been promulgated for a component, components designed in accordance with the standard are used. The production of new standard components often involves heavy investment in production facilities, which must be planned long in advance, and manufacturers require some reasonable assurance that the standard product will be used at once on an economic scale. Only such an assured market makes possible the potential reduction in cost which can be obtained from standardisation.

Until metric components conforming to a new metric British Standard are available, boards should continue to specify the components set out, in the Compendium which, by the end of 1968, will be described also in metric terms. Boards are requested not to develop their own local standards for metric components. Such local standards may well prove to be different from the relevant British Standard and will therefore not be acceptable for schemes on or after 1 January 1973. Moreover, after the publication of the Design Note on the application of the new metric dimensional framework, any metric scheme submitted at layout stage will be expected to conform to the recommendations in that Note, and approval may be withheld if it departs unreasonably from these recommendations.

Metric schemes, like those using imperial measurements, will be subject to the guide material and cost limits set out in Building Note series. A further Design Note will be published which will set out the metric space standards for all health buildings. Building Regulations will also be metricated to enable metric schemes to be designed in compliance with them.

It is to be expected that the first metric schemes may bring to light problems which it would be advantageous to disseminate. The Ministry will keep in touch with the metric schemes as they progress and provide an information service on problems arising out of metrication. As part of this service the Ministry will arrange lectures and seminars for the practical application of the new dimensional framework and the recommendations in the Design Note which it will issue on this subject.

BUILDING METRICATION NEWS

The Metric Change

9. The METAL FIXING ASSOCIATION FOR CEILING SYSTEMS

In the autumn of 1967 the MFACS set up a Metric Working Party to study how the metric change will affect their members. The subsequent report, of which this article is a précis, was circulated to MFACS members in the spring.

The MFACS Metric Working Party consisted of members representing wood fibres, metal trays, luminous ceilings, mineral fibres, strip ceilings, asbestos-based products and metal goods for suspended ceilings. Their functions include the provision of decorative concealment of services, protection of structures against fire, illumination, thermal insulation acoustical control and heating and ventilating.

PRODUCT	THICKNESS		COMMON SIZES	
	Current sizes in imperial units (with metric equivalents	Possible future co-ordinated sizes per B.S. 4011—first preferred metric dimensions	Current sizes in imperial units (with metric equivalents)	Possible future co-ordinated sizes per B.S. 4011—first preferred metric dimensions
WOOD FIBRE—SHEETS (normally full size for industrial linings)	½ in. (12·700 mm) ⅝ in. (15·875 mm) ¾ in. (19·050 mm) 1 in. (25·400 mm)	12·700 or 13·000 mm 16·000 mm 19·000 mm 25·400 or 25·000 mm	2 ft. (609·6 mm) and 4 ft. (1219·2 mm) widths × 2 ft. (609·6 mm) and 1 ft. (304·8 mm) increments to 12 ft. (3657·6 mm)	600 and 1200 mm widths × 600 and 300 mm increments to 3600 mm
PANELS FOR LAY-IN GRIDS (slightly undersize for exposed grids—future sizes reduced by 5 mm—not 6·35 mm)	½ in. (12·700 mm) ⅝ in. (15·875 mm) ¾ in. (19·050 mm) 1 in. (25·400 mm)	12·700 or 13·000 mm 16·000 mm 19·000 mm 25·400 or 25·000 mm	nom. 2 ft. (609·6 mm) act. 1 ft. 11¾ in. (603·25 mm) widths × nom. 2 ft. (609·6 mm) act. 1 ft. 11¾ in. (603·25 mm) and 1 ft. (304·8 mm) increments to nom. 6 ft. (1828·8 mm) act. 5 ft. 11¾ in. (1882·45 mm)	nom. 600 mm act. 595 mm widths × nom. 600 mm act. 595 and 300 mm increments to 1800 mm
BEVELLED PANELS (plain, decorative and acoustic)	½ in. (12·700 mm) ⅝ in. (15·875 mm) ¾ in. (19·050 mm) 1 in. (25·400 mm)	12·700 or 13·000 mm 16·000 mm 19·000 mm 25·400 or 25·000 mm	Bev. only: 1 × 1 ft. (304·8 × 304·8 mm) 2 × 1 ft. (609·6 × 304·8 mm) 2 × 2 ft. (609·6 × 609·6 mm) 2 × 4 ft. (609·6 × 1219·2 mm) 3 × 4 ft. (914·4 × 1219·2 mm) 4 × 4 ft. (1219·2 × 1219·2 mm) Bev. kerfed and rebated or T & G 2 × 1 ft. (609·6 × 304·8 mm) 4 × 1 ft. (1219·2 × 304·8 mm) 8 × 1 ft. (2438·3 × 304·8 mm) 1 ft. 4 in. × 1 ft. 4 in. (406·4 × 406·4 mm) 2 × 1 ft. (609·6 × 304·8 mm) 2 × 2 ft. (609·6 × 609·6 mm)	 300 × 300 mm 600 × 300 mm 600 × 600 mm 600 × 1200 mm 900 × 1200 mm 1200 × 1200 mm 600 × 300 mm 1200 × 300 mm 2400 × 300 mm 400 × 400 mm 600 × 300 mm 600 × 600 mm
METAL TRAYS (plain, decorated or perforated from $\frac{1}{16}$ to ⅛ in. (0·015 to 0·031 mm) at various pitches approx. 15% open area). Derived units. Thermal conductivity 0·25 k-Btu/in/ft²/Hr/deg. F with 1 in. mineral wool (0·036 w/m deg. C with 25·4 mm mineral wool). Weights ¾ lb. to 3 lb. per sq. ft. (3·7 kg to 14·6 kg per sq. metre).	(Gauge) 24 g (55·88 mm) approx	(Gauge) Available metric gauges not known	1 × 2 ft. (304·8 × 609·6 mm) 1 × 4 ft. (304·8 × 1219·2 mm) 1 × 5 ft. (304·8 × 1524·0 mm) 2 × 2 ft. (609·6 × 609·6 mm)	300 × 600 mm 300 × 1200 mm 300 × 1500 mm 600 × 600 mm
LUMINOUS CEILINGS—CLOSED DIFFUSERS PVC film tensioned on to a metal frame	(Gauge) 0·004 in. (0·1016 mm)	(Gauge) Informed sources suggest 0·1 mm will be chosen	2 × 2 ft. (609·6 × 609·6 mm) 3 × 3 ft. (914·4 × 914·4 mm) 3 ft. 4 in. × 3 ft. 4 in. (1016 × 1016 mm) 5 ft. × 3 ft. 4 in. (1524 × 1016 mm)	600 × 600 mm 900 × 900 mm 1000 × 1000 mm 1500 × 1000 mm
Acrylic sheets (flat or extruded sheets)	⅛ in. (3·2 mm)	3 mm	Panel: 2 × 2 ft. (609·6 × 609·6 mm) Sheet: 8 × 6 ft. (2438·4 × 1830 mm)	 600 × 600 mm 2400 × 1800 mm
OPEN LOUVRES Light stabilised polystyrene	Varies according to cell size	—	2 × 2 ft. (609·6 × 609·6 mm) 3 × 3 ft. (914·4 × 914·4 mm) 4 × 4 ft. (1219·2 × 1219·2 mm)	600 × 600 mm 900 × 900 mm 1200 × 1200 mm
Metal—aluminium	Varies according to cell size		2 × 2 ft. (609·6 × 609·6 mm) 2 × 4 ft. (609·6 × 1219·2 mm)	600 × 600 mm 600 × 1200 mm
MINERAL FIBRE Mineral and glass fibre tiles and lay-in boards (plain, decorative or acoustic)	½ in. (12·70 mm) ⅝ in. (15·88 mm) ¾ in. (19·05 mm)	minimum 12 mm minimum 15 mm minimum 19 mm	Tiles: 1 × 1 ft. (304·8 × 304·8 mm) 1 × 2 ft. (304·8 × 609·6 mm) 2 × 2 ft. (609·6 × 609·6 mm) Lay-in boards: nom. 2 × 2 ft. (609·6 × 609·6 mm) act. 1 ft. 11¾ in. × 1 ft. 11¾ in. (603·25 × 603·25 mm) nom. 2 × 4 ft. (609·6 × 1219·2 mm) act. 1 ft. 11¾ in. × 3 ft. 11¾ in. (603·25 × 1212·85 mm)	 300 × 300 mm 300 × 600 mm 600 × 600 mm nom. 600 × 600 mm act. *approx.* 593·65 × 593·65 mm nom. 600 × 1200 mm act. *approx.* 593·65 × 1193·65 mm

