

Building Metric News

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

GIVING A LEAD

During the coming month the British Standards Institution will be establishing the first of a series of new panels. They will be faced with one of the most complex tasks that any BSI committee has ever faced, for it will be their job to prepare recommendations for co-ordinating the metric sizes of all major building products. Already the dimensional basis has been established in BS 4011, and following on this a draft standard has been prepared for controlling dimensions. This draft, which gives key horizontal and vertical dimensions for building, is due to be circulated to industry for comment shortly. But the next stage is to consider the detailed basis on which individual products should be sized in order to achieve co-ordination between them. The task is not only complex but it is huge. In order to ease it somewhat, building products have been divided into six functional groups. (See News from BSI, page 145.) Each panel will be concerned with one of these groups and will be of a size to allow each sector of the industry to be properly represented.

If the change to the metric system of measurement is to be anything more than an expensive academic exercise it is vital that the co-ordination of components should succeed. In the past we have had standardisation but we have lacked co-ordination—it is far more difficult to achieve. Many more people and much more money is concerned. But even when the recommendations have been prepared, and they will be applicable to all products not only those included in British Standards, the main job of work still has to be done. Each product will need to be changed in size to a greater or lesser extent.

Who is to change first? The architect who specifies the new metric products or the manufacturer who produces them? This is the chicken and egg situation which prevails. The architect needs the assurance that the new products will be available if he specifies them and the manufacturer needs the assurance that if he produces the products the architect will specify them. Over 50 per cent of building is controlled by government directly or through consortia, local authorities

and regional hospital boards. Manufacturers need to be assured that the government's plans for changing to metric are in an advanced stage and that they conform to the BSI programme. There is every sign that individual sectors of government building, such as some schools consortia, have already determined when they will be changing. But what is needed is for government to publish a comprehensive plan. So our second plea in Building Metrication News is for each government department to prepare and publish its programme in as great a detail as possible as soon as possible.

However large the government programme is, there is also a very large private sector programme. Perhaps the word programme is mis-used for it is extremely difficult to co-ordinate or programme the private sector. But the larger contractors' and architects' offices can contribute to providing the necessary assurance by determining their own plans. In due course it would be of great assistance if the NFBTE and RIBA were to draw up programmes based on their members' plans.

SPECIAL REDUCTION

One of the major contributions that contractors, consortia and architects can all make in the change to metric is to reduce the number of specials that are being specified. The purpose of modular co-ordination or dimensional co-ordination, whichever term one prefers, is to reduce the need for specials. It is possible that the costs of going metric will have to be passed on to the client and a figure of 3 per cent is currently being mentioned. Much of this can be offset if standard modular components are used and specials are dropped. It is certainly undesirable for architects to design new metric components when manufacturers are doing just this. But if architects are to specify standard components there has to be a cost advantage in doing so. For too long manufacturers have discouraged the architect from specifying standards by keeping the price of special components at an apparently artificially low level, by off-setting the cost against standards. This point was made at a recent discussion sponsored by 'Building.' It can be made again.



SI Units

BY PHILIP DUNSTONE, FRICS, FIARb

In going metric we shall be adopting a rationalised system of metric units known as *Système International d'Unités*, fortunately abbreviated by international agreement to SI. An explanation of these units and their derivatives is given below.

In the shadow of the closely impending change to metric, we seem determined to avoid standardising what we shall call it 'Metrication,' 'Metricisation' and 'Metric-change' all have their adherents, but, strictly speaking, and many of us think in some aspects of the change we are not speaking strictly enough, the construction industry is not going metric, it is going 'SI.' To be more formal about it, we and 23 plus other countries have adopted, or are going to adopt, the rationalised system of metric units known as the *Système International d'Unités*. Fortunately for Britons the expression 'SI' is the internationally agreed and understood abbreviation! We should also be glad that, just at the time of our own change from imperial measures, this more coherent variant of the metric system is being widely adopted internationally. It puts us in a position where we are able to take the lead in the adoption of SI units and many countries are looking with interest at the way in which we shall do this and at the results of our fundamental metric thinking. They are experiencing the same sort of difficulties in adopting SI as we would have met had somebody tried to rationalise the imperial system fairly drastically; our metric change is a radical one which will make us think again in every sphere of industry, theirs generates perhaps only a why-don't-they-stop-mucking-about-with-the-system attitude.

No short article on SI units can be much more than a spotlight on, or a new way of looking at, the information contained in *The Use of SI Units*, PD 5686 published by the British Standards Institution, April 1967 (the light blue revised one). This booklet covers most of the aspects of the subject which users in the industry will want, and the fact that the earlier edition of it sold 60,000 copies speaks for itself. Every organisation should have a copy. But briefly what is SI and how is it different from the 'pure' metric system?

Firstly there are the basic SI units; secondly the units which are derived from these and which, because they stem back to the basic units, make the system a logical one; thirdly there are prefixes for multiples and sub-multiples; and lastly the selected units which are combinations of basic units and multiples and sub-multiples.

The basic units are metre (length), kilogrammes (mass—commonly thought of as

weight), second (time), ampere (electric current), degree Kelvin (temperature), and candela (luminous intensity). These basic units comprise the original MKS (metre, kilogramme, second) system of about 1900, which, by adding the ampere in 1950, became the MKSA system. In 1954 the two remaining units were added and in 1960 an international conference formally gave the system its present SI title. The derived units are newton (force), joule (work, energy), watt (power), volt (electrical potential), lumen (luminous flux), and lux (illumination). These are, in effect, special names for interactions between the basic units; the newton, for example, being defined as 'that force which, when applied to a body having a mass of one kilogramme, gives it an acceleration of one metre per second squared.'

The Newton

There is considerable contention over the adoption of the newton, which has been interpreted by one engineer as about the sort of force an apple in the hands exerts, or, by another and more irreverent one, as that which a spread of margarine exerts on a slice of bread.

