The Journal of the Institute of Hospital Engineering March 1983

HOSPITAL ENGINEERING

International Federation Issue

The problems of access for Disabled People

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HOSPITAL ENGINEERING

The Journal of the Institute of Hospital Engineering
and of
The International Federation of Hospital Engineering

I.F.H.E.

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March 1983

Front Cover: The role of the engineer in tackling the problems of access for disabled people is discussed in our article on page 7.

Institute News

Elections to Council — 1983

There has been only one nomination in respect of each of the seats on Council which will become vacant at the 1983 Annual General Meeting of the Institute to be held at the Hotel Piccadilly, Greater Manchester on Friday 13th May.

The nominations are:

J. B. Packer, *Nominated member*
K. I. Murray, *General Member*
P. Jackson, *Area Member-Wales*
M. H. Smith, *Area Member-North East and Yorkshire*
P. C. Vedast, *Area Member-London*

CEI Announces Poll Result

The Council of Engineering Institutions (CEI) announces that its Chartered Engineer members have voted by postal poll in favour of transferring the regulation of the engineering profession to the new Engineering Council.

The number of votes cast by the closing date (noon 7 February) was 82,065 representing 41% of the 200,000 voters. The result of the poll, which was declared today by the Electoral Reform Society, was: 76,274 votes (92.2%) in favour of the transfer, and 5,791 votes (7.1%) against. The two-thirds majority of those voting, required by CEI's Royal Charter, has therefore been secured.

This confirms the decision taken on 11 November by the CEI Board that CEI's powers to maintain a register of engineers and to award titles should be relinquished to enable the Engineering Council to take them over. The decision will now go to the Privy Council for ratification and an early decision is hoped for.

Commenting on the result, the Chairman of CEI, Mr Gerald Mortimer, said: "This is a most satisfactory result which fully confirms the decision of the CEI Board to relinquish these powers. In the circumstances it is a high poll and convincingly demonstrates the close interest taken by Chartered Engineers in the organisation of their profession and their wishes in this matter."

Mr Mortimer went on to say: "The CEI Board has already accepted in principle that, in the event of a YES vote in the poll, CEI would no longer have a worthwhile role and should set about winding up its affairs and surrendering its Royal Charter. This matter will be the subject of a formal resolution at the next meeting of the Board, and the Board's decision will be put to the whole membership at an Extraordinary General Meeting in early Summer. CEI will of course continue to carry out its obligations until they can be handed over in an orderly manner, but the Board expects this to be possible by the end of 1983."

In conclusion, the Chairman of Council drew attention to the fact that CEI had organised this poll on a tight timetable and thus had fully met the needs of the Engineering Council. Mr Mortimer concluded: "The efficient organisation of the poll and the twenty regional meetings, attended by some 1200 engineers, reflects much credit on everyone concerned, and is a major contribution by CEI to getting the Engineering Council off to a good start. We wish them every success in their difficult task."

North Western Branch

On Wednesday evening, the 26th January, members of the North Western Branch visited Christie Hospital, Manchester where they were shown the Pat Seed Body Scanner Suite.

The visit included a short introductory talk with slides, followed by visits to the various rooms of the suite which include the scanner, operator's console, computer room diagnostic interpretation and also the equipment for treatment.

The excellent presentation by the hospital staff together with the most impressive engineering of the equipment ensured a most interesting and enjoyable evening.

Obituary — K. W. Ashton

It is with great regret that we record the death of K. W. Ashton, who succumbed to the second of two heart attacks suffered within a few days.

Ken Ashton always gave his all and in so many causes, and his contribution to the Institute was very, very considerable.

His Health Service career began with service at Guys Hospital in 1947 before moving to Cornwall in 1950. In 1955 he was appointed Group Engineer, Highcroft Hospital, Birmingham moving to the East Birmingham Group as Group Engineer in 1963. In 1974 he was appointed Area Works Officer to Solihull A.H.A. He retired only last year.

Reverting to his service to the Institute, Ken was a member of Council of the Old Institution and, indeed, was one of the seven named subscribers at the time of the Incorporation of the Institute in 1967. He continued on Council right through to 1979 and the list below gives some indication of the measure of his service:-

Member, Finance and General Purposes Committee 1973-1979

Member, Education Committee 1967-1973

Member, Membership Committee 1968-1969

Member, Publications Committee 1967-1979 (Chairman 1974-1979)

From 1975-1978 Ken served as one of the Institute's two representatives on Council of the International Federation of Hospital Engineering, a role he enjoyed particularly and another field in which he gave much.

At Branch level he was a member of Committee for many, many years and was Branch Chairman 1961-1963 and again in 1982 right up to his untimely death. Surely a record of which anyone could be justly proud. Our thoughts are with Jean Ashton at this time of bereavement.

Northcroft Silver Medal Award 1982

The Northcroft Silver Medal Award for 1982 is made to R. R. Morgan for his Paper entitled 'Mobile Radio Communications' which appeared in the November issue of *Hospital Engineering*.

The presentation of the Silver Medal will be made to Mr Morgan at the 1983 Annual Conference Dinner.

New Appointments

Malcolm Brooke

Malcolm Brooke, Area Council Member for East Anglia, has been appointed District Works Officer for Great Yarmouth and Waveney Health Authority.

Mr Brooke was born in Wakefield, Yorkshire in 1944. He served an apprenticeship with the National Coal Board and remained with the NCB as an Engineer until 1967. After a brief spell as a Production Engineer with a manufacturing company he entered the Health Service in 1968 as Assistant Engineer with the then Hull 'B' Group HMC. Whilst in Hull he spent a one year secondment with the Inter Regional Training Scheme for Engineers, and in 1971 was appointed Hospital Engineer with the Ipswich Group of Hospitals.

Mr Brooke became a Member of the Institute in 1968 and has always participated in Branch activities. He has been Hon Branch Secretary for a number of years for the East Anglia Branch and serves on Council on both the Education and Publications Committees.

Alan Thorn

Alan Thorn, CEng FIMechE FCIBS has been appointed Regional Engineer for the North West Thames Regional Health Authority.

He replaces Ray Hodge who retired from the Authority at the end of last year.

Mr Thorn (55) has worked for the past 19 years at the South East Thames Regional Health Authority as an Assistant Regional Engineer. He was employed in industry up to 1962 when he joined the NHS as a Principal Assistant Engineer working for the North East Thames Metropolitan Hospital Board. He joined South East Thames RHA in 1964 and has been acting as deputy to the Regional Engineer since 1974. He takes up his new post on March 1.

Mr Thorn is married with two grown up children and lives in Sanderstead, Surrey. His hobbies include sailing and caravanning.

C. H. Cox

C. H. Cox, BA DMS MCIBS FIHospE FBIM has recently been appointed as District Works Officer to the Bolton Health Authority. Before reorganisation he was the District Works Officer with the Buckinghamshire Area Health Authority.

W. A. Taylor

W. A. Taylor CEng MIMechE MIMarE was appointed District Works Officer to the Scarborough Health Authority on the 1st January.

Eric Hall

Eric A. Hall, MCIBS FIHospE MIPlantE MBIM FRSH, Secretary of the East Midlands Branch, having been with E. G. Phillips Son & Partners, Building Services Consulting Engineers, for 20 years has now joined the Practice as a Partner.

Frank Smith

Frank Smith, TEng CEI FIHospE MIPlantE AMIIM also of the East Midlands Branch, is now Works Officer at The Towers Hospital, Leicester Health Authority.

Forthcoming Branch Meetings

London Branch *Hon Sec: P. C. Vedast London (01) 807 7340*

22nd March	Branch Annual General Meeting followed by Paper on Design, Manufacture, Installation and Testing of Ventilating Ducts. HVCA Document DW 142.	Wolfson Lecture Theatre National Hospital Queen Square WC1

Midlands Branch *Hon Sec: W. Turnbull Birmingham (021) 378 2211 ext 3590*

22nd March	Annual General Meeting followed by Heating Design for New and Refurbished Buildings G. D. Braham CEng MInstE	Aston University Warwick Room

North Western Branch: *Hon Sec: E. A. Hateley Manchester (061) 236 9456 ext 452*

22nd March	Annual General Meeting followed by Paper on Sterilizers	Bolton Medical Centre

Southern Branch *Hon Sec: R. P. Boyce Chichester (0243) 781411*

19th March 3 pm	The Electron Microscope	St. Mary's Hospital Portsmouth

Welsh Branch *Hon Sec: T. Roche Cardiff (0222) 755944 ext 2247*

9th March	Design and Commissioning of Air Handling Plant in Hospitals (Part 2) K. K. Williams WHTSO	Board Room Lansdowne Hospital Cardiff
13th April	Annual General Meeting Preceded by Film	Bridgend Ambulance Training School

South Western Branch *Hon Sec: A. J. Graver Cheltenham (0242) 21361*

30th March	Visit to view the Engineering Services Services at the Gloucester Royal Hospital	Gloucester Royal Hospital, Great Western Road, Gloucester.

Those wishing to attend any of the above meetings please contact the relevant Hon. Branch Secretary.

International Federation News

Symposium – Hannover

Electricity Supply and Electrical Installations in Hospitals

10–12 March, 1983

A three day Symposium on Hospital electrical supply and installations is being held from 10–12 March, at the Medical College, Konstanty-Gutschow-Strasse 8, 3000 Hannover 61, West Germany.