BUILDING METRICATION NEWS

PRODUCT	THICKNESS		COMMON SIZES	
	Current sizes in imperial units (with metric equivalents	Possible future co-ordinated sizes per B.S. 4011—first preferred metric dimensions	Current sizes in imperial units (with metric equivalents)	Possible future co-ordinated sizes per B.S. 4011—first preferred metric dimensions
STRIP CEILINGS Aluminium	(Gauge) 25 swg (0·508 mm)	(Gauge) 0·508 mm	2·835 in. (72 mm) 3·96 in. (100 mm)	72 mm 100 mm
Plastic (Polyvinyl Cnloride)	0·02 in. (0·508 mm)	0·508 mm	4 in. wide × 300 ft. (101·6 × 101500 mm)	100 × 100000 mm
ASBESTOS-BASED PRODUCTS Panels and planks (plain, patterned and perforated)	¼ in. (6·4 mm) ⅜ in. (9·5 mm) ½ in. (12·7 mm)	under consideration	2 × 2 ft. (610 × 610 mm) 2 ft. × 2 ft. 8 in. (610 × 813 mm) 2 × 3 ft. (610 × 914 mm) 2 ft. × 3 ft. 4 in. (610 × 1016 mm) 2 × 4 ft. (610 × 1219 mm) 3 ft. 4 in. × 3 ft. 4 in. (1016 × 1016 mm) 4 × 4 ft. (1219 × 1219 mm) 8 in. × 8 ft. (203 × 2438 mm) 8 in. × 10 ft. (203 × 3048 mm)	600 × 600 mm 600 × 900 mm 600 × 1200 mm 1000 × 1000 mm (second preferred dimension) 1200 × 1200 mm
Lay-in panels	¼ in. (6·4 mm)	under consideration	Basic 2 × 2 ft. (610 × 610 mm) Basic 2 × 4 ft. (610 × 1219 mm) Basic 1 ft. 8 in. × 3 ft. 4 in. (508 × 1016 mm) Basic 3 ft. 4 in. × 3 ft. 4 in. (1016 × 1016 mm) Panels are cut $\frac{3}{16}$ to $\frac{5}{16}$ in. (4·8 to 7·9 mm) less than basic size to suit grid centres on a 2 ft. module	Basic 600 × 600 mm Basic 600 × 1200 mm
Derived units Area ft^2 (m^2) Volume ft^3 (m^3) Weight lb/ft^2 (kg/m^2) Density lb/ft^3 (kg/dm^3) Modulus of rupture tensile strength Youngs modulus lb/in^2 (N/m^2) Frequency c/s (Hz)				

Metal Grids

The metal grid systems for supporting ceiling panels, both concealed and exposed in existence in imperial sizes at present, have been designed over a number of years to give the most economical sections coupled with the minimum dimensions required to support certain types of infill panels. For instance, 1½ in. table width is generally specified as the minimum required standard for supporting wood fibre lay-in panels, and a similar width has been adopted for concealed fixing with kerfed and rebated panels.

Depth of stalk and thicknesses (i.e. gauge) of metal have also been adapted to minimums, bearing in mind the economics involved and the required spans. It would, therefore, seem imprudent to recommend any drastic alterations in gauge thickness or dimensions of grid systems. The industry would naturally recommend, for reasons of safety, that the dimensions should be taken up to the nearest metric equivalent rather than to diminish existing sizes.

At this stage it is not known what proposals will be made by the steel rolling industry with regard to thicknesses, and final gauges and thicknesses of metal will depend largely on those to be produced by the strip rolling mills.

With regard to altered size of ceiling panels, the proposals would seem to be for a slight reduction in overall dimensions, but virtually insufficient to make any reduction in gauges of metal sections used to support them. The alteration in grid sizes to the co-ordinated metric dimensions should present little or no difficulty by adjustment of existing tooling, except where perhaps interlocking systems with punched stalks are concerned and in this respect the distances of punching should be adjusted.

A suggested set of dimensions for standard punching of main tee sections for interlocking cross tees might be as follows:

Main tee lengths 3,600 mm, punchings at 150 mm centres commencing 75 mm from each end of the tee section.

Cross tee dimensions 1,200 mm and 600 mm effective lengths.

This will allow for concealed grids to be set out for panel sizes of 600 mm x 600 mm, 600 mm x 300 mm and 300 mm x 300 mm.

Panels for exposed grid systems to the above modules would normally require to be supplied to nominal sizes, i.e. less than 5 to 6 mm to each dimension.

For concealed grid, lengths of main tee sections are of less importance but it would be suggested that a present length of 12 ft. should be translated to 3,600 mm and lengths of 15 ft. to 4,500 mm.