Many would have preferred to have retained the use of metric technical units of which the *kilogramme force per square millimetre* is an example. The *kilogramme force* is the force due to standard gravity (9.806 65 metres per second squared) acting on a mass of one kilogramme.

Engineers' difficulties have been anticipated by BSI who state that both SI and metric technical units will continue to be quoted in British Standards for the next few years. The immersionists say that this is just another Fahrenheit/Centigrade situation and the sooner we discard our old clothes the better; the reluctant bathers counter that the temperature of the liquid (measure it as you will) is too low and that this dual standard will give us time to adjust our thinking.

Engineers, in fact, seem to be divided by the newton in a way which Sir Isaac himself would surely have deplored. Those against, complain that the concept of the newton upsets the whole of their engineering lower minds; those for, argue that if a change is to be made it might as well be a complete bloodbath and the sooner we get our feet red the better. The other

contention that the newton is too small is surely negated by the permitted use of multiples of which the meganewton and the kilonewton are allowed by 'The use of SI Units.' Although subject to revision by experience, it recommends the use of *newtons per square millimetre* rather than *meganewtons per square metre* which, of course, are the same thing.

Multiples and Sub-multiples

The multiples and sub-multiples of units covering the construction industry are given in *The Metric Guide* (PD6031) as mega (one million times), kilo (one thousand times), hecto (one hundred times), deca (ten times), deci (one tenth), centi (one hundredth), milli (one thousandth), and micro (one millionth), but not all these are recommended to be used with all basic and derived units, at least in writing. The permitted combinations of units and multiples/sub-multiples are given in Appendix A to *The use of SI Units* and Table 6 of *The Metric Guide*.

From these publications it will be seen that the centimetre has been eliminated. The former says bluntly 'cm. deprecated—limited use only,' the latter kills it altogether. But it dies hard. Some say it will not die at all and that in the light of a few years' experience we shall come to regret restricting expressions of lengths to metres and millimetres. Others say the metre or millimetre only should survive, not both.

Many bodies of opinion, as distinct from individuals, are coming round to thinking that we should adopt the SI system and the recommendations for its use as they are now, and not try to modify them in any way; in this manner we shall achieve standardisation, the lack of which has been identified as one of the factors limiting productivity.

I would go further and say that we should standardise all notation and every means by which we could express the new system in more than one way, and that this should be done precisely character by character. This may sound Orwellian but in this way we shall be free from interpretation, even subconsciously, of the symbols which come before our eyes at a time when our thoughts should be cleared for dealing with the implications of the metric change. Some of this has already been done; it is laid down, for example, that we should write *mm* and not *mm.* or *m.m.* but this sort of standardisation should be taken as far as it can possibly go so that we are never, even deep down, wondering 'What does that mean?'

What is wrong with taking what we have been given, which has been produced after much thought and consultation, with as much further standardisation as possible, and having a go? Once we are determined on this course our national characteristics will ensure that we make a job of it and when we do, the benefits to this country's economy will be great.



NEWS FROM BSI

Estimate of Timing

The latest BSI publication on the metric change in the construction industry—Dimensional co-ordination in building: Estimate of timing for BSI work (PD 6249)—follows the BSI Metric Programme (re-published in Building Metrication News last month). The programme, which dealt with all aspects of the change, pointed out that a unique opportunity was provided for improving the sizes and design of products, especially through the application of dimensional co-ordination. A detailed timetable for the work of dimensional co-ordination was not then available, but an estimate of one is now given.

The publication also describes the method of working that BSI proposes. For this purpose building products have been divided into a convenient arrangement of six groups

reflecting their function in a building: 1. Structure, 2. External envelope, 3. Internal sub-division, 4. Services and drainage, 5. Fixtures, furniture and equipment, 6. External works.

Each group is sub-divided, either according to the plane of a building (i.e. vertical or horizontal) or to a well-established division by function (e.g. sanitary equipment and storage equipment). This arrangement lends itself to considerations beyond those of dimensions, and at a later stage studies on other performance aspects can be correlated within the same framework.

Six sub-committees, called panels, one for each functional group, are to be constituted to represent manufacturing and user interests (through respective trade associations or other organisations). A BSI specialist will serve each functional group panel and will consult closely and frequently with manufacturers and users and collate existing international agreements, British Standards and other relevant information. The specialist will co-ordinate the work of the panels and also that of other BSI technical committees dealing with individual product standards and re-

lated subjects, such as tolerances and fits, joints and jointing. Overall co-ordination by BSI sub-committee B/94/4 'Metric building sizes (advisory)' which is responsible for the detailed direction and co-ordination of the work of the panels, will thus be facilitated.

It is proposed to constitute the panels for the first three functional groups in November of this year, Panels Nos. 4 and 5 during 1968, and Panel No. 6 either in 1968 or soon after. The time bar for Panel No. 6 is provisional, pending further studies. At first the panels will need to prepare a list of all products and components within their respective product group, with a system for cross-referencing them, since many products will occur in more than one group. The panels will also be planning their method of working and will be producing more detailed time tables of their own work, which will also be published if appropriate.