The organiser is Prof. Dr. O. Anna, of Fachtagung Krankenhaustechnik, Postfach 61 03 24, 3000 Hannover 61, Telephone Hannover 532-3349/2703. The Symposium is being mounted jointly with the WGKT, the German Society of Hospital Engineering, which is of course a full member of the IFHE, and of which Prof. Anna is President.

Unfortunately, notice of the symposium was received too late for inclusion in the last issue of *Hospital Engineering*, and the closing date for enrolments was 28 February. However, it may be that late enrolments can be accepted by telephone.

The content of the symposium sessions include Electrical Distribution, Energy Saving, Central Mains Supply, Emergency Power Supplies, Maintenance, Medical Equipment and Safety, Safety Precautions in Electrical Supply, Management and Responsibility, Safety at Work, Hospital Lighting, Key Points in Communications Technology, and Safety Testing and Fault Finding.

There are also several external visits to installations including Central Generators, Emergency Supply facilities, Refrigeration Plant, Refuse Disposal Installations, Laundries, Kitchens, Air-conditioning plant, etc.

The cost of the Seminar is 230 Deutschmarks per day (approximately £60).

Dutch Organisation Programme 1983

March: In St. Nicolas, near Antwerp with the co-operation of Messrs. SVK
Topic: The materials used in hospital buildings.

June: In Bruges, in the 'Hopital A.Z. St. Jan'
Topic: Day of study in hospital waste.

September: In Brussels with the co-operation of Messrs. ATLAS-COPCO
Topic:Compressers and compressed air and treated air in hospitals.
Power saving in the field of compressed air.

December: In Ghent with the co-operation of Messrs. VYNCKIER
Topic: Power saving in the field of motive power and therms.

Mars: à St. NICOLAS près d'ANVERS avec la coöpération de la firme SVK
Thème: Les matériaux appliqués dans les bâtiments des hôpitaux.

Juin: à BRUGES à l'hôpital A.Z. St. Jan
Thème: Journée d'etude des déchets Hospitaliers.

Setembre: à BRUXELLES avec la coöpération de la firma ATLAS-COPCO
Thème: Les compresseurs et l'air comprimé et traité dans les hpitaux.
Economie l'energie dans le domaine de l'air comprimé.

Décembre: à GAND avec la coöperation de la firma VYNCKIER
Thème: Economie d'énergie dans le secteur de la force motrice et de la thermie.

Portuguese Hospital Engineering Association (A.P.E.H.)

Programme for 1983

The programme of activities of the 'Associação Portuguesa de Engineering Hospitalar' (A.P.E.H.) for 1983 comprises the following events:

30th April to 9th May	—	Study Tour to hospitals in Spain and Southern France. Participants will attend the Fifth Seminar of the Spanish Association — Asociación Española de Ingenieria y Arquitectura Hospitalaria (AEDIAH), in Barcelona, on the 6th and 7th May.
20th May	—	Free presentation of papers on the Study Tour by participants in the Tour. Venue: Lisbon. Lecture Room of the 'Portuguese Oncological Institute' (I.P.O.)
27th and 28th October	—	Seminar on the theme: 'Safety in Hospitals'. Venue: Lisbon. Lecture Room of the I.N.S.A.

Le programme des activités de l'Associação Portuguesa de Engineering Hospitalar' (A.P.E.H.) comprend les évènements suivants:

Du 30 Avril au 9 Mai	—	Visite d'Étude à des Hôpitaux en Espagne et dans le Sud de la France, avec participation aux '5 eme Journées d'Études' de l'Association Espagnole d'Ingénierie et Architecture Hospitalières, (AEDIAH), à Barcelone, les 6 et 7 Mai.
20 Mai	—	Exposés libres sur la Visite d'Étude, par des membres y ayant participé. Local: Amphithéâtre de l'Institut Portugais d'Oncologie (I.P.O.) à Lisbonne.
27 et 28 Octobre	—	Séminaire sur le thème: "La Sécurité dans les Hôpitaux". Local: Amphithéâtre de l'I.N.S.A., à Lisbonne.

IFHE Statute

At the first meeting of the IFHE Executive Meeting which took place in Madrid in October 1982 the Committee, having taken into account all comments and suggestions received from Council Members till then, has prepared the final version of the Statute which is printed below in English and in French. Further copies can be obtained by writing to the General Secretary, Joao L. Galvao, R. Teixeira de Pascoais, 13, 2°.-Esq.°, 1700 Lisboa, Portugal, or, from 1 June 1983, to any member of IFHE Council.

Article 1 — Titre

Cette organisation se dénomme 'FEDERATION INTERNA–TIONALE D'INGENIERIE HOSPITALIERE' (FIIH).

Elle regroupe les Associations Nationales d'Ingénierie Hospitalière qui adhèrent aux présents Statuts, et encourage d'autres organisations et personnes engagées dans des activités du domaine de la santé à contribuer à la poursuite des buts fixés à l'Article 3 ci-dessous.

Article 2 — Qualité

La FIIH est apolitique, non-gouvernementale et indépendante. C'est une organisation strictement sans but lucratif, ses ressources étant exclusive employées à créer et promouvoir des échanges de technologie d'ingénierie hospitalière, son unique but final étant que les malades puissent recevoir partout de meilleurs soins de santé.

Article 3 — Objectifs

Les objectifs de la Fédération Internationale d'Ingénierie Hospitalière sont les suivants:

a) promouvoir, développer et diffuser la technologie d'ingéneirie hospitalière;
b) comparer les expériences internationales;
c) promouvoir le principe de la programmation, du projet et de l'évaluation globales, par l'amélioration de la collaboration entre les professions;
d) promouvoir une gestion plus efficace du fonctionnement, de l'entretien et de la sécurité des hôpitaux, de leurs installations, matérials techniques et bâtiments;
e) offrir sa collaboration aux autres organisations internationales.

Article 4 — Catégories de Membres

La Fédération Internationale d'Ingénierie Hospitalière comporte cinq catégories de Membres:

Membres 'A' — Les Associations Nationales d'Ingénierie Hospitalière dont l'appartenance est overte à tous les techniciens professionnellement engagés dans le vaste domaine de l'ingénierie hospitalière et dont les buts sont ceux de la FIIH.

Membres 'B' — Des Personnes qui sont intéressées à promouvoir les objectifs de la FIIH. Ils se divisent en deux catégories:
i) Ceux ne pouvant pas ëtre membres d'une Association Nationale catégorie 'A'.
ii) Ceux qui sont membres d'une Association catégorie 'A' et qui veulent mener une action personnelle.

Membres 'C' — Les organisations gouvernementales, autorités sanitaires et autres organisations, associations et institutions directement occupées dans le domaine de la santé.

Membres 'D' — Les organisations professioneeles techniques et Firmes industrielles ou participant à l'ingénierie de la santé.
l'ingénierie de la santé.

Membres 'E' — Les membres honoraires, qui sont des personnes ou des organisations ayant rendu des services éminents à la FIIH ou qui se sont distinguées dans le domaine de l'ingénierie hospitalière.

Article 5 — Assemblée Générale

L'Assemblée Générale réunit les Membres de toutes les catégories de la FIIH. Elle doit se tenir au moins une fois chaque deux ans à l'occasion des Congrès Internationaux. Tous les membres ont droit à la parole lors des réunions de l'Assemblée Générale, et de proposer des recommendations au Conseil.

Article 6 — Le Conseil

Le Conseil est le corps dirigeant de la FIIH. Il établit les orientations et gouverne les affaires de la Fédération. Le Conseil est composé par le Président, le Vice-Président, le Secrétaire—Général, le Trésorier, le Vice-Secrétaire et deux représentants de chacun des Membres 'A'. Sur invitation du Président, des membres 'B' peuvent prendre part aux réunions du Conseil mais seuls les Membres 'A' peuvent voter, avec un vote par Membre 'A'. Aucune décision par vote ne sera prise en Conseil sans la présence d'un quorum d'au moins un tiers de ceux ayant droit au vote.

Le Conseil doit se réunir au moins une fois tous les deux ans.

Article 7 — Le Comité Executif

Le Comité Executif appliquera les orientations décidées par le Conseil. Il comprendra le Président, le Vice-Président, le Secrétaire-Général, le Trésorier, le Vice-Secrétaire et, au plus, trois membres du Conseil désignés par le Président.

Article 8 — Le Président et le Vice-Président

Le Conseil élira à la majorité simple un Président et un Vice-Président qui tiendront ces postes pendant une période de deux ans, la date exacte étant déterminée par le Conseil. Sauf en cas de circonstances spéciales, le Vice-Président sera confirmé comme Président pour la période de deux ans suivant son mandat de Vice-Président.

Article 9 — Les Ressources

La Fédération tirera ses fonds des sources suivantes:
a) Cotisations et souscriptions annuelles des Membres, fixées par le Conseil;
b) Revenu provenant des biens appartenant à la Fédération;
c) Des activités spéciales, comme des conférences ou des publications;
d) Toutes souscriptions et dons reçus d'autres sources.