Ancillary components such as edge trims, hangers, etc., it is suggested would also follow a similar trend in that lengths would be adjusted to conform to a suitable metric dimension, i.e. 3,600 or 4,500 mm. Hangers and other components normally supplied to lengths should also be given in suitable metric dimensions, i.e. 300 mm, to replace the present 12 in. dimension, and equal variation thereof. Gauges and sizes of hangers should be to the nearest metric equivalent without reducing gauge or thickness beyond safe limits.

All screws, nuts and bolts, self-tapping screws and other fixing items would be given in metric sizes, these being already in force for these industries.

Future Programme

In accordance with the Programme for the change to metric in the construction industry, PD 6030, metric equivalents (in mm) for products as they are now produced must be indicated in manufacturers' technical information by the end of 1968. Following the receipt of specifications and drawings in metric units from January 1969, suspended ceiling specialists will start to change construction based on metric units on new contracts in 1970. Meanwhile MFACS, since February, has representation on functional group panel 3—internal subdivision, BSI Dimensional Co-ordination in Building.

Information Sheets

As the changeover to metric progresses we shall be including, within this section, details of metric products, and manufacturers will be invited to support these with information sheets. Manufacturers wishing further information on this service are invited to contact the Advertisement Director of 'Building.'

International Modular Group

COMMITTEES MEET IN ZURICH

A meeting of the technical and editorial committees of the International Modular Group was held recently in Zurich to settle a programme of work for the next year. An account of the proceedings is given by Bruce Martin.

A joint meeting of the technical and editorial committees of the International Modular Group was held in Zurich from the 23 to 25 April. Convened by the Swiss Centre for Rationalisation of Construction, the meetings took place at the head office of the Swiss Society of Building Contractors (Societe Suisse des Entrepreneurs). During the course of the meetings visits were made to the brickworks of Keller & Co. Ltd. in Pfungen and to a housing development near Winterthur.

Delegates present represented 12 countries: Denmark, France, Italy, Japan, Netherlands, Norway, Poland, Sweden, Switzerland, United Kingdom, USSR, and Western Germany. The International Organisation for Standardisation (ISO) was also represented. The purpose of the meeting was to settle the future programme of work of the group, especially during the next 12 months.

Lennart Bergvall (Sweden) was elected chairman of the joint meeting. In the early stages, papers were presented by N Uskiy, of the USSR State Committee on Civil Construction and Architecture, on experience acquired in the field of modular construction; by A. Chkinev and V Bourlakov on controlling dimensions for industrial and agricultural buildings; by D. Khasanov on multi-modules and their use in the USSR; and by G. A. Atkinson of the UK BRS on the work of the CIB Commission W 19, relating to joints and tolerances.

Russian Experience

Mr. N. Uskiy, in his report on the application of modular co-ordination in the USSR, wished particularly to call the attention of the IMG committees to the fact that adoption of modular sizes had not yet, of itself, ensured either common jointing details or standard work sizes for components. Long experience of construction in the USSR had shown that unification of modular sizes of components had not prevented considerable variety in the corresponding work sizes. For example, the work sizes of a floor panel with a modular size of 6000mm might be 5980, 5960, 5940, 5920, 5880, 5860, 5760 and so on. These sizes resulted from the positioning of walls in relation to the buildings' centre-lines, the support provided for the panel, the joint widths and other factors.

In order to reduce the number of sizes of components having the same modular size, it had been decided to introduce catalogues of prefabricated industrial components and structural members into factories and design organisations. Furthermore, in individual cities or regions a further selection was made to limit the number of types and sizes of components appropriate to the area. Such catalogues become mandatory for all building organisations within the region. Work was proceeding on the improvement of these catalogues and envisaged 'The general assortment of modular elements applied in new standard design series for building in 1971-1975 (sic.).

A. Chkinev and V. Bourlakov in their paper on industrial and agricultural buildings proposed studies intended to determine suitable sizes for the key controlling dimensions: floor-to-floor heights, spans, spacing of crane rail tracks, distance between axes of columns, at right angles to the span, column grids, heights of wall panels and heights of window openings.

D Khasanov's paper was concerned with the proposed sizes of multi-modules, their use in the USSR for buildings made of prefabricated reinforced concrete components, and their fields of application.

Future Programme of Work

A report was provided by BRS on current work in the United Kingdom. The IMG Group is a working commission (W.24) of CIB (Centre Internationale du Batiment) and provides a forum for international exchange of information on the progress of work in the fields of sizing of building components and products, dimensional co-ordination of buildings, tolerances in manufacture and deviations in asembly, and jointing of components.

Folowing the presentation of papers, discussions ranged for nearly two days over the subjects requiring attention in the immediate future and the methods of organising the work.

Mr. Bergvall emphasised that the work of IMG was not one of scientific research, which was done at the national research centres, but to co-ordinate the efforts in different countries by establishing the existence of different viewpoints and then trying to reconcile them. Mr. Khasanov stressed the necessity of having different points of view represented on the working groups if a genuine agreement was to be reached. G. Blachere (France) was anxious to limit the scope of study work to new developments and to clarify priorities.

It was agreed that in the light of the limited facilities available to the IMG, the number of subjects to be studied should be restricted and that choice should be based on the following:

a) the urgency, from the point of view of reaching international co-ordination, of an agreement on the subject.

b) the extent to which sufficiently useful information on the subject was at hand or easily available.

c) the importance of undertaking complementary studies needed to make previous agreements practicable.

It was agreed that the discussion of any subject on which agreement had already been reached should not be reopened unless there was new information on the subject, whether practical or theoretical.

It was further agreed that a distinction should be made between subjects of short-term study and those of long-term. In practice this meant subjects able to be reported on in a year's time at the next plenary meeting and those which were either less urgent or required more time for study than one year.

It was also recognised that while some subjects could be dealt with by a single rapporteur, others would require comprehensive work through a rapporteur acting with a sub-committee, and it was agreed to treat as many subjects as possible by rapporteur and to form a sub-committee only when essential.

It was eventually decided to set priorities in the subject-matter and to nominate rapporteurs who would be responsible for gathering information, in some cases with the help of a small specialist group, and reporting back to the plenary meeting of the IMG in about a year's time.

Three subjects were regarded as of prior importance and to be studied in the immediate future, namely: conventions on jointing, multi-modules for large buildings and multi-modules for small buildings. The following groups were therefore set up:

Group 1: Conventions for jointing. Bruce Martin (United Kingdom) (rapporteur), K. Blach (Denmark), G. Blachere (France) and P. Maggi (Italy).