Thereafter the panels will work on the production of dimensional recommendations for ranges of basic sizes (as defined in BS 4011) for products in and between functional groups. It is expected that these

Dimensional Co-ordination in Building: Estimate of Timing for BSI Work

Functional group	Sub-group	Example items	1967	1968	1969	1970	1971	1972
1. Structure	vertical element							
		columns: walls						
		sills: lintels						
		wall ties						
	horizontal element							
		beams: roofs: floors						
		foundations: toppings						
	combined elements	portal frames: pitched trusses						
		staircases: ramps						

2. External envelope	vertical element							
		windows: door sets: cladding						
		insulation: facing slabs						
	horizontal element							
		sheet roof cladding						
		roof insulation						
		subsidiary items						

3. Internal subdivision	vertical element							
		partitions: door sets						
		balustrades: grilles						
		subsidiary items						
	horizontal element							
		ceilings						
		floor finishes						
		subsidiary items						

Functional group	Sub-group	Example items	1967	1968	1969	1970	1971	1972
4. Services and drainage	supply systems (heating and ventilation, electrical, water, gas)	stacks: trunking: tanks: heaters: generating units: radiators: boilers: lighting fittings						
		subsidiary items						
	disposal systems (soil, rainwater, refuse)	manholes: stacks: gulleys: chutes: turntables: ducts: large containers						
		subsidiary items						
	communications and protection systems	distribution boards and boxes: hydrant boxes: hose reel cabinets: sprinkler grids						
		subsidiary items						
	mechanical vertical circulation	passenger and goods lifts: hoists: escalators						
		subsidiary items						

5. Fixtures, furniture and equipment	kitchen equipment, storage equipment, furniture	cooking units: sink units: racks: refrigerators: cupboard spaces: built-in units						
		subsidiary items						
	sanitary and laundry equipment	urinals: baths: cisterns: sinks: wash basins: drying appliances: incinerators						
		subsidiary items						
	miscellaneous equipment	garage equipment: bicycle racks						
		subsidiary items						

6. External works	(provisional time-bar pending further studies)							
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Key: time for producing and publishing controlling dimensions time for producing and publishing dimensional requirements in and between functional groups time for metrication of relevant British Standards



recommendations will take the form of a complete treatise on the subject of dimensional co-ordination for the particular group of products, to explain the evolution of the dimensions starting with BS 4011, continuing with controlling dimensions, then ranges of basic sizes from which the selection of sizes for all products in the functional group may be made, and finally how co-ordination between functional groups themselves is to be achieved. The important British Standard for controlling dimensions, vertical (e.g. floor to ceiling heights), horizontal (e.g. distances between zones for walls and columns), intermediate dimensions, and the application of these dimensions, is now being prepared and a draft for general comment should be available in November. It is planned to publish the completed BS by the spring.

The chart of the estimate of timing shows that recommendations in respect of the principal components should be complete during 1968 and 1969, to enable, on the one hand, BSI Committees to revise relevant British Standards to accord with them (from autumn 1968 to early 1972); on the other, manufacturers to change the design and production of their products shortly afterwards.

The programme for the change, PD 6030, envisaged effective completion of the whole change to metric in the construction industry by the end of 1972, and this detail does not upset that target at all. Copies of PD 6249 may be obtained from the BSI Sales Office, 101-113 Pentonville Road, London, N1. Price 5s. each.

BSI Finances

'Does industry want the BSI to become a Government Department? There is no suggestion that it should, but it might occur to someone unless industry is prepared to play its part financially,' said J. E. Stupples, AADipl., ARIBA, divisional chief technical officer, BSI, The Building Centre Forum on 4 October.

Mr. Stupples, who was one of the two opening speakers at the Forum on 'Standards and Codes of Practice' organised by The Building Centre in conjunction with the BSI, went on to say that the BSI had been trying hard to get industry to pay more in subscriptions and had been greatly helped by the NFBTE, but the result had been negligible. He was replying to a point raised in the discussion by a speaker who said that the change to metric would put a greatly increased load on the Institution. Who would pay? Industry or Government? The speaker thought it should be the Government because industry was already paying a lot.

'This,' said Mr. Stupples, 'was the sad part of the story. In the last 12 months, income from subscriptions has risen by only £5,000. Annual total needs are now £1,800,000, of which industry contributes only some £300,000 or £400,000—the rest comes from the Government by means of special grants.'

METRIC PANEL CHAIRMAN

It is unusual that the BSI, for such a key post as chairman of their metric panel for the construction industry, should look outside their own committee membership for



KENNETH M. WOOD

an appointment. But although he may not have come up through the BSI ranks, it would be hard to find anyone with better qualifications to succeed the late Ernest Cook than Kenneth M. Wood. As chairman and joint managing director of Concrete Ltd., he heads a company that has been one of the pioneers of applying industrialised building techniques, and also one of the few, so far, that has done so successfully.

Under the now established Bison trade mark, Concrete Ltd. started planning their wall frame system of precast reinforced concrete wall and floor panels in 1962 (it was first used for a block of flats in Kidderminster in 1963), long before the Government began to give official encouragement to the idea; and it is perhaps significant that a man who has long been advocating standardising components, and achieving it in a practical way, should be given the job of guiding our change to metric. In the past, Mr. Wood has made no secret of his attitude to our metric conversion. In leading a Modular Society discussion earlier this month he said that if we were simply to change the foot for the metre we would be involving ourselves in a great deal of turmoil for very little gain. The real point of the change, as he sees it, is the chance it offers of a complete reappraisal of our standard components in order to achieve a co-ordinated range.

He admits to the difficulties involved. 'For one thing there is bound to be a rise in costs when we change over to making metric components. This is partly because of the element of unfamiliarity and manufacturers will need to allow for the unknown in their costings.' But he does not think the rise will be as high as most people think. 'Prices will tend to be kept on the low side for metric products in order to encourage their use. On the other hand, manufacturers who don't change over to metric will have no need to disturb their prices. An increase of 2 or 3 per cent may be enough to cover most products.'

There could be some conflict here for Government departments in their own building programmes since, on the one hand they are committed to promoting the metric change, and on the other they may be under pressure to keep within their financial budgets. Mr. Wood, however, believes that the value of the change to

the country is so enormous that short-term considerations will be swept aside. The success of the BSI programme, he says, relies very heavily on Government backing. If it is going to be carried out it must have sufficient teeth. The BSI are not in a position to enforce action but the Government are, and as soon as it becomes clear that they are giving a lead by putting actual projects on the ground, this will provide the necessary impetus for the rest of industry.