Article 10 — Langues

Les langues officielles de la FIIH sont déterminées par le Conseil. En cas de différences d'interprétation concernant ces Statuts et les Réglements Généraux le texte en anglais sera considéré comme étant l'original.

Article 11 — Amendements

Ces Status peuvent être amendés par une majorité des deux-tiers du Conseil mais seulement après que les amendements proposés aient été présentés à l'Assemblée Générale pour commentaires à soumettre à l'appréciation du Conseil, par écrit, dans les douze mois.

English

Article 1 — Title

This organisation shall be known as "The INTERNATIONAL FEDERATION OF HOSPITAL ENGINEERING" (IFHE).

It is constituted to group National Associations of Hospital Engineering adhering to this Statute and to encourage others in activities associated with health care to contribute to the intents set out in Article 3 below.

Article 2 — Status

The IFHE is non-political, non-governmental and independent. It is a strictly non-profit organisation, its resources being exclusively used to foster and promote the exchange of hospital engineering technology, with the ultimate goal that sick people everywhere may receive better health care.

Article 3 — Objectives

The objectives of the International Federation of Hospital Engineering are as follows:
a) to promote, develop and disseminate hospital engineering technology
b) to compare international experience;
c) to promote the principle of integrated planning, design and evaluation by improved collaboration between the professions;
d) to promote more efficient management of operation, maintenance and safety of hospitals, their engineering installations, equipment and buildings;
e) to offer collaboration with other international organisations.

Article 4 — Membership

The International Federation of Hospital Engineering has five classes of membership:
'A' Members — National Associations of Hospital Engineering whose membership is open to all technologists and technicians who are engaged in the broad field of hospital engineering and whose objectives are those of the IFHE.
'B' Members — Individuals who are interested in promoting the aims of the IFHE. There shall be two categories:
i) Those who cannot be members of an 'A' Member Association.
ii) Those who are members of an 'A' Member Association and who wish to contribute personally.
'C' Members — Governmental organisations, health authorities and other organisations, associations or institutions directly concerned with the health-care field.
'D' Members — Professional, commercial or industrial firms interested in the health-care field.
'E' Members — Honorary Members being persons or organisations who have rendered special service to the IFHE or who have distinguished themselves in the field of health-care engineering.

Article 5 — General Assembly

The General Assembly is the assembly of the membership of the 'A' Members, representatives of 'C' and 'D' Members as defined by the Council and all 'B' and 'E' Members, and shall meet at the time of the International Congress. All present at the General Assembly shall be entitled to speak and propose recommendations to the Council.

Article 6 — The Council

The Council is the governing body of IFHE. It defines policy and manages the affairs of the Federation. The Council shall consist of the President, Vice-President, General Secretary, Treasurer, Vice-Secretary and two representatives of each of the 'A' Members. At the President's invitation 'B' Members may attend meetings of Council but only 'A' Members may vote with one vote of those eligible to vote are present.

The Council shall meet at least once every two years.

Article 7 — The Executive Committee

The Executive Committee shall execute the policies agreed by Council. It shall consist of the President, Vice-President, General Secretary, Treasurer, Vice-Secretary and up to three other members of Council appointed by the President.

Article 8 — President and Vice-President

The Council will elect by simple majority a President and a Vice-President who will serve for a period of two years, the actual dates to be determined by the Council. The Vice-President will, except in special circumstances, be confirmed as President for the two-year period following his term as Vice-President.

Article 9 — Funds

The Federation will have funds available from the following sources:
a) annual subscriptions, as determined by Council, from Members:
b) income from any property owned by the Federation;
c) special activities, for example, conferences or publications;
d) any subscriptions and donations from other sources.

Article 10 — Languages

The official languages of the IFHE shall be determined by Council. Where in this Statute and in the Standing Orders there is a difference of interpretation, the English text shall be taken as being the original.

Article 11 — Amendments

This Statute can be amended by a two-thirds majority of the Council but only after submitting the proposed amendments to the General Assembly for comments to be submitted in writing within twelve months for consideration by Council.

This article was first presented as a paper at the IFHE Congress in Amsterdam in May 1983. The authors are from the Hospital Technical Departments of Forlì and Cagliari, Departments of Engineering and Architecture of the Univ. of Bologna, Bari, Roma, Italy. Alberto Lena is Vice-President of FeNATO.

The Handicapped and Hospitals

ALBERTO LENA, P. BRAVETTI, G. TORTORICI, G. ZEDDA

Preliminary Remarks

1981 was the international year of the handicapped, as proclaimed by a UN resolution which proposed, among its main objectives: "to help handicapped people find their place, psychologically and physically, in society; to promote a sense of obligation, both national and international to allow handicapped people to have adequate legal allowances, assistance, training, care to give them the opportunity to work and to ensure their full integration into society; to encourage studies and research with the aim of facilitating the practical participation of the handicapped in everyday life, by resolving, for example, the problem of accessibility in public buildings and in public transport.[1]

The most recent Papal Encyclical on the work of man also dealt with the specific problems of the handicapped: "Since the person who has a handicap is a person with all his rights, he should be helped to participate in the life of society in all aspects and at every level. The handicapped person is one of us and participates fully in our own humanity. It would be completely unworthy of man, and a negation of common humanity, to admit into society, and therefore to work, only fully functioning members because in so doing he would be falling back into a grave form of discrimination, that of the strong and the healthy against the weak and the sick".[2]

In Italy, shortly before this, two important new laws came into effect, one dealing with Health Service Reform and the other with 'Regulations concerning standards in the matter of architecture with barriers and public transport'.[3]

At the beginning of 1982 a weekly newspaper ran a special feature called "Every day, the year of the handicapped begins".[4]

Perhaps at this point we could weigh up the pros and cons, reflect, and make a few proposals.

The pros and cons can be summed up very concisely by the following quotation: "The year of the handicapped has aroused the attention of public opinion but the State has made little reaction. Let us be quite clear about this: many Town Councils have spent money and time in organising meetings and exhibitions but, for example, how many have put the regional laws into effect?".[5]

In fact one cannot deny that there has been a remarkable participation at an emotional level; that the legislation in force, whether national or regional, to deal with the problem in its various aspects; that there have been and there are suitable funds to begin to confront the major needs. Often, however, the initiative is lacking to carry out what has been discussed and scheduled; for example the Council in my home town set apart 300 million Lire in the 1981 budget for 'the elimination of architectural barriers' but I don't believe that anything specific has been achieved so far.

Sommaire en Français

Les handicapés et les hôpitaux

1981 avait été désignée comme l'Année Internationale des Handicapés. Les auteurs de ce communiqué, qui travaillent dans les départements du génie et de l'architecture de l'université de Bologne, en Italie, discutent ici de l'élimination des "barrières architturales". Celles-ci peuvent être définies comme étant les barrières sociales, les barrières législatives et les barrières psychologiques.

Pour parvenir à éliminer ces barrières, il est nécessaire de réaliser qu'il ne s'agit pa tout simplement d'un problème d'accès mais aussi d'une question sociale plus vaste impliquant les préjudices des individus et les faıons de voir de l'Etat. Ce qu'il faut pour commencer, suggèrent les auteurs, c'est que les concepteurs et les architectes dans le domaine du bâtiment et de l'environnement prennent conscience des problèmes qui se posent journellement aux handicapés. Les auteurs décrivent alors d'une manière générale les secteurs où des problèmes risquent des e poser à l'inteérieur des hôpitaux et suggèrent différentes manières de faciliter l'existence pour les gens souffrant de toutes sortes d'handicaps.

L'un des éléments les plus importants dont on doit tenir compte c'est que n'importe quel bâtiment public doit être polyvalent, susceptible d'tre agrandi et adapté. Les auteurs passent alors à la description générale de différentes innova-
innovations techniques et de plans pour la mise en oeuvre de leur programme. L'article est illustré au moyen de graphiques et diagrammes.

Assessing the problem

If we accept that we are all potential invalids and that we are all biologically destined to grow old then it matters little whether those who require attention are few or numerous.[6] Yet since it is important for the purposes of research to classify and quantify the object of that research, we should identify the medical and legal as the most important viewpoints.

From time to time it can be important to consider a complex series of combinations of such points of view to specify exactly the facilities to introduce in the planning of the main architectural elements. For example a research project was conducted, to this end, in the USA by the HUD (Housing and Urban Development) for three years to revise existing standards;[7] while in Holland, research was carried out by SAR (Stichting Architecten Research) of Eindhoven for "the development of forms of housing accommodation for occupants having specific dwelling requirements, or of types of dwellings or forms of housing having better possibilities for adaptation than usual".[8]

Unlike the English classification, which makes reference exclusively to the degree of disablement of those individuals deemed to be handicapped, in Italy the legislation takes account of the causes of the obstacle.[9]

We are concerned chiefly here with distinguishing two categories of invalid which in turn, may be subdivided into four groups:

1) Sensory invalidity.
   a) the blind b) the deaf
2) Locomotive invalidity
   a) invalids with limited mobility
   b) invalids with no possiblity of moving.

Each category has its particular needs, but also others which it shares with other categories.[6]

This classification, though quite schematic and generalised, will allow us as we can see later, to examine simply the problem of planning and this is of considerable value in confronting, without excessive, unnecessary intellectual complications, a problem which is already extremely complex; though we must always remember "The inherent error in the problem regarding the handicapped is in considering it as a problem and not a fact of life."[5]

If it is difficult to define who is a handicapped person, it is even more difficult to say how many there are, even if, as we have said at the beginning, it matters little whether they are few or many.