Group 2: Multi-modules for large buildings. D. Khasanov (USSR) (rapporteur), K. Blach (Denmark), H. Joss (Switzerland) and Anthony Williams (UK).

The third subject, multi-modules for small buildings (one-family houses), was to have a rapporteur only, but the following members were to be consulted: L. Bergvall (Sweden) (rapporteur), S. Kent (Canada), E. Stathakis (Greece), T. Komada (Japan) and Bruce Martin (United Kingdom).

Subjects for long-term study were then considered and their rapporteurs were elected as follows:

Subject 4: Storey-heights for large buildings. N. Maggi (Italy).

Subject 5: Storey-heights for small houses. L. Bergvall (Sweden).

Subject 6: Industrial and agricultural buildings. A. Chkinev (USSR).

Working in Metric

PORTSMOUTH SCHOOL OF ARCHITECTURE EXPERIENCE

How easy is it to work in metric? In 1966 the School of Architecture, Portsmouth College of Technology, introduced metric working into the curriculum and their subsequent experiences are described here by Barry Russell, ARIBA. Students, it appears, accepted the change rather more easily than the lecturers.

In discussions among the staff during the summer of 1966, the question of introducing metric working into the school was examined. Although there was little official information at the time, it was quite clear that an early start should be made, since students starting the course in September of 1966 would not finish their course until 1972—well towards the end of the ten-year change period. It was also felt that there was little point in delaying the start until more information was available since the problem areas would only become evident when work in metric was carried out.

It may be recalled that in the autumn of 1966 there was little information from official sources. The BSI Questionnaire had gone out early in 1966 but neither the Programme for the change nor the Guide were published until February 1967. The school was, however, fortunate in that Michael Clarke of BSI paid it a visit early in 1967 and gave a comprehensive lecture on the implications of the change which provoked a good deal of thought.

The introduction of metric working was coincident with the introduction of several projects and lecture courses on dimensional co-ordination, systems design and component building. It should perhaps be mentioned that initially no members of staff had direct experience of metric working although subsequent staff additions included two with experience of continental practice which proved invaluable in that they were thinking in metric sizes.

Discussions are currently taking place in the school to review what has so far taken place, to pinpoint strong and weak areas and to consolidate the position in preparation for the next session.

Areas of Change

Project Work

Initially it was agreed that it would be mandatory for all project work in first and second years to be in metric. This session for the first three years all work is in metric and the majority of thesis work is so by choice. This means that all projects and related material have been written in metric.

Lecture Material

It was also agreed at the outset that an attempt should be made to use metric terminology in technological subjects and in 1966 verbal numerical equivalents were given in some Building Science lectures. However, it proved that there was very inadequate information at this time—as indeed there still is—which made progress slow. Those proposing to introduce metric working overnight 'when the time comes' should remember that it is a laborious process converting large quantities of material much of which may be interdependent. One useful intermediate step developed was to convert, where possible, into ratios or percentages, thus eliminating many direct imperial references.

Similarly there has been an information deficiency in such areas as environmental science and structures. The recent publication of the AJ metric guide and the loading Code of Practice have slightly improved the position. Lecture material given to the school by other departments contains little reference to the metrication aspects of the subjects: this is perhaps to be expected since the full impact of the programme for the change is only of recent months being widely felt, and other departments are largely involved in the rate of progress in their own particular area.

Handouts

Information sheets relating to lectures and to projects are considered important and fall into two categories apart from actual project programmes: lecture/seminar information sheets and project/general course information. These are issued on A4 sheets and normally carry their reference in the top right-hand corner (SfB or project reference) and wherever possible carry information in metric terms or imperial with metric equivalents.

Clearly handouts to support projects called for in metric terms had also to be in metric and this involved conversion work: e.g. in one case the provision of Parker Morris space standards tables in square metres and density figures per hectare.

Examinations

Drawn examinations in lower years are in metric, written examinations are generally still in imperial with an option to work in metric. This option has been taken up by some students used to metric working in science subjects at sixth form level. It is intended that all examinations next session shall be in metric.

Some Problem Areas

Thinking Metric

Although all project work has been in metric it was felt that, due to the built-in understanding of imperial, thinking metric would be a real difficulty. As far as students are concerned it is clear that this is not the case after exposure to frequent use—an obvious point but one worth making in view of the apprehension raised by the now frequent theorising on 'going metric' at various professional gatherings.

An early project in the first year is an anthropometric study. All students in the year are measured and relevant averages are extrapolated in metric terms throughout. This forms an early introduction to the dimensional relationships in the human figure and makes students conversant, early in the course, with the meaning of this information in relation to metric numeration.

Another project, this time in second year, entailed taking an existing building and converting this into metric modular terms. This was useful in several respects: it acquainted students with the meaning of space in metres, encouraged them to become conversant with the metric meaning of 'a door,' 'a table,' and raised the problems of taking a set of requirements and producing an optimum modular metric solution.

One of the problems facing architects in practice will be the availability of metric components whilst students, in all but live projects, can accept the principle of a component or material without being obliged to accept its precise existing dimensions. Only where a student rigidly adhered to existing component and material sizes and configurations did he revert to the use of imperial measure (or the use of metric equivalent sizes) on his drawings.

As was pointed out at a recent RIBA metric discussion, the teaching of technological subjects is an attempt to clearly state the principles; the mechanics of it, whether in metric or imperial, normally being an illustration of those principles. This may be paralleled with methods for teaching mathematics in primary schools, where children are encouraged to measure using all manner of units, from an odd collection of jars and buckets to their own body height. This provides a growing awareness of the principles. However, there is no doubt that getting the feel of metric space or judging the likely size of a beam will require an inbuilt experience which only actually using metric can give.

Scales and Paper Sizes

At the introduction of metric working in the school the recommended scales as later set out in the BSI guide were not known and students therefore investigated for themselves which scale appeared suitable for a given situation. When the Guide became available students were encouraged to obtain copies. However, it is my view that it is far preferable for students to find out for themselves what may be the implications of using specific scales than to insist on a set of recommended scales which none of us know is THE answer until we have experienced using them. Of course, on some projects the scales had to be laid down as had other requirements.

The use of international paper sizes was also introduced for project work and all school documentation. A scale problem often arose where drawings had been called for on a specific A sized sheet: a particular solution, for example, would not ideally fit the sheet unless it was drawn, say, to a scale of 1:75 or 1:125—very non-rational scales by BSI standards. On occasion the selection of the 'wrong' machinery sheet size or mandatory scale was due to lack of metric expertise on the part of the staff concerned but more usually it pointed up a problem which most 'drawing architects' face frequently—namely, 'which scales and which paper sizes shall I use for this job?'