Here Mr. Wood's past experience—from June 1966 to July of this year he was adviser to the MHLG on industrialisation in house-building—could be instrumental in ensuring adequate Government backing. In that time he learnt a lot about local authority housing and about how the Government and local authorities work. Since a close liaison between Government and industry is imperative in the metric operation, his contacts on both sides are obviously going to be helpful. Mr. Wood thinks that the most important thing at the moment for a reasonably smooth transition is that the B/94 committee, who are to make dimensional recommendations, should do their job to schedule, since manufacturers themselves are unable to act until these are published. This preparatory work has to be completed within the next two years so that the metric system can be introduced into new contracts by 1970.

Kenneth Wood is in no doubt about the harvest there is to be reaped by the present programme even though, for the building industry, it may take another 10 years before it pays off. This is an illustration of his far sighted and pragmatic approach to the problem. It is just the sort of guidance needed to ensure that we don't miss out in our change to metric.

PUBLICATIONS

Going Metric

Answers to some of the most frequent inquiries addressed to the BSI about the change to metric are given in a new booklet—Going metric: first stages (PD 6245). It describes the events leading up to the decision to make the change and explains BSI's programme for the metrication of British Standards. Useful BSI metric publications are listed. Price 10s. for 25.

ISO Metric Fasteners

A greater range of specifications and much wider information incorporating the proposals in six ISO Recommendations going through for ratification and included in the 1967 revision of BS 3692: ISO Metric precision hexagon bolts, screws and nuts. The additional information includes details of the mechanical properties of fasteners. Price 25s. Both publications from 101-113 Pentonville-road, N1.



Conference on Metric Components

Our Special Correspondent reports the Conference on Metric Components organised by MPBW on 13 October on behalf of the Interdepartmental Building Development Liaison Committee. 'The change to metric' in one speaker's words, 'can be seen as the catalyst for rapid and substantial advances in building technology.' And a call was made for the Government to announce firm planning dates for its share of the building programme.

Phrases like 'unique opportunity,' 'great challenge' and 'a race against time' flowed from the lips of speakers at the conference on metric components at the RIBA on 13 October (writes our Special Correspondent) to describe the size and urgency of the task facing the industry, and the potential benefits involved. As Mr. Robert Mellish, Minister of Public Building and Works, said in opening the conference, architects should be designing buildings using metric measurements in less than 15 months' time. It is barely long enough to start thinking in metric terms, let alone taking the steps necessary to get component co-ordination under way on a large scale. Manufacturers cannot be content with aspiration. It was made quite clear—indeed much conference time was spent discussing it—that they need to know when to expect the orders and how large they are likely to be. Hard and fast decisions have to be made. But confidence that the job could be done was expressed by all the platform speakers; confidence, moreover, supported by solid achievement in many fields. The British Standards Institution has started the way, the Ministries are giving a splendid lead, now it is up to the rest of the industry to buckle to and see that this operation is a success—that was the conference message. And chairman Sir Donald Gibson offered this final inducement: 'If we can do this job well in Britain, we will be years ahead of any other country in building.'

The conference was organised by the MPBW on behalf of the Interdepartmental Building Development Liaison Committee and attracted a large audience, representing all sections of the industry.

Minister's Opening Address

After stressing the limitations on time, Mr. Mellish went on to refer in his opening address to the 'unique opportunity' to re-think the dimensions commonly used in building. 'By doing this we shall gain four advantages,' he said. 'First, we shall have ranges of components that are dimensionally co-ordinated. Second, we shall be able to make sensible reductions in the variety of sizes without unduly restricting the designers' freedom of choice. Third, we shall get longer production runs which should lead in due course to lower prices. Fourth, because components will be better co-ordinated, we should get greater speed in

construction.' This advance in component co-ordination which was being linked with the change to metric measurements was thus in everybody's interest.

The Minister referred to the BSI programme, announced in February this year, which envisaged that from 1 January 1969, architects would start preparing drawings and other documents in metric terms for all new contracts. Saying that the Government was pledged to adhere to it for its own contracts, Mr. Mellish went on to urge all responsible for building programmes to do likewise, and especially local authorities and hospital boards. Laying down the guide-lines for component development was a complicated task, he said. Not only must they get the sizes and method of jointing right, they must also have performance standards. Here they must look to the Agrément Board. The Board was already in close touch with parallel organisations on the continent and he hoped would soon join the European Union. This would open up prospects of internationally-agreed dimensions which would be of ultimate value to all in the construction industry.

Presentation of Papers

The Minister's speech was followed by the presentation of papers by BSI representatives and speakers from the various government departments concerned and, to round off the proceedings, the effects of the changeover on the building regulations were considered.

Mr. Michael Clarke, BSI co-ordinator for the change to metric in the construction industry, saw the timetable proceeding to the point where, by the end of 1971, the balance of advantage should have swung firmly in favour of new metric products. He thought it essential that they should plunge in and not try and soldier on with two sets of measurements—this would create 'gigantic muddle and confusion.' He proposed that action be taken on three fronts—reference material should show metric equivalents before 1969; measuring instruments should be metricated and made available in sufficient quantities well in advance; training in the new measurement should be undertaken. And he underlined the importance of having visual aids around the office to help people to think in metric terms.

He thought that, without overstating the

case, the change to metric could be seen as 'the catalyst for rapid and substantial advances in building technology.' It would also facilitate the exchange of ideas between our industry and its counterparts in Europe. A year or two should begin to show the effects of this and open up to our product and component manufacturers larger and hitherto untapped, export markets. In short, we had 'a unique opportunity.' Could we afford to let it slip through our fingers?

Mr. G. H. Wigglesworth, assistant chief architect, Department of Education and Science and chairman of the BSI technical committee responsible for dimensional co-ordination in building (B94), dealt with this committee's contribution.