The number varies greatly according to the criterion adopted to determine it; so whereas an English statistic emerged some time ago which indicated that in western societies spastics count for two in every thousand of the entire population, a survey carried out at the beginning of 1960 in Bologna (Italy), and still reliable enough to constitute a basis for study of the Emilia-Romagna region, indicates that the incidence of disablement among schoolchilren between 3-14 years old (spastic, deaf-mutes, hard of hearing, blind, mongoloids) on the whole is six in every thousand.

This would tend to conclude that the handicapped in Italy definitely number at least 300,000, to which number nevertheless must be added all those people who are victims of minor disablements or who suffer not from permanent traumas, but from illnesses which require a slow and gradual recovery; the number increases further if one considers the mentally handicapped as well.

However the observation of the factors which determine physical disabilities cannot stop at a pathological level. There is a vast section of handicapped people whose disablement is attributable to the illnesses of the modern world, to accidents at work and on the roads.

Every year, throughout the world, 50 million workers suffer minor or serious injuries; on the roads the phenomenon is of almost the same dimension. To these accidents, which injure one person in ten, must be added the occupational illnesses, not to mention the alienation which the new methods of intensive organization of work inevitable cause.[10]

In Italy, in fact, we have surveys which show that at least 8 million Italians, 15% of the entire population, are affected by problems of "architectural barriers", i.e. about the elimination of these obstacles in buildings which limit or impede the possibility of movement of handicapped people whatever their disability.

These figures, quoted by ISES (Institute for the Development of Social Building) in 1970, and also reported by ISTAT (The Central Institute of Statistics) in 1978, have been confirmed at the National Convention of the Handicapped and their place in work, which took place in Rimini (Italy) in September 1979. This estimate also includes cardiopathics, those with behavioural problems, the hard of hearing and the mentally deficient.

Architectural Barriers

We have scarcely defined what we mean by "architectural barriers" but we must add right away that as well as these there exist three other types of difficulty which for convenience's sake we will continue to define with the term 'barrier': social barriers, legislative barriers and psychological barriers.

To dismantle all these 'barriers' we really need the participation of the handicapped, that we may be aware first and foremost of their presence. It has been said in fact that: "handicapped people are playing an important role in the creation of a new civilization, by removing social barriers and by introducing new values, not those of strength but of humanity".[11]

The first misconception that must be swept away is that of thinking of an 'us' and a 'them', a misconception which has penetrated our mentality, so creating the first real barrier, much more stubborn and more radical than the architectural barriers, because it touches on the question of human relationships.[12]

In western society independence is considered as an ideal, associated with strength and control; independence in reality is a transitory state, unimaginable in old age or in a mechanised society. It is also necessary to speak of interdependence because this allows the explanation of that 'convivial society' that enables people of different resources to meet and help one another in solidarity. The architectural barriers are then also obstacles to the explanation of the possibilites of help from the non-handicapped, because it is unimaginable to rely only on the efforts of the helper to enable invalids to use stairs and narrow doorways.[6]

"It is important to consider architectural barriers" wrote architect A. Ornati "because one must realise that it is not solely a problem of steps, entrances, lifts, as many still think, but a fact, a social problem, which shows the precariousness of houses, of towns, of infrastructures, of transport ... For the sick or disabled individual, society has always acted in trying to set up special establishments, general hospitals, mental hospitals, nursing-homes, old people's homes, convalescent homes, where the individual might recover his health completely or partially, but the mistake is that it never has been taken into consideration what happens after he has been discharged, particularly when disablement follows as the result of accident or illness. So he returns to an environment, in an urban framework which in most cases, is not suitable for his requirements".[14]

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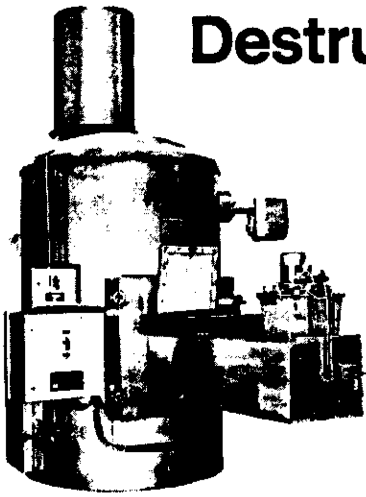

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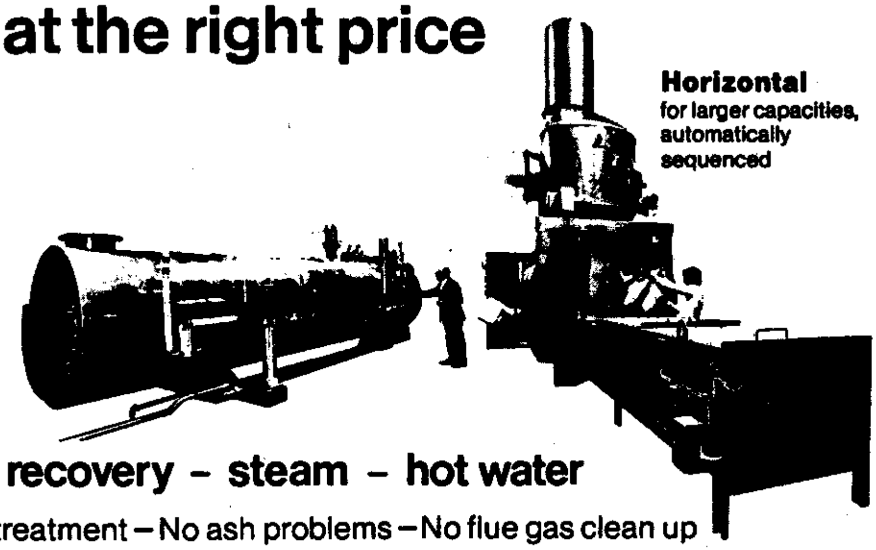

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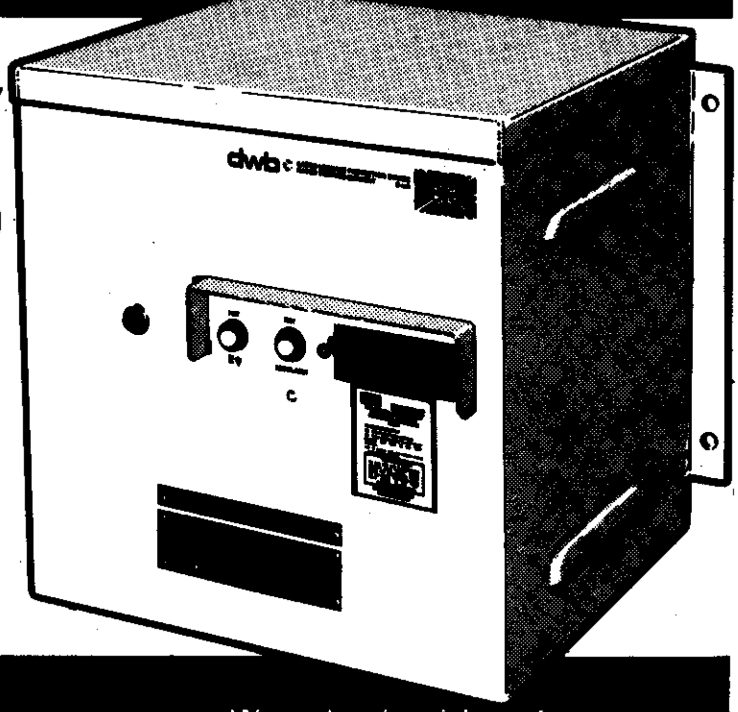