It is worth remembering that we have a built-in set of values for this operation in imperial measure and, although many metric scales are similar, an adjustment will have to be made. In fact the decision here could usually be said to be 'solution dependent': i.e. what you are drawing determines at what scale you draw it and on what sheet size. If either scale or sheet size are predetermined, a problem may be raised if the class of solution is not known already. If, however, both scale and sheet size are predetermined the range of solutions can be affected.

The question of obtaining metric scales presented a problem initially, since local suppliers had to be convinced that the requirement was real. It may be recalled that there was some discussion in the journals concerning the difficulty of obtaining scales prior to the marketing of those produced by the RIBA. A student, however, easily and rapidly found a ready supply source already marketing a wide range of scales and at prices below those of the RIBA scales. Metric scales flooded the school.

The usual problems were encountered by students in obtaining paper and prints to A sizes from local suppliers but the view was taken that the demand would encourage the supply which, ultimately, it appears to have done. The production of school documentation on A4 sheets suggested a problem with the supply source: an interim measure was to precut foolscap to A4 length until the burden of precutting suggested to that source that it might be simpler to order the required size.

Reference Material

The lack of reference material of a general nature but particularly for subjects such as environmental science and structures has been a handicap. There is an increase in the flow, but metric equivalent tables and the re-publishing of official publications and textbooks is still sparse in these areas.

The number of manufacturers providing metric equivalents, although improving, is far from adequate. The fact that students in the school are conversant with metrication has meant that where the opportunity occurs (plant or exhibition visits) they can be particularly forthright in discussions with manufacturers.

Effects

I have not recently been asked the question I was sometimes asked by students in the autumn of 1966: 'is the building industry seriously going metric?' and it is hardly necessary to even state that drawn work is to be in metric: it has been accepted as a normal part of the working of the school. It is also accepted that conversion has to be carried out in connection with projects where the source material is still in imperial—students readily converting a Ministry or other document when necessary. I think it can also be said that many students, having worked in metric for some two years, are now thinking metric. It is the staff who are finding it difficult. Students will confidently explain their schemes in metric terms and it is an odd experience to realise, when they hesitate in converting a floor height or room size to imperial measure for a flagging lecturer, that they have never thought of the scheme in feet and inches.

Students currently in their third year now looking for jobs for the year out have found that, however minimal their knowledge of metric working is, that knowledge is usually to their advantage when most offices are having to face the prospect of starting projects in metric early in 1969. Further than this, a recent link with schools and offices in Denmark will enable students to gain experience of the relation of continental practice in metric to progress here.

I have detected a note of concern from staff at some schools who see their position as educators in jeopardy when asked to teach something about which they know little and in which they have had no experience. It is perhaps not so bad as far as the student is concerned since he can see himself acquiring a fluency more quickly than his educators. The change was not made because we knew all the answers but because we saw it as an area that both students and staff could usefully explore together. It has also meant that over the past two years progress and developments in the change to metric have been followed with the critical faculties sharpened by the necessity of having to use the results.

PUBLICATIONS

The 1968 Red Book

The 1968 Red Book, published by the Architects' Benevolent Society, has as its theme the conversion to metric dimensions. It is in the form of a brief metric manual, and advertisers have been asked to support the theme and to include metric information about their products. The Red Book, which will be sent to all members and subscribers of the ABS, contains the society's annual report and accounts, as well as the metric manual. Through the generosity of Wates Ltd., the building contractors of Norbury, and with the support of H. W. Faber Castell, manufacturers of scales, the society is able to include in each copy of the Red Book a free metric scale with divisions as recommended by the RIBA.

Conversion Aid

From January 1969, all drawings and documents for new buildings and civil engineering contracts should incorporate metric units. To help with the change-over, the Construction Industry Research and Information Association (CIRIA) has prepared a comprehensive booklet of metric conversion factors to cover engineering and building requirements. The booklet is pocket size (A6: 105mm. x 148mm.), printed on non-tear water-proof plastic film and eyeletted in one corner so that it can be hung from the drawing board. CIRIA members receive one copy free; further copies are available from E. N. Mason and Sons, Colchester, Essex, price 6s. each.

NFBTE Guide

NFBTE has published a contractors' guide, The Change to Metric, to help builders when the changeover to metric is made. By January 1970, contractors will start working to metric drawings.

The guide is in three sections. The first describes the general background to the subject; the second gives details of the current situation and the programme for the change as it affects publishers of reference publications, designers, materials manufacturers and contractors; and the third section recommends the action to be taken by member firms of the NFBTE. In this connection it is recommended that each firm should appoint a person of appropriate seniority who will keep up to date on all matters connected with the change and advise the firm when specific action should be taken. All member firms are strongly urged to adhere scrupulously to the programme for the change. 'To lag behind the programme,' says the guide, 'or to anticipate it, seems likely to involve builders in costs additional to those which will unavoidably occur in making the change in accordance with the programme.'

Copies are obtainable from the NFBTE Publications Section, 82 New Cavendish-street, W1, price 1s. 9d. each, post free.

The Contractor's Viewpoint

EFFECT OF GOING METRIC

G. G. Rice, director, Richard Costain (Projects) Ltd., outlines some of the problems the contractor has to face in making the change and what preparations should now be made to meet them.

It is only now that people outside the few dedicated experts are beginning to realise how total will be the impact of the metric change on our business and personal lives.

That it will be more difficult than the change to decimal currency there is no doubt. With decimal currency there is an already agreed clean break-point. We go to bed on the night of 14 February 1971 and wake up next morning decimalised. Admittedly, the old coins will be circulating for quite a while, but our transactions will be in decimals. Moreover, the Government will be undertaking a massive education programme between now and Decimal-day.

No M-day

With the metric change there is no M-day equivalent to D-day. Industries will make the change over a period of years in accordance with programmes produced by the British Standards Institution in collaboration with the industries concerned. The programme for our industry was published in February 1967 and allows for the change to begin in 1967 and be substantially complete by the end of 1972. Other programmes are being worked on, and a draft for the engineering industries was issued for comment in March 1968. This programme, which allowed for the change to take place during the years from 1969 to 1975, has had a varied reception by the industry. It seems that more firms are beginning to assess the likely cost and the possible benefits of going metric. And in some instances the sums have been alarming.

Schizophrenia

It has so far been assumed that the metric system would be introduced industry by industry, and that the retail sector would make the change at some later date. Now that the implications of the change are becoming more fully understood, the wisdom and even the practicability of a later date for the change for the retail sector is being questioned.