Work was being done in four stages, he said—general agreement on the basis of dimensioning, already published as BS 4011; agreement on controlling dimensions and arrangement of building components in functional groups; recommendations covering functional groups in terms of dimensional specifications; and drafting of product standards. He announced that the BSI had produced a draft British standard for controlling dimensions which he described as 'a historic document.' It covered as many building types as they had been able to get recommendations upon.

The term 'functional groups' might need some explanation, he felt. It was recognised that products having similar performance requirements (dimensional and otherwise) should be grouped together for specification purposes. A division into six basic groups had been agreed—Structure; external envelope; internal sub-division; services and drainage; fixtures, furniture and equipment; external works. Consistency could thus be given to each group. This should help to prevent product committees choosing unrelated sizes and in practice would mean that BSI committees and individual firms would be offered co-ordinated advice covering a group of products in a way which, up to now, had not been possible.

Mr. Wigglesworth concluded with a warning against succumbing to the temptation to 'go it alone.' One might find oneself saddled with a product whose dimensions were unrelated to those developed by others.

Co-ordination of Government Work

Presenting a paper on the co-ordination of central government work on component development in relation to metric, Mr. J. T. Redpath, MBE, director of development, MPBW and chairman of the Interdepartmental Sub-committee for Component Co-ordination, said the ISCC did not undertake development of any specific building type, but distilled the work produced by individual government departments to find the common factors and so to be able to present to industry, usually through the BSI, a clear and definitive picture of the

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needs of the Government building programme as a whole.

To meet the programme for the change-over, the sub-committee's efforts had been concentrated on the co-ordination of dimensions but when this was sufficiently advanced, it would turn to the co-ordination of the other performance requirements. Components had been classified in the six functional groups mentioned. Over the next two years the sub-committee's work, supported by the Component Co-ordination Group, would be concentrated on performance specification and on tolerances and jointing problems.

Mr. Redpath's paper was followed by others describing studies being undertaken by the various government departments. Whilst differing in detail, they followed a pattern.

Mr. J. L. H. Kitchin, principal architect at the Department of Education and Science, said their most important current work was the development of a common pool of dimensionally related components; that is, components capable of being used without modification in more than one educational system. They had already written a performance specification for one component—internal partitions—which they felt would give better partitions in terms of performance and cost.

Ministries and Industry

Mr. Robert Radford, assistant chief architect, Ministry of Health, said this department's initial work on co-ordinated components had been summarised in a compendium. The first volume covered the years 1965-67 and volume two for 1967-70 had now been produced. The material was being revised in metric terms.

Describing the work of the MPBW, Mr. F. Walley, deputy director of development, said a draft bulletin for the design of Crown offices in metric dimensions had been prepared. It was visualised that the Ministry's approach to manufacturers would be in two or three stages. Several manufacturers would first be invited to submit preliminary designs and costings. After a study of these, the firms would be encouraged to complete—or possibly discouraged from completing—the development with the submission of firm tenders for the supply of acceptable components. Prototypes of components for testing would be required at the time of submission or possibly shortly afterwards. It must be emphasised that the requirements would have to be met within an acceptable price.

Although this might appear to some to be quite a lengthy procedure, the Ministry thought it important to make sure that the components would be suitable for use where required. If all went well, he said, it should be possible to have tested prototypes and manufacturers' design drawings ready by the end of next year for a programme of metric components to be available for use on site in 1970.

Outlining the work of the Ministry of Hous-

ing and Local Government, Mr. Terence O'Toole, assistant chief architect at the Ministry, said their next project, which would be the first in metric measure, would probably start construction at the beginning of 1970. However, local authorities, with Ministry approval, might wish to embark on a limited number of trial runs before then. The NBA could help to collect and disseminate the information gained. In the first stages—at least until a wide range of standard components were available—some standard framework would be necessary. They proposed to publish a bulletin which could provide such a framework. He added that agreement was in sight for dimensions of local government offices—it was expected to follow the MPBW proposals for Crown offices.

How will the changeover affect the building regulations? According to Mr. Oliver Lawn, assistant secretary, Ministry of Housing and Local Government, it will be treated as a special kind of amendment, though subject to the normal consultations. The Ministry of Housing and the Scottish Development Department propose, he said, to publish later this year simple 'conversion tables' showing metric equivalents of all the imperial dimensions in the present regulations and to prepare for wide circulation proposed sets of metric dimensions which may eventually replace the present ones.

These are intended merely to help those who might be planning in metric terms. The dimensions will be taken to an appropriate number of significant figures and will not be 'rounded.' The proposed sets of metric dimensions will be rounded so far as practicable and might therefore in some cases be significantly different from the present ones. Mr. Lawn said they hoped to receive advice from those concerned with competent co-ordination as soon as possible.

Points from the Discussion

Discussion of the papers was dominated by what was felt to be a lack of understanding between the designing and manufacturing side of the industry. The first reference to the manufacturers' position was made by Mr. W. Kirby Laing, speaking on behalf of the builders. He thought these early jobs would undoubtedly involve the whole industry in additional costs. Manufacturers would have to lay down a new production line and run it in parallel with existing lines. Inevitably they would charge extra for metric components at first. He hoped the Ministries would allow some relaxation of cost criteria to take this into account.

Mr. P. A. Denison (Cape Building Products) asked how they could forecast the actual weight of demand for metric items. 'We seem to be making the giant assumption that because we have a public programme, we are able to judge when the demand will occur,' he declared. 'When will major Government sectors announce firm planning dates so that one can judge exactly when the load of work will occur?' The chairman (Sir Donald Gibson) won-

dered whether the situation was really any different from what had been going on with projects like CLASP. As long as one went out in time to get drawings done to keep to the actual building programme, he didn't see why it wouldn't work.