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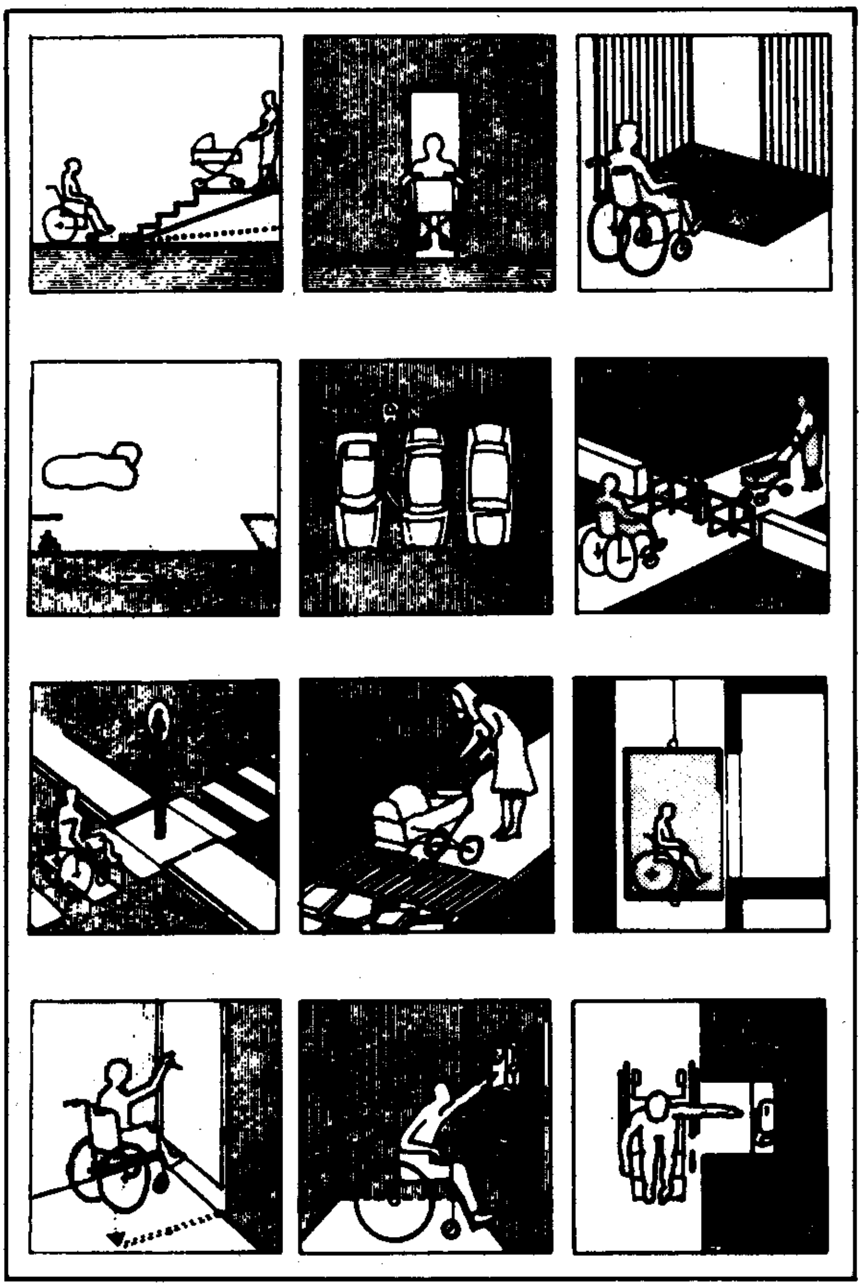


Figure 1.

Flights of stairs, small lifts, steep inclines and narrow passages limit the possibility of movement not only of the handicapped, but also of the elderly, of pregnant women, of mothers with infants in prams and anyone who has his leg in plaster (*see Figure 1*). A problem of such vast dimensions continues to exist despite the fact that possible modifications during the planning stage would not have constituted a serious economic burden, and sometimes even would have resulted in some savings.[10]

Now that society has obtained legal instruments so that even practical every-day problems of the handicapped are taken into consideration, we have gone the other way, because it needs a new 'forma mentis', that is the awareness of the designers and operators in the building and environmental field.

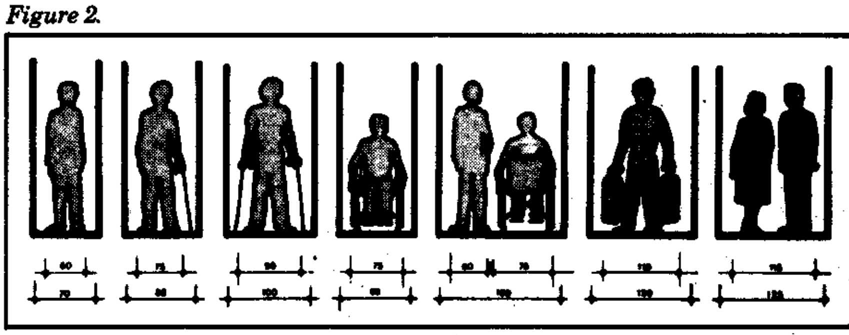


Figure 2.

This implies solutions that allow the adaptation of the location to the different needs and to the changes in the future.

These solutions may be stimulated by examples and methodological proposals but are not codifiable in prestated forms.[15]

Methodology

On a methodological plane we can see how a design which answers the specific needs brings the designer closer to the user and to his requirements and may provide the stimulus to try and establish a closer relationship with the consumer through the designer asking questions, having identified himself with the problem, with all his array of knowledge, problematic, specific and technical.[16]

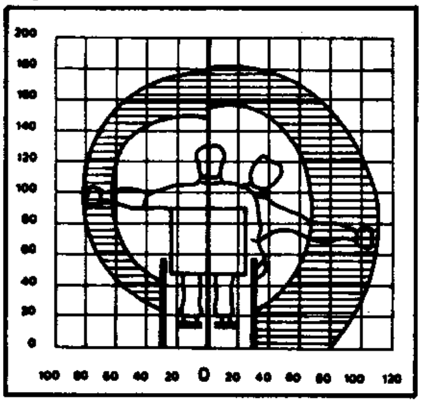
This is the method which we ourselves have used, as we will mention later on.

Taking account of the user's needs, leads to the adoption of a human 'scale' because: "man is small, and therefore, small is beautiful, to go for giantism is to go for self destruction".[17]

In fact paragraph 76 of the Athen's Charter of 1933(18), one of the most well-known manifestoes of the rationalist movement, says that: "The calculation of the dimensions of everything within the scope of urban authorities can only be regulated according to the human scale. Man's natural size should serve as a basis for all the standards connected with life and the different functions of being (*see Figure 2*). Standards of size applied to surface areas and distances, standards of distance considered in relation to man's normal pace, standards of time which should be determined taking into account the daily movement of the sun".

Giving a specific say in the matter to the consumer means that the role of the planner is also more clearly defined. With a reduction in the number of variables involved he can offer more adequate solutions separating, as suggested by Habraken, the supports like beams, pillars, roofs ..... from those arranged and decided upon by the user (*see Figure 3*).

Figure 3.

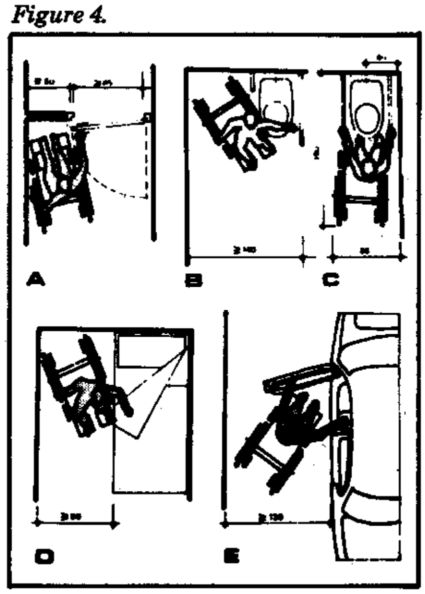


At this point we can examine some methodological indications, some of which are drafts of research conducted by the SAR, Eindhoven[8] and others are studies carried out by Goldsmith[19] and by Orofino.[6]

It is important to determine the possible points of difficulty which can create barriers if the planner's point of reference is only a healthy male in the 25 to 50 age group.

If we consider moreover that the constructed elements define an external sphere and an internal sphere, besides the very element which separates the two, we can divide these points into: (*see Figure 4*).

Figure 4.



1 Possible external problem points

1.1 arrival; the amount of parking-space; (*see Figure 4-E*)

1.2 transit; the width of the pavement, the presence of inclines for surmounting kerbs, the absence of unforeseeable obstacles, with suitable types of surface to avoid sliding and to point out changes of level, junctions, etc.;

1.3 approach; the presence of ramps, stairs, lifts, and handrails in keeping with particular requisites.

2 Possible problem area in doorways etc.

The doorway (*see Figure 4-A*) is a filter which, as far as we are concerned now, should allow people and things to pass through it.

The problems are therefore: passages, doors and steps. The doorway nevertheless defines also two areas where the user plays an important role.

3 Possible interior problem areas

These have to do chiefly with functional areas, as defined according to precise predeterminable activities.

The functions will be located in a certain area and that will have a bearing on the times of the journeys, since the functions are closely joined to the technical installations, they

Table 1: Parking, Ramps, Accessibility and Internal Traffic.