It is going to be difficult enough to re-educate people, but how much more difficult will it be if we use the metric system during the working day, and the imperial system in our private lives? The painter getting used to covering power in terms of litres of paint to the square metre, goes home to buy his beer in pints and his new carpet by the square yard! His wife will remain 'imperial,' whilst he will become a metric/imperial schizophrenic.

It is clearly desirable, as soon as possible, to form a Metrication Board with functions and powers similar to the Decimal Currency Board. This Metrication Board would 'overlord' the change throughout the economy, and ensure that industry, commerce and education kept their plans in phase.

Costs

It has been said that costs in the construction industry will be reduced when we go metric. Taking the industry as a whole this is not so. Just 'going metric' achieves nothing. Benefits will only occur if at the same time we can secure a great reduction in the varieties of sizes of materials and components, and also go a long way towards the goal of dimensionally co-ordinated interchangeable components. The attainments of these objectives is absolutely vital to our industry. The main reason why construction was the first industry to produce a programme for the change was to use it as a means of putting new impetus into work on dimensional co-ordination and variety reduction.

Some industries can justify the costs of the change by advantages gained in the export field. This is not so with construction. Annual output of the industry is around £4,000m per annum. Exports of construction materials are about £120m a year. A study of those materials and components exported will show that only a small proportion are likely to gain from being metrically dimensioned. It seems most improbable, therefore, that extra costs of UK output could be recouped by profits on additional exports.

The Contractor's Problems

In an article of this length it is not possible to cover all aspects of the change, so most of the rest will be devoted to the contractor's viewpoint. This is not to pretend that the architects, engineers, quantity surveyors, and others will not have their problems. Of course they will, but they are likely to be more easily soluble than the contractor's. In a professional office, for instance, it should be possible to allocate 'teams' to metric contracts as they arrive in the office, with the reasonable hope that these teams will not have to return to imperial contracts. With the materials producer, he should be able to turn over his factories one by one to metric, or at least to have metric and imperial production lines—although this latter solution would seem to imply greater rather than lesser costs.

The contractor, however, as usual has to set up his factory on the site each time he starts a new contract. It may occasionally be possible to transfer key staff like agents, surveyors and engineers from one metric contract to another. But with the gradual introduction of the metric system, operatives recruited locally will have for many years to switch from imperial to metric contracts and back again. Probably the biggest problem facing the contractor is re-training, and this will be accentuated by the improbability of obtaining a neat succession of metric contracts in any geographical area which would enable a 'metric' labour force to be retained.

Fortunately the Construction Industry Training Board is well advanced with the production of training aids. These will include courses of about three days to train people to train others; programmed learning booklets for self-tuition; pocket conversion tables; display posters and so on. My firm intends to rely heavily on these training aids and to use them as an essential and integral part of our own training programmes.

In this re-training work the most difficult problem will be to get people to 'think metric.' With professionally qualified staff, and with the next generation of school-leavers, this is relatively easy. But with most of us it is going to be difficult. How many think of thermal comfort (or discomfort) in centigrade even though this has been quoted for years in the BBC weather forecasts—along with Fahrenheit, of course! And when on holiday abroad how many of us can carry on a conversation in French or Spanish without mentally translating into English and then back again? Until we can each develop this facility, our metric reactions will inevitably be slower than our imperial ones.

The largest cost to the contractor, which can be measured, is that of re-training. Amongst other arrangments which will have to be made (all of which will cost money) are:

Purchasing metric measuring equipment such as rules, surveying staffs, etc.

Recalibration of plant such as cranes, concrete mixers, etc.

New reference books, revised office forms, alterations to 'standard' details.

Rewriting purchasing, costing, bonus estimating and work study data in metric terms.

Replacing or modifying office calculating machines to enable them to work in decimals.

Rewriting computer programs.

Stocking materials and components in

(concluded on next page)

BUILDING METRICATION NEWS

FUNCTIONAL SPACES

Now that five of the functional group panels set up by the BSI to bring about dimensional co-ordination are active, the most important phase of our change to metric has been entered. A straight conversion to metric would barely justify the upheaval involved. The challenge, as Hugh Clamp, chairman of the group on external envelope (covering windows, claddings, etc.) sees it, is metric modular. Whilst agreeing that the industry has set itself an enormous task, he is well aware that, if we can make the programme work, we shall lead Europe in modular co-ordination and will gain very great advantages, through variety reduction, in gearing the manufacture of our components to the modern industrialised process.

Overseas Experience

Mr. Clamp, and his partner T. F. A. Manning, with whom he is in private practice, have both worked in France and they have done several projects overseas involving metric, including the Olympic Sports Centre in Athens. His present appointment, on the recommendation of the Royal Institute of British Architects, is, however, probably due more to his initial activity in finding out what the metric change was all about and what the implications were.

The work the panels are now getting down to is that of identification, i.e. for each group (structure, external envelope, internal sub-division, services and drainage, fixtures, furniture and equipment) to establish the products and components within its field, and then to pick out the most important components for dimensional co-ordination (and those that take their cue from them) so that, in effect, an order of priority can be drawn up of all present building components. This document will probably be published in June or July. Then, with the work of the Component Co-ordination Group being made available to the panels, and the British Standard for Controlling Dimensions agreed, the way will be clear, says Mr. Clamp, to produce recommendations for sizes of spaces incorporating all known requirements of industry. Matrices for each group of components are expected to be published during 1969.

Timing

The timing, of course, will not please everybody. Architects have to start drawing in metric at the beginning of next year and some metric components, according to the programme, should be coming off the production line in 1970. But Mr. Clamp believes that some uncertainty was inevitable. Borrowing a quote from Churchill, he says, 'If we waited until we solved all the problems we couldn't move off from stop.' First of all, he says, the problems had to be pinpointed before anybody could tell how much work there was to be done. Even so, within the time scale laid down, it is possible for the job to be done competently. Architects would only be drawing some of their projects in metric terms in 1969 and they would have to decide which were the most suitable. They would also have to consider the availability of metrically co-ordinated products. The programme also says that manufacturers' literature should give metric equivalents in 1968.

Mr. Clamp feels the sooner the information can be put in metric terms the better but he recognises that some manufacturers may not find it economic to bring out literature that would be out of date as soon as the dimensional co-ordinated sizes are known.

Spaces and Sizes

He also foresees imaginary problems emanating from confusing spaces and sizes (the functional group panels are only concerned with spaces; component sizes will be decided by BSI technical committees). There will be no difficulty, he says, in using plasterboard sheets 1219.2 mm. (4 ft.) wide as long as the measurement is made clear. When 1200 mm. board also becomes available, because 100 mm. is slightly less than 4 in., there will be an interim period of sloppy fits, but these can be adjusted on the joints.