Mr. W. E. Tatton-Brown (chief architect, Ministry of Health), said that they, in common with most other government departments, had a three-year programme. 90 per cent of the projects were already named and placed in time in the programme with starting dates and target costs. It was therefore possible for manufacturers whose products had been agreed in the compendium mentioned by Robert Radford to go to the architects or Ministry and find out what size the market was likely to be. They could even go to the private market and identify projects in time and cost and get out order books and start manufacturing.

He thought the answer to Kirby Laing's important point about costs was that they were reducing the numbers of products and therefore giving the consumer the advantages of variety reduction and mass-production which the housewife got in a supermarket.

Mr. J. S. B. Colombi (Crittall's), said their real worry was the length of time through which they would have to store both metric and imperial components. He, too, pleaded for a date when they could stop supplying standard windows in imperial sizes, adding that the shorter the period of changeover the less expensive it would be.

Mr. Denison wanted to know whether the Ministry of Health was able at this moment to indicate what part of the programme set out in the compendium referred to was metric and when it would be launched.

Later Mr. Redpath said it was vital to have an understanding between central and local government, and between the public sector and manufacturers about these dates. So far as central government was concerned, it would be possible to indicate the dates on which manufacturers could expect inquiries for large programmes. What central government wouldn't be able to say would be which manufacturers would be successful in obtaining these orders. It was also vital, as Mr. Colombi had said, to keep down the changeover period.

Among other matters discussed was the ability of the BSI to cope with the work involved. Mr. Clarke said they had been recruiting very dramatically over the last 12 months. It was not so much a question of whether they could get staff as to whether they could keep them. Theirs was an act of faith. They relied mainly on industry for financial support. Did industry recognise the amount of work they were doing on its behalf and was it prepared to support it to the required extent?

He felt the Government was setting a very good example indeed in the amount of effort, time and money it was prepared to devote to this change. He was quite sure that industry realised the potential benefits—let them show this in a practical way.



LETTERS

Scale Adjustment

Sir,—Very little consideration seems to have been given to the effect which metrication will have upon the professional judgement of experienced engineers, architects and surveyors.

That sense of proportion, of scale or what looks right on the drawing board is a faculty gradually and subconsciously developed by any designer as he progresses through his career and accumulates experience. The ability to spot a design error on a drawing is not a gift but is a naturally acquired instinct founded on the continual use of the same set of dimensional units and conventional scales. From time to time for some jobs overseas many of us have already used the metric system but it has been done essentially by working in British Units and converting to metric later and this is equivalent to trying to speak a foreign language while still thinking in English.

Somehow we shall have to train ourselves, by visual aids in the office or other means, to think in metric terms as it will not be possible to spend the rest of our lives converting. New constants and rule-of-thumb formulae will have to be absorbed to replace those which have become second nature to us. Any British surveyor, architect or engineer can judge the size of a piece of land, room or member in yards, feet and inches but how many can do this in metres and centimetres without resorting to mental arithmetic?

All this will take far longer than the BSI have allowed and the more senior men are likely to find it very difficult ever to make the change. The confidence with which structural engineers carry out the initial engineering of the simpler building structures or judge the cost of an operation may suffer for a time if we are to learn to do without mental conversion processes.

No difficulty is anticipated where calculation can be done on paper in the office or in carrying out the preparation of working drawings, but I do expect moments of embarrassment in the extempore performance of duties. So, when verbal advice involving a dimension is given, it will be essential to check at leisure and confirm in writing to ensure that no misunderstanding of units has occurred until complete confidence in usage of the metric system is gained by all concerned both on site and in the office.

JOHN H. H. WILLIAMS, CEng.,

Partner: Donovan H. Lee & Partners.

Sir,—In the change to metric there is the real problem of an architect who has been accustomed for the whole of his lifetime looking at 1/8 in. scale drawings suddenly

finding himself doing 1/10 scale. The slight variation is really quite upsetting since certain basic standards which are ingrained in one are shaken up. How one gets round this difficulty, I do not know.

I remember that when we were working on Brussels we had not only to produce all our drawings in the metric system, but also to caption them in French for the benefit of the office staff and the people in control, whereas virtually everybody on the building site spoke Flemish. We got round this difficulty by having a tri-lingual clerk of works. I wonder if the Institute of Clerks of Works are organising a Conversion Course!

HOWARD V. LOBB, CBE, FRIBA,

Precast Concrete Activity

Sir,—The British Precast Concrete Federation congratulates 'Building' on its initiative in instituting a special section 'Building Metrication News' under the able consultant-editorship of Mr. Anthony Williams.

The forerunners of the BPCF have, particularly since the post-war period, appreciated both the opportunities and the cost implications arising from dimensional co-ordination. Early experience with farm buildings and system building indicated the way ahead and the federation has co-operated with the British Standards Institution, originally on imperial units and subsequently metric units. The industry is sensitive to the problems of tolerance and fits on account of economic considerations and has been represented on BSI Committee B/94/2, whose work resulted in the publication of BS 3626.

The precast concrete industry is a heterogeneous one and the vertical organisation of product sections within the Federation has materially assisted and simplified representing to the BSI the relevant major factors in the task of planning for the change.

British Standards have been established for most products produced on mechanised plants and these already have metric equivalents for most dimensions. Attention is being given to filling in any gaps (e.g., for some radii) to facilitate manufacturers implementing stage 4(a) of the Programme Chart.

The federation welcomed the decision to clear at an early stage products which do not require dimensional co-ordination. A precast concrete case in point is roofing tiles where the British sizes have presented no problems to continental countries. This is just as well since the cost of new pallets (incidentally not covered under the Board of Trade's present restrictive interpretation of investment grant) would be very heavy indeed.

Likewise, the federation has welcomed the intention to identify products and components which only require partially dimensional co-ordination. Some sections of the

industry have prepared for this in the design of their plants so as to minimise the cost in changing to metric.