Items	Italy	England	Sweden	Holland	Canada	U.S.	Norway	Switzerland	Germany	Belgium	Denmark	Finland	France	GDR	Ireland	Israel	New Zealand	Poland	Comparative average data
PARKING																			
Max. trans. slope	5%																		
Type:	Herring bone					Herring bone													
Width.	3.00 m		3,5 – 4,00 m.	3,30 m.	3,70 m.	3,66 m.	4,00 m.	3.50 m	3,50 m.	3 30 – 3,60 m.	3,50 m.	3,40 m	3,30 m.		3,00 m	3,05 m	3,60 m.	3.60	2,000 + 1,30 m.
– vehicle	1,70 m																		
– seat	1,30 m.																		
RAMPS																			
Min. Width	1,50 m	1.20 m	1.30 m	1,30 m	0,9 m		1,80 m		1,20 m		1,30 m	1,30 m.	1,50 m.		1,20 m		1,22 m.	1,50 m.	Ave. 1,50 m.
Max. slope	8%	8%	5%	5% – 8%	8%	8%	5% x 10 m 8% x 6 m	6%	6% 4% x 15 m.	5%	8%	5%	5%	8%	6%	10% – 8%	8%	12%	8% x 10 m.
Terrace.	every 10 m.	every 10 m for slope 5%		every 9 m.	every 9 m	every 9,5 m			every 6 m										every 9 m.
Length of Terrace	1,50 m			1,30 m	1,20 m.	1,52 x 1,52 m			1,30 m.										1,5 m.
Handrail	90 cm. h	91 cm h		90 cm h.		91 cm													90 cm.
– prolongations	50 cm					30 cm													50 cm.
Protective borders	10 cm	5,1 cm.																	10 cm
Terraces at ends		1,22 m	1,83 m			91,5 x 91,5 m.													
+ presence of doors	1,50 x 1,50 m					152,5 x 152,5 cm													1,50 x 1,50 cm.
INTERNAL ACCESSIBILITY																			
Accesses (free space)	1.50 m. (Door)	0,83 m			0,75 m	0,81 m	0,85 m		1.00 m	0,9 m.	0,83 m	0,9 m.	0,8 m	0,75 m.	0,8 m	0,8 m	0,70 m.	0,90 m	90 cm.
Threshold (max.)	2,50 cm	2,00 cm		2 cm.	1,25 cm		2,00 cm		2,5 cm										2,00 cm
Depth for protection from rain	2.00 m																		2.0 m.
Doors			closure taking 6 seconds		if two-leaf doors, as with delayed closure														
INTERNAL TRAFFIC																			
Platform	min. side 2 m																		
Width of corridors	1,50 m.	1,22 m	1,30 m.	1,90 m		1,05 m			1,40 m.	2,00 m	1,30 m.	1,30 m	1,20 m. 1,50 m. 1,60 m.	1,80 m.	1,22 m.	1,50 m.	1,22 m.		1,50 m. (*)

(*) permits turning 360° and the passage of two seats on wheels.

Items	Italy	England	Sweden	Holland	Canada	U.S.	Norway	Switzerland	Germany
DOORS									
Clearance	0,85 m	0,76 m	0,76 m		0,81 m	0,80 m	0,85 m	0,90 m	0,85 m
Space at flank		0,38 m	0,70 m		1,50 direction of opening	1,52 direction of opening			
Space in front					0,90 m opposite	+ 30 cm. + door on other side			
LIFTS									
Cabin			internal rotation						
– depth	1,50 m	1,45 1,125 m	1,4 - 1,4 m	1,40 m			1,60 m	1,00 m	1,40 m
– width	1,20 m	1,07 - 1,345 m	1,4 - 1,0 m	1,10 m			1,40 m	1,00 m	1,10 m
– door clearance	0,90 m	0,835 m	0,80 m	0,80 m			0,90 m	0,80 m	0,80 m
– height of control panel	1,20 m			1,20 m	1,20 m		1,00 m		
Balancing	frequent inspection	necessary	desequilibrium 0,025 m						
Handrails					on 3 sides			0,90 m from floor	
TOILET SIZE	(*) (**) 1,80 x 1,80 m	1,37 x 1,75 m	2,10 x 1,40 m 1,70 x 1,70 m 2,20 x 1,70 m	1,80 x 2,80 m 1,90 x 1,90 m 2,25 x 2,25 m	1,65 x 2,00 m			1,50 x 1,50 m	1,80 x 2,00 m 2,20 x 2,00 m
Height from floor of cistern	0,9 m	1,07 m	0,9 1,20 m	1,00 m		1,20 m		0,90m	1,05 m

Items	Belgium	Denmark	Finland	France	G.D.R.	Iceland	Israel	New Zealand	Poland	Comparative average data
DOORS										
Clearance	0,86 - 0,90 m	0,63 m	0,80 - 0,90 m	0,80 m	0,83 m	0,78 m	0,80 m	0,76 m	0,85 - ,90 m	0,86 m
Space at flank										
Space in front										
LIFTS										
Cabin										Area approx. 1,5 1,5 mq
– depth	1,50 m	1,20 m		1,30 1,50 m		1,455 m	1,46 m	1,83 m.	1,50 m	1,45 m
– width	1,20 m	1,10 m		0,80 - 1,20 m		1,07 m	1,37 m	1,10 m	1,10 m	1,10 m
– door clearance		0,83 m		0,80 m		0,83 m	0,84 m		0,90 m	0,85 m
– height of control panel										1,20 m
Balancing										
Handrails										0,90 m
TOILET SIZE	1,80 x 2,10 m	2,20 x 1,80 m		2,10 x 2,17 m	1,82 x 1,80 m	1,52 x 1,75 m	1,40 x 1,76 m 2,40 x 1,30 m	1,62 x 1,78 m 1,37 x 1,83 m	1,55 x 2,25 m 1,90 x 1,90 m 2,25 x 2,25 m	(*) (**) 1,5 x 1,75 m average 1,67 m
Height from floor of cistern		0,90 - 1,20 m	0,90 - 1,20 m	1,00 - 1,40 m		1,07 m	1,30 m	1,14 m	0,90 m	1,05 m average 1,06 m

(**) Depth (*) Width (part in which the door opens)

Table 2: Doors, Lifts and Toilet sizes.

will remain a fixed element around which to centre the construction; we can therefore consider them as forming part of the very support, being practically outside the field of influence of the user.

We can consider, therefore, as interior problem areas: the toilets, the kitchens and technological sectors, functional areas in general; particularly as regards entrances, internal traffic, use of equipment, use of furniture. (*Fig. 4-B.C.D.*)

It is also necessary to give some consideration to the functional requisites and to the anthropometrical data prior to planning, as inferred from comparison of different studies carried out by others[20] and from a comparison of the standards of different countries[21 22 23 24]. As has been said previously the dividing of handicapped into those in wheelchairs and those not, is appropriate and serves to give indications in the case of specific projects.

In uncertain cases it is always the needs of the more sensitive user i.e. of those on wheelchairs which are considered.

In the tables which follow, reference is made to the definitions given earlier of problem areas, by examining some of the main barrier elements such as: parking, ramps, internal accessibility, internal traffic, doors, lifts and toilets[25 26 27 28 29 30 31 32].

Regarding the more specific indications for the planning of public buildings in general and of health-service buildings in particular, I would like to state some preliminary ideas and methodological criteria, as deduced from all the references cited from [33] to [43].

Planning Rules

One of the most important characteristics that a public building should have is flexibility, defined as the ratio between the variation of functionality and the duration of the restructuring, in relation to the increase in costs.[33]

The flexibility is composed of versatility, i.e. the possibility of change of activities taking place in one or more functionally dependant areas;
expandibility i.e. the possibility of adding new spheres to existing parts;
convertibility i.e. the possibility of redistributing the activities of one part of the building in a new organizative pattern.

As regards versatility, one rule of planning could be the fixing of the dimension of the rooms, modulated so as to increase the possibility of combinations.

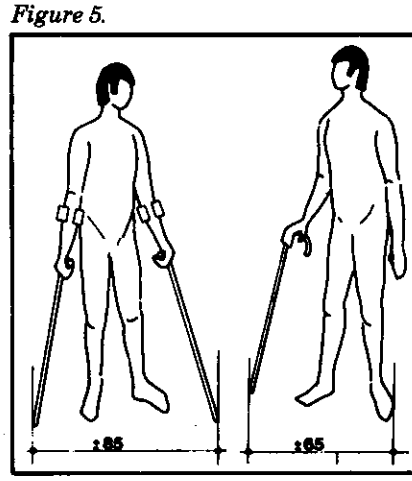
The series 1.80-2.40-3.00 etc (module of 60 cm.) seems more useful than the 2.00-3.00-4.00 (based on a module of 100 cm.).

As far as expandibility is concerned, it is important to be able to expand the building in phases so that it is adaptable to the economic resources available even if the project should be considered as a single unit from the beginning.

Of particular importance in the planning sphere generally are the models of traffic and of the distribution of water, energy, heating because of their influence on future extensions.

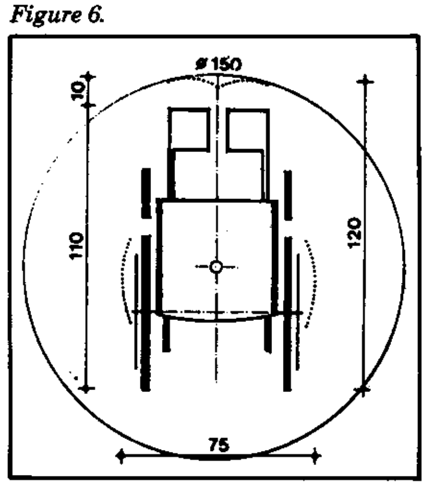
As regards convertibility, particular attention should be paid to the modular co-ordination between support structures and non-support structures so as to be able to change partitions or doors in a way which is consistent with the span of the structure.

Figure 5.



Besides the criteria of the human scale (*See Figure 5*) and of flexibility, the planning must also examine: facility of movement (*see Fig. 6*), respect for the environment, sociality of relations.

Figure 6.



All these considerations bring many planners to prefer the horizontal solution for medical buildings. The horizontal lay-out, by abolishing the architectural barriers also allows the physically handicapped use of the service, whether for rehabilitation courses or other social or health services. In buildings with horizontal lay-out nature and internal spaces can play a dual role; nature provided outside the buildings and inside in shady patios of plants around which the thoroughfares are arranged. The external space is therefore conceived of in such a way that life, both inside and out, allows an exchange of social contacts (G. Zedda Arch. Plan of health infrastructures — Oristano–Italy).