Effect on Design

At the end of the day are architects likely to accept standardised products? 'They are already doing it,' says Mr. Clamp. 'What is now being proposed is simply the rationalisation of sizes in order to get variety reduction.' Neither does he see any change in design coming out of it. In fact 'only a very sophisticated eye may recognise that a rationalisation of sizes has been imposed.'

If design does change, which he concedes is probable, it will not be because of dimensional co-ordination. 'Economics are tending to push us towards using larger units.'

Meanwhile, the dialogue between designers and industry, now taking place in the functional group panels, is, he hopes, going to prove of great value.

THE CONTRACTORS' VIEWPOINT

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both imperial and metric sizes.

Planning and administering the change.

There are two areas where difficulties and costs will arise for which only the crudest 'guesstimates' can be made. But these may be very serious. Firstly errors. Errors in estimating, in setting out, in calculations, in waste through cutting wrongly. Errors will occur, let there be no wishful thinking about it. All that we can do is by meticulous planning, training and control to try to keep them to the minimum. Secondly, a slowing down in the rate of work, both in the office and on site, until we can all think metric. How much will work slow down? 1%, $2\frac{1}{2}$%, 5% or what? And for how long? Weeks, months or years? Here again it is only by our planning and retraining that we can minimise the costs.

What can contractors do now? The contractor is the last of the construction 'team' to come into action, so it may be argued that he need do nothing yet. This is not so. In every contracting firm there should be at least one fairly senior man whose job it is to keep himself informed of progress in metric matters. This can be done by reading the key metric publications and articles as they are issued. He can then alert his colleagues in other departments to matters concerning them. Only in this way will an awareness and understanding of the problems come about. It emphatically is not a matter for the office boy, nor can it be swept under the carpet on the basis that 'it may never happen and in any case won't affect me.

In my own firm we have had our own Metrication Committee for 18 months now. This committee provides a network of contacts on metrication matters covering such aspects as building, civil engineering, design, specialist services, manufacturing, personnel, training, computers, purchasing, research, accounting, office administration and machinery, and others.

A final word. Planning for the change should begin now. Training of office and design staff can begin as soon as the first metric contracts are in sight. Training of site staff and operatives should not, in general, begin until the starting date of their first metric contract is known.'

NEWS FROM THE INDUSTRY

SI Calculations

An interesting example of the use of SI units was given by R. A. Sefton-Jenkins at a week-end course on the change to metric organised by the Gloucester Architectural Association at Cheltenham last month.

BS 3763 defines the Systeme Internationale (SI) units as follows:

length: metre (m.), millimetre (mm.)

mass: kilogram (kg.), gravity (g.), tonne—similar to ton

area: m^2, mm^2, hectare (ha.) = 10,000 m^2

volume: m^3, mm^3, litre

temperature: degrees Celsium (°C or °K)

angle: Rt., L. and degree (°), also minutes (′) and seconds (″)

pressure: mega.Newtons per sq. m. (MN/m^2 or N/mm^2)

stress: kiloNewtons per sq. m. (kN/m^2)

2nd movement of area = m^4

Mr. Sefton-Jenkins illustrated the use of the new units by working through two parallel examples of calculations for a reinforced concrete slab:

60lb.ft²

↑ 13ft. ↑ UD load on 7in. RC slab with 1in. screed

Dead load	96lb.
Live load	60lb.
Total	156lb./sq.ft.

Total load = 156 × 13 = 2030 lb.

BM = 2030 × 13 × 1·5 = 39,000lb. in./ft. width of slab

$$\text{Area of steel} = \frac{39{,}000}{20\,000 \times 0{\cdot}8 \times 6}$$

= ⅝in. ms bars at 9in. centres

3 kN/m²

↑ 4m. ↑ UD load on 175mm. slab with 25mm. screed

concrete mass density 2400kg/m³ or 2·4kg/m² per mm. thickness

Dead load 200 × 2.4 × 9·821 = 4700 N/m²

Live load 3 kN/m² = 3000

7700 N/m²

Total W = 7700 × 4 = 30·8 kN/m width

$$BM = \frac{30{\cdot}8 \times 4}{8} = 15{\cdot}4\ \text{kNm/m width}$$

20,000 E = 138 N/mm²

$$\text{Area of steel} = \frac{15{\cdot}4 \times 1000 \times 1000}{138 \times 0{\cdot}8 \times 150} = 16\text{mm. at } 200\text{mm.}$$

which is almost identical to the previous result.

Earlier, Bruce Martin, talking about the implications of the change on the architect, stressed the benefits of dimensional co-ordination. It offered the simplification of architecture (the main function of design) and on-site work. A modular size was simply a component plus a joint—the same modular size would apply to the component and to the opening into which it was to fit—the actual sizes of each would be determined by the modular size and the type of jointing procedure to be used.

During the period of change, some materials and components in current use would continue to be employed, e.g.: brickwork, which can be built to modular sizes; timber sections (4in. x 2in. is 100 x 50 m.), whilst some components such as window and door assemblies will be purpose-made, as in fact they are at present. The availability of metric-sized components must be ascertained before being designed or specified into a scheme.

Some components, such as proprietary steel-framed buildings, may remain in feet and inches until ultimately redesigned in metric. Some existing imperial-sized components, e.g.: roof sheeting, which is normally cut-to-fit on site, may be used. Mr. Martin said that the 4 drawing types as agreed by the RIBA and MPBW could be accepted:

1 location drg.—tells where components are situated.
2 assembly drg.—the present construction drg.—e.g.: ½in. scale.
3 component range drg.—showing what's available or what's to be used.
4 component detail—showing what component is required to be.

Notation is to be standardised at this stage too and must be used entirely in accordance with the recommendations, to avoid confusion. The reference grid line is to be a fine continuous line. The centre line remains as at present—a chain dot line. An open-headed arrow will denote a modular size. An engineer's arrow head will denote ALL other dimensions.

Brick Sizes

What should the brick industry do about brick sizes? P. D. Edmondson, speaking at a Keir-BDA symposium on bricks and brickwork held early this month, said that some manufacturers could supply 8in. and 12in., and some would find it very difficult because of the type of clay, firing, drying processes etc. There were, however, more ways of achieving dimensional co-ordination with standard brick than was immediately apparent and a good deal had been learnt in the last three years from the Keir BDC system of dimensionally co-ordinated building in brick.

The brick industry, said Mr. Edmondson, wanted to maintain a single brick standard, and they hoped that, in the initial changeover, brick sizes would be rounded off to the nearest metric equivalents of existing dimensions.