The recognition in the first issue of BMN of the added problems costwise of components which will still be needed in pre-metric sizes presages a practical as well as a theoretical approach in future issues. The paving flag is a typical instance. The product has a very long life and replacements are only required when damage arises through open-up of footpaths. A solution to maintain the advantages of hydraulic pressing in situations when decorative paving slabs are required, e.g., for forecourts, to metric designed buildings, is to take up the resulting difference by way of emphasised joint or special units thereby providing a pattern.

The functional group panel procedure combined with the federation's product section procedure should facilitate the change to rational metrication with the minimum side effects costwise. Representatives to these panels have been nominated by the sections.

R. W. PARKS,

Director,

British Precast Concrete Federation.

Controlling Dimensions

Sir,—The letter in your issue of 22 September entitled 'More Time Needed' underlines the common misconception that an unco-ordinated component (in foot/inch terms) will be smaller than the space provided by the larger components already co-ordinated in metric terms.

Your correspondent states that, for many, new capital equipment would be required especially as the metric size ranges are usually slightly greater than the foot/inch sizes. This is not necessarily so.

Although it is difficult to anticipate the recommendations of the BSI for controlling dimensions, it is likely that 300 mm. will be a key dimension. In this case a 1 ft. component (304.8 mm.) would be reduced to 300 mm., 2 ft. to 600 mm., 3 ft. to 900 mm. and so on.

This reduction of dimension should ease the problems of changeover for the manufacturer, particularly of rolled products, where by the moving of stops inwards, the control of width and length would be a relatively easy matter.

Furthermore this slight reduction in size when changing to metric should encourage manufacturers to make an early rather than a late change.

By being early many metric components will be a loose fit within a foot/inch dimensional framework and thus any gap can be accommodated by packing and cover fillets.

On the other hand a late manufacturer is likely to find himself supplying oversized imperial components for fixing within a metric grid.

A. J. BROOKES, BArch, ARIBA.

Brunton, Baden Hellard & Boobyer.



The Metric Change

2. THE EDUCATIONAL BUILDING CONSORTIA

In the second of our articles on how government bodies are organising to meet the coming adoption of the metric system, we publish a statement by the Educational Building Consortia, who represent the largest co-ordinated group of building users in this country. Closer co-operation between individual consortia members is envisaged.

In 1964 the Department of Education and Science in collaboration with the Educational Building Consortia set up a Technical Co-ordination Working Party as a forum for discussion of problems of mutual concern. The Technical Co-ordination Working Party reports to a Committee of Chairmen of Boards of Chief Architects of the Educational Building Consortia and both the Technical Co-ordination Working Party and the Commission to which it reports meet at regular intervals. Recent studies undertaken have been consortia management, the organisation of site labour studies and the preparation of a performance specification for internal partitions for which tenders have been invited from industry. Recently the Committee of Chief Architects met to discuss the arrangements needed to be made for joint work with particular reference to the change to the metric system as given in the BSI Programme, and the implications of this for closer collaboration. The adoption of the metric system will require the present systems to be modified; the timing of these changes within the BSI overall programme will vary from one Consortium to another depending on a number of factors and must be individually determined. Nevertheless the occasion of such an important change is recognised as being an opportunity to extend co-operation and co-ordination between individual consortia through the medium of the Technical Co-ordination Working Party and the Committee of Chief Architects. The Committee recognises that there is a general move not only in the public sector, but also throughout the building industry to attempt to achieve greater compatibility between components at the time of the metric changeover and that this is based on strong economic arguments. The work of the Interdepartmental Sub-Committee on Component Co-ordination (ISCCC) and its Working Group set up to co-ordinate the requirements of the different Government programmes, will play a part in meeting these objectives. While recognising that there is a case for co-ordination to avoid duplication of professional work the Committee is conscious of the need to maintain the momentum and confidence already developed by the various consortia systems in meeting the educational and other building demands which, as already announced programmes show, are increasing rapidly. Any action in pursuit of wider co-ordination must not affect adversely the confid-

ence of local authorities and the building industry in consortia nor their ability to meet their obligations in respect of building programmes and to improve the performance and the quality of their products. There are a number of factors which have been preventing consortia making use of each other's components; the first of these was the absence of a common dimensional framework and with the publication of Building Bulletin 24—'Controlling Dimensions for Educational Building'—a common framework was established in 1964. Since then all consortia not already using this framework have radically modified their systems to bring them into line. The second factor has been differences between one consortium and another in physical performance required for components. Third, even if these differences were reconciled further work would be necessary to reach agreement on common methods of jointing and fixing. Jointing, particularly in relation to the external envelope, is widely recognised as a problem which will require considerable time to solve.

The educational building consortia represent the largest co-ordinated group of building users in the country. They are equipped with the means to carry out technical work for the benefit of all their members, and they propose to set up a detailed programme of joint work.

Performance Requirements

In order to eliminate differences in performance requirements between the consortia, the Development Group of DES, on behalf of the Technical Co-ordination Working Party, has been preparing a number of performance specifications. The first of these is on partitions and others are in preparation or under consideration. Some of these specifications may take longer to draft than others and it is not necessarily the intention that they should all form the basis of a tender exercise such as the one for partitions, but the way in which they will be used will be settled in the light of circumstances.

To overcome the difficulties mentioned, there is a need for a common code of building practices or conventions. For this purpose the Technical Co-ordination Working Party, in collaboration with the DES Development Group, is preparing a bulletin which will set down what these agreed

conventions need to be. Reconciliation of the varied dimensional practices, together with agreement on performance standards, will for the first time provide the basis necessary for the design of components which can be used outside the consortium for which they were initially developed. It should be added that some of the consortia have begun to work on these lines. The consortia record:

- 1) that the existing co-ordinating machinery in the form of its Committee of Chairmen of Boards of Chief Architects and Technical Co-ordination Working Party will guide the educational building consortia in the change to the metric system;
- 2) that the continued development of consortia is essential if building programmes are to be achieved;
- 3) that they intend to explore the possibility of reaching agreement on performance specifications; these it is hoped, could lead to the development of components by individual consortia which could be used by others.