With what we have already said and through a comparative examination of the dimensional standards of the larger western countries as they appear in the tables just described, we can try to draw, from the research shown, some planning rules for health buildings.

The car parks should provide an adequate number of spaces with a minimum width of 3.30 m. to provide access for persons with wheelchairs *(See Figure 7)*.

Access to the entrances of the buildings from the adjacent street and/or car-park should be level, with an incline of 6%–8% and a minimum width of 1.50 m. with a final level area of 1.50 x 1.50 m^2.

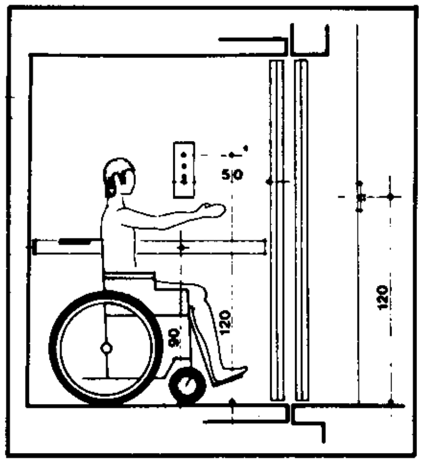
Vertical movement between floors should be by means of lifts of minimum area 1.5 sq.m or better 2.05 sq.m., the minimum width of the lift-door being 85 cm. The difference in level should be controlled at a maximum 2.5 cm., with a minimum free space at the exit of 1.50 x 1.50 *(See Figure 8)*.

The steps should have a maximum height of 2 cm.

The doorway doors should be 90 cm. wide.

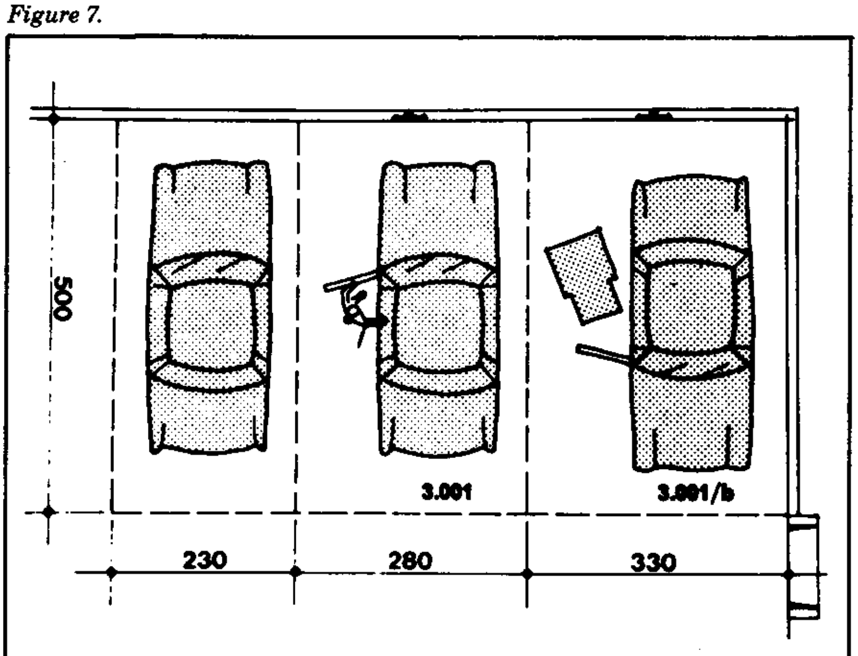
The areas which should be accessible to a disabled person should be on the same level as the entrance or level with a lift and the approach should be through doors and circulation areas of the dimensions we have stated before.

Figure 8.



The toilets should have a door which opens towards the outside, with a minimum width of 85 cm., internal dimensions: minimum length 175 cm., minimum width 140, with vertical

Figure 7.



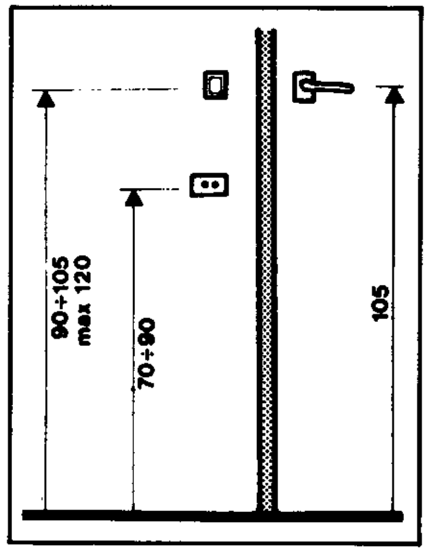


Figure 9.

handrails on both sides of the toilet bowl, horizontal ones behind or to the right of the toilet, with an internal wash-basin, with rim, 83 cm. from the floor.

As an example of the transformation of a normal structure into a special one, the combining of two normal toilets through the removal of the partitions, with the removal of one toilet-bowl and the fixing of rails, makes the existing installation feasible for handicapped people in wheelchairs.[9]

Additional elements: window-handles no higher than 163 cm. from the floor; door-handles between 90 and 100 cm. from the floor; switches at a variable height: between 90 and 105 cm. with a max. of 120 cm., the models with a large switch area are preferable.[6]

Inpatient areas

Entrances from the outside of the hospital to the inpatient areas should be practicable for people in wheelchairs. The entrances should conform with the requirements outlined before, regarding which the figure have been quoted.

The entrances and all the areas used by the patients inside the inpatients zone should be amenable to people in wheelchairs.

All the toilet areas used by the inpatients should be practicable for people who, though disabled, can still walk; it is important that this recommendation be followed in inpatient areas where patients are encouraged to start walking again soon.

The toilet seats should be at different heights to suit different requirements.

At least one toilet in every inpatient area where there may be wheel-chair

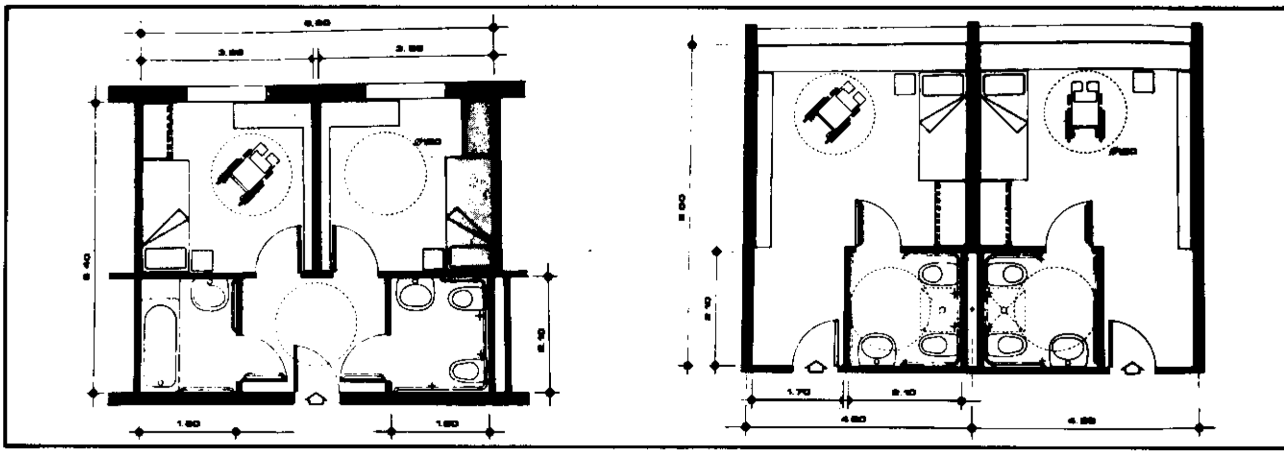


Figure 10.

users should be practicable for people in wheel-chairs. *(See Figure 10).*

Diagnosis and therapy unit

Access points from outside the hospital to the clinics and casualty units, laboratories and radiodiagnosis, radiotherapy, physiotherapy, occupational therapy, hydrotherapy and routes to other departments where patients are treated should be accessible to people in wheel-chairs.

The entrances should comply with the requirements already given.

At least one toilet for the use of outpatients and one staff toilet should be practicable for people in wheel-chairs.

General units

The areas where staff may be employed in sedentary work should be accessible to people in wheel-chairs.

The entrances should comply with the requirements given. At least one toilet for the use of staff of each sex should be useable by people in wheel-chairs.

All the access zones to common-rooms and entertainment areas, to the staff canteen and the rooms themselves should be accessible to people in wheel-chairs.

It is also desirable that all areas of health buildings be accessible at least to those disabled who can walk.

Administrative units

Access to these units and the areas inside should be practicable for people in wheelchairs.

The entrances should comply with the requirements given. At least one toilet for staff of each sex should be able to be used by people in wheelchairs.

Special rehabilitation units

They may be useful to 'normal users temporarily handicapped, but they are more appropriate for handicapped users, since they cannot use other therapeutical means.

We must only observe that unfortunately those defences are not sufficiently known and taken into consideration.

Hydrotherapy unit

The most important factor of this unit is the swimming pool that combines therapy with recreation. Water, and in particular hot water, loosens the nervous system and allows the handicapped to get rid of accumulated energy.