Of course it would appear, he went on, that a new modular sized brick would greatly facilitate application of the new method of dimensional co-ordination. 'There is however much to be done by designers and builders and by manufacturers of key components before the new method is put widely into practice and savings begin to accrue. Provided brickwork is made to conform, the case for making other brick sizes should emerge much more clearly than it is at present. In the meantime innovation and development will continue to be directed towards maintaining the overall economy of brickwork.'

Eire Going Metric

The Irish Government, having considered the report of a working party set up by An Foras Forbartha, The National Institute for Physical Planning and Construction Research, have taken a decision in favour of dimensional co-ordination on a metric basis. An Foras Forbartha have been asked to work out a scheme and draw up a timetable for the introduction of the system.

As a result, Meitheal Modúlach, a new working party on dimensional co-ordination, has been set up. Its members include architects, engineers and quantity surveyors drawn from Government departments, local authorities, semi-state bodies, private practices and building contracting firms. Direct contact will be made with manufacturers in each of the component groups as the work proceeds.

At present special consideration is being given to the metric sizing of the concrete block as in Ireland it is commonly used and has a controlling influence on building dimensions.

An Foras Forbartha is setting up an advisory committee on the introduction of the metric system under the chairmanship of James Daly, BE, AMICEI, Research Officer.

Maintenance Costs

The use of metric sized components on the maintenance of older properties is going to increase the cost of maintenance, said E. G. Francklow, ARIBA, FRICS, speaking at a meeting of representatives of smaller building firms in London on 10 May. He pointed out that timber boards produced to metric sizes would be fractionally inches smaller in area than those being produced to imperial sizes. Therefore, he argued, it would require more metric sized units to cover a set area than it would units of imperial sized material. This increase in the use of materials would then have to be reflected by an increase in costs. The meeting was organised by the London Region of the National Federation of Building Trades Employers to review the position and future of the smaller building firms in the light of the country's economic difficulties.

Closer Links

At the opening of the 7th Eurogypsum Congress in London on 15 May, Robert Mellish, Minister of Public Building and Works, said that technical co-operation between the countries of Europe is essential in paving the way for British membership of the European Economic Community. The construction industry in this country had earned itself a reputation for being slow to adopt new ideas, but this reputation was undeserved. It was the first industry to publish a programme for changing from imperial measure to the metric system. Once we had learned

BUILDING METRICATION NEWS

to think and work in metric terms, our contacts with the Continent would be even closer.

LETTERS

Metric Gauge

Sir—Philip Dunstone is as usual the first to put his finger on an aspect of metrication to which it appears no one else has, as yet, given any thought. His article 'Metric Gauge' ('BMN,' 23 February) was most interesting and the scheme proposed makes a great deal of sense. There is, however, already in existence another possible answer to the treatment of gauge sizes in metric terms. This is ISO Recommendation R388—International Metric Series for Basic Thickness of Sheet and Diameters of Wire which appears to possess most of the attributes of the Metric Gauge.

The foreword to this Recommendation mentions the difficulties presented by the current multiplicity of gauge systems and the fact that the significance of gauge numbers may vary from country to country and even from industry to industry.

The Recommendation, therefore, provides a basic set of sizes in millimetres to replace existing gauge systems. The designation of a sheet thickness or wire diameter by a basic size is an indication that this is the nominal size of the sheet or wire.

The standard thickness or diameter sizes are selected from three tables of basic sizes in the Recommendation taking into account the thicknesses or diameters appropriate to the product and of the extent of size differentiation appropriate to its manufacture and use. The three tables are listed as R10, R20 and R40 series and preference is given to selection from the tables in that order.

The series for the basic thicknesses and diameters is established on the series of preferred numbers set out in ISO Recommendation R3 — Preferred numbers. Series of preferred numbers.

The range of sizes covered by the Recommendation is from 0.020mm. to 25.0mm. and the tables provide the following selectors of sizes: R10, 37 sizes; R20, 68 sizes; R40, 130 sizes.

The method of designation of thickness or diameter is by stating the basic size in millimetres, followed, if desired, by the letter U to indicate that the size belongs to the ISO metric series. Sizes are given to three places of decimals between 0.020mm. U and 1.000mm. U, to two places of decimals between 1.06 mm. U and 10.0mm. U and to one place of decimals between 10.00mm. U and 25.0mm. U. The size ten millimetres can, thus, be given as either 10.0mm. U or 10.00mm. U but this is the only size that has an alternate.

Comparison with some Metric Gauge examples gives the results tabled above.

Present gauge	Thickness	Metric gauge	ISO R388	
24 swg	0·559mm.	G 056	0·560mm. U	(from Tables R20, R40)
4lb. lead	1·730mm.	G 173	1·70mm. U	(from Table R40)
32oz. glass	3·969mm. (approx.)	G 397	4·00mm. U	(from Tables, R10, R20, R40)

The use of such a system would have the advantage of encouraging a re-examination of present ranges of thickness and diameters with a view to reducing the variety of sizes and the standardisation of those sizes which are to remain. Thus, for example, sheet lead thicknesses would probably be quite acceptable if selected only from the R10 series of basic sizes and, where we now have a 4 lb. lead this would become either 1.60mm. U (3.7 lb.) or 2.00mm. U (4.6 lb.) thick.

Although this method of designation retains the use of decimalised millimetres and generally results in more digits and symbols than the Metric Gauge, the use of the symbol letter U does help to identify clearly what the figures relate to and should be of assistance during the transition period of metrication.

It seems very likely, as we progress further with the adoption of the metric system, that the Recommendations of the ISO will come to have a much wider application to industry in this country and the implementation of international standards, wherever practical, is an obvious step in the right direction.

J. W. MORRISON [ARICS],
Government of Northern Ireland,
Ministry of Finance,
Works Division.

METRICATION INDEX

An index of references to metrication published in Building' since Building Metrication News last appeared.

The pool of speakers, established by the BSI and the London Building Centre to lecture on the change to metric, is to be rebriefed. More detailed lectures on specific applications of metrication are now being asked for and it is to meet this demand that a meeting of pool members has been called for 6 June. (17 May, p. 76.)

Concern over the Board of Trade's failure to establish a metrication programme for the retail industry. (3 May, p. 96.)

Appraisal of a new design manual, published by A. H. Anderson Ltd., on the A75 system of component building. The components are in metric dimensions. (10 May, p. 175.)

Plans for the Building Centres throughout the British Isles to link-up in order to meet the industry's information requirements during the changeover to the metric system were formulated at the annual general meeting of the Association of Building Centres, held at Greystone, Co. Wicklow, on 6-7 April. (19 April, p. 82.)