METRIC PRODUCTS

As the programme for metric adoption progresses, more and more products will be made to metric sizes or for ready conversion to metric. We shall be listing these products as they come on the market and, to help us provide as complete a service as possible, we should be glad to learn of any changes to metric made by manufacturers.

Decimal Conversion

Arrangements made for decimal conversion of Remington Rand's Aristocrat range of accounting machines will involve nothing more than moving three levers and replacing the existing pence wheels with $\frac{1}{2}$ d. wheels. This conversion can be carried out free of charge, on site, in the course of a normal service call and taking approximately 2 hours.

All installed machines will be fitted between now and 1971 with the necessary components for such a conversion.

British Olivetti say that their new adding and accounting machines, the '71 range, will handle every aspect of the new currency—particularly the awkward halfpenny. The machines operate in both the special UK decimal system and £ s. d., and cater for all categories of user.

No machine modifications are required to change from one currency to another. Changeover is accomplished by a single switch. Machine capacity is unaffected and operating technique remains the same. The Olivetti '71 decimal/£ s. d. range consists of four adding printing machines and a comprehensive series of electro-mechanical and electronic accounting and invoicing machines and data processing equipment.



NEWS FROM THE INDUSTRY

Impact on BRS

The impact of metrication on the Station can be viewed under three headings. Firstly there is the part the Station is playing in assisting the programme of the B.S.I. and undertaking various studies which are required. Then there are some problems which arise in the research process itself due to changes in measurement. Finally, presentation of the results of research in metric terms has to be considered.

Participation in BSI Programme

K. Alsop was one of the original members of the BSI Metric Panel (Construction Industry) set up in May 1965. In March 1966 his place was taken by G. A. Atkinson who continues to be a member of the Panel. Building Research Station thus has contributed directly to the preparation of the Metric Programme and is centrally involved in its implementation through BSI. BRS continues to take an active rôle in the work of the key BSI Committee concerned with dimensional co-ordination (B/94) and its sub-committee, B/94/4 Metric Building Sizes (Advisory). BRS scientific experience and its many links with research and industry in metric countries are also being made use of through participation in BSI Codes of Practice and Specification work.

Implication for BRS

Currently BRS is reviewing the implications of the change on its own research, information and education activities. In many fields of scientific research the metric system is already used. This is particularly so in physical and chemical laboratories, and where electrical or electronic apparatus is used for measurement. In these fields some rationalisation in the expression of results may be necessary to make them compatible with the SI system. In some research fields, however, e.g. in structural engineering and geotechniques, radical changes in the units used in research will be required. Here, in particular, it is necessary to review experimental practices and techniques, including standard tests, and the recalibration of some larger equipment may be necessary. The review is under way and any changes are planned to be completed by the end of December 1968. The newly-established Research Services Division will be assisting other Divisions at Building Research Station with any consequent problems of data logging and handling.

Information

Up to the present, information resulting from research has been presented in a variety of units. For example, some publications mainly use imperial values but some of the information is also given using metric units. In some fields, information is presented in the form of a ratio like the sound reduction factor expressed in dB. The change to the metric system will permit a rationalisation and will also faci-

litate comparisons with current work and standards in metric countries.

Information arising from research may have two uses. Firstly it may help towards a greater understanding of a particular problem. Here there is considerable value in the use of non-dimensional terms; coefficients; percentages; ratios, and cost data related to a specified base index.

Secondly, there may be a necessity to express in the SI system particular values required for design in calculations, specifications and the dimensioning of drawings. Here no difficulties are foreseen in the expression of linear dimensions other than the necessity to relate the rounding of metric values to the accuracy of the subject.

From January 1968 Building Research Station publications will include SI metric values. It is proposed that as from the end of 1969 Station publications will appear with only SI metric values.

Metric Meetings

For their inaugural meeting of the current season, the Civil Engineering and Building Division of the Institute of Purchasing and Supply were given a talk on the change to metric. It was delivered by N. D. Schofield, AIQS, who was obtained through the voluntary system run by the Building Centre. The meeting was attended by 154 people and full discussion followed. The one-day symposium at the University of Aston, Birmingham, organised by the RIBA West Midlands Region, on 12 October, had an audience of 850.

Metric Instruments List

As metric items for the drawing office become available we shall be publishing details in BMN. For the provision of this information we are indebted to the Drawing Office Material Manufacturers and Dealers' Association (DOMMDA).

Drawing Boards

Company	Plain edge for parallel motion	Ebony edge for tee square	For parallelogram type drafting machines	Cut-out boards for parallel motions	For Spacemaster (without telescopic extensions)
Angula Engineering Co Ltd	A0, A1, A2	A0, A1, A2	—	—	—
Hall Harding Ltd	—	A0, A1, A2	A0	A0, A1	1,000 × 1,500, A1
Holmes Bros (Leyton) Ltd	Made to order	A0, A1, A2	A0, A1, A2	A0, A1, A2	A0, A1, A2

Drawing Board Assemblies

Company	Counterweight parallel motion complete with straight edge	Dual-purpose Essex tables	Board with Eclipse parallel motion straight edge
Angula Engineering Co Ltd	A0, A1, A2	A0	—
Hall Harding Ltd	—	—	A0, A1

Drawing Board Stands

Company	To suit	
	A0	A1
Angula Engineering Co Ltd	54 × 32 in	36.2 × 25.6 in.

Plan Files

Company	Vertical chest	Cabinet of drawers on plinth
Angula Engineering Co Ltd	A0, A1	A0, A1

Tee Squares

Company	A0	A1	A2
Holmes Bros (Leyton) Ltd	≈ 1270	920	650