Near the swimming pool and along the sheet of water there must be hand-rails for protection and assistance. The pool premises must be provided with posters of swimming movements.

It is also useful to have windows in the wall of the pool through which the staff can supervise.

It is useful for the people in the water to observe their movements and this is possible with mirrors fixed obliquely on the wall. The walls and the ceiling could be covered with attractive paintings to encourage the use of back stroke.

Gym for functional re-education

It is convenient that the gym is by the swimming pool and the most important precaution, as most of the work is done of the floor, is that the floor must be comfortable, under floor heating by radiant panels. Proper material must be used (cork, linoleum and the like). Well selected equipment is important. Mirrors for self-correction, training stairs and steps and various kinds of hand-rails, drawings of the exercises to be done, mirrors for unilateral observation are all important. Moreover the space for the re-habilitation must be open and projecting onto an outside space.

Day hospitals and nursing homes for old people

The requirements here are largely the same as for the elimination of the barriers in hospitals. However, this huge category to which biologically, if reluctantly, we all potentially belong does have particular needs.

Let us examine the specific aspects of elderly users; limited motion, lessening strength and vigour; dizziness, reduced sense of balance; reduced sight; hearing; smell; obliviousness.

The leading criterion in the planning of facilities and structures for the old must be that of alteration and not that of special structures.

Signals

Inevitably once the architectural barriers are removed it doesn't automatically mean that the handicapped will feel inclined to go out or use the buildings. A survey of interviews could establish what importance the advertising of facilities and the elimination of barriers has in the inclination to use the building.

Therefore it is crucial to study and consider adequate signals, sign-boards and symbols, to determine which

Figure 11.

images and colours should be used *(See Figure 11).*

The routes must be as easy as possible, and must be clearly signposted.[9]

Costs

As far as the elimination of existing architectural barriers is concerned, the costs to be met will be adjunctive costs.

Through experiments carried out, we can say that generally there are no remarkable costs when planning had taken into consideration the need for clear and easy routes without narrow spaces.[44]

However the costs will be higher for those buildings in which you must intervene and modify the outside accessibility and where the toilets, bound to a network of pipes and floors and sheathing need to be substituted; or where the wall structure rigidly defines the size and the distribution of the premises.[45]

Inevitably, since invalids need larger spaces to afford them mobility, a building which takes their needs into consideration will be larger and therefore more costly yet the problem can be minimised if taken into consideration at the planning stage.

As Le Corbusier said, a more accurate study "costs only to the architect and not to the builder."

Conclusions

To end we reaffirm that the real 'barriers' are above all those of our 'normality' and of our carelessness. Once we have overcome them, the technical problem is certainly more simple.

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Jan de Vries first presented this article as a paper at the International Federation of Hospital Engineering Congress in Amsterdam in May 1982.
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Progress and Problems with Hospitals in developing countries

J. DE VRIES

General Aspects

When one uses the words "developing country" it should be noted that their meaning is highly relative.

All countries have been and still are subject to development processes, and highly relative criteria of cultural, social and economic nature which determine the functioning of a country.

Sommaire en Français

Le progrès et les problèmes que posent les hôpitaux dans les pays en voie de développement

Dans ce bref article, Jan de Vries raconte son expérience et ses impressions après un voyage en tant qu'ingénieur conseil en Indonésie.

Il commence par déclarer qu'il ne faut utiliser l'expression "pays en voie de développement" au'-avec une certaine prudence: tous les pays ont été et sont encore sujets à des processus de développement et à des critères hautement relatifs de nature culturelle, sociale et économique qui déterminent le fonctionnement d'un pays.

Depuis 1969, l'Indonésie a eu une série de plans quinquennaux pour les soins médicaux. M. de Vries poursuit en résumant les différentes techniques et méthodes employées. Celles-ci comprennent le service d'eau et l'électricité, le choix de l'équipement et l'utilisation du fuel-oil. L'une des conclusions auxquelles ont abouti l'auteur et son équipe a été l'introduction de panneaux à énergie solaire pour fournir de l'eau chaude aux cuisines et aux blanchisseries.

Il aboutit à la conclusion que l'on a besoin d'équipement de base non-automatique parce que les produits manufacturés sont plus coûteux que la main-d'oeuvre en Indonésie. On a besoin de toute urgence d'équipment simple et moderne qui soit sf, robuste et de la meilleure qualité.

In the Western industrialised world too, a long and meandering path has been followed. It is interesting to consider which parts might be skipped by developing countries.

Most effective appear to be those efforts aimed at prevention of a disease by improvements of the housing situation, water supply, sewer systems etc. We consider it very unfortunate that efforts to improve the quality of water and food do not appeal very much to the public and especially not to medical professionals.

The development both in the medical and the technological field in the Western countries has been explosive and spectacular, however, substantial parts of the world are not as yet in touch with these developments. Also the disease pattern has changed in the Western World during those years, and it appears that the medical profession has adapted its professional behaviour to this change. A strong emphasis on curative care can be noted. Therefore it is to be considered unwise to think that our highly specific and technical approach to medicine, based on curative care, should be transplanted all at once to an area that is not ready for it as yet. We believe that extreme caution is imperative and that certian developments cannot and should not be imposed.

The Role of the Engineer

The hospital engineer should play a part in the process to find an approach that is more community-orientated and takes a critical view to real need for, and applicability of, specific technologies, especially when third world projects are concerned.

He will have to study the adaptability of a technology to basic cultural patterns, the local hygiene situation and take into account the dependability of the provision for water, electricity and sewage, both of liquid and solid waste.

Another problem one is inevitably confronted with, consists in the lack of financial resources and the non existence of a sickness-insurance system. To develop a health care system aimed at the very poorest imposes a specific problem especially in third world countries. It also makes a big difference whether big cities or rural areas are concerned. This introduction applies mainly to the second category. We consider it wise to put in the second place the highly technological approach, characteristic of engineers, and to study first the general infrastructure and cultural pattern of the local community. After the general observations, I would like to tell you more about the country I visited as a consulting engineer, the Republic of Indonesia.

Indonesia

Indonesia is situated in both the oriental and Western spheres of influence. It is also a country with very high cultural standards. Geographically it is a conglomerate of islands, spread out over a large area. The most important island, Java, has approximately 80 million inhabitants; 6–7 million live in the capital Jakarta. Java is highly overpopulated, as opposed for example to Irian Jaya which has only 1.4 million with a surface area approximately three times Java's. The total population of Indonesia is 145 million. The increment of the population is big and urbanisation is important.

This, in combination with difficulties in communications with some of the islands causes many difficulties. Transmigration on the other hand, is strongly encouraged by the government.

In comparison with other developing countries much is being done in the health care field. Since 1969 5-year plans have been instituted; at the moment the third plan is under way.

The first plans were concentrating on the development of programmes to provide trained health care personnel and the development of three big academic hospitals with training facilities for specialist medical professionals.

In Indonesia four levels of hosptials can be distinguished, according to mixed criteria of function and treatment capacity:

Academic hospitals with training facilities for specialists;

Regional Hospitals with training facilities for generalists;

District (so-called Kabupaten) hospitals with four basic departments, ie. surgery, internal medicine, obstetry and pediatry; and Health centres for primary health care.

At the moment attention is being given to improvement of the Kabupten hospitals outside Java, because the level of facilities in those hospitals was too low.

Secondly, a good referral-system to the regional hospitals outside of Java is planned; this also provides a good opportunity to achieve improvements in these hospitals. Also the improvement of primary care in health centres is receiving attention in order to serve the basic needs of the community.

Visit to Indonesia

I would like to describe in some detail the visit we made and the experience gained on the spot.

In 1980 I was one of a team of three experts, a medical doctor, an expert on water and electricity, and myself as a hospital engineer. We were joined by an identical team of Indonesian experts.

The total duration of our visit was six weeks. Of these six weeks, two weeks were for the greater part taken up by consultations at a ministerial level and the other weeks by visits to some 10 hospitals and 4 health centres. Altogether we had twenty trips by air. This turned out to be an extremely effective manner of co-operation, seeing that our counterparts in the country itself were directly involved.

One of the departments of this ministry occupies itself in particular with the construction and installation of technical equipment. They have developed and set up a standard module system along the lines of the typical concept of low level building, with a roof construction which offers protection against the intense rays of the sun as well as against tropical rainshowers. A heating system is, of course, not necessary. Cooling for certain wards as well as for the operating theatres, is obtained by means of fans.

Hospitals are in most cases in possession of their own water supply by means of an installation for the purification of river water, or they just simply collect rainwater at one of several points.

Supply of electricity in some cases takes place during the evening or night hours only, unless the hospital has its own generator.

Selection of equipment

The purpose of our visit actually was to determine what kind of equipment would be most effective for the various hospitals. This means in most cases an improvement of the water and electricity supply.

The first step in this direction was of course to discover to what extent local resources could provide for these needs.

Large generators are out of the question because of rising oil prices and the limited budget. One discovers at such a moment how difficult it is to make a choice here in this medi-technical field, despite our advanced technical know-how. This is the consequence not only of the limited budget but also of the poor supply of water and electricity.

One should, moreover, always ask oneself whether the Western world really wants to provide assistance, or just to sell products.

This results in a completely different cost structure in these hospitals from the one that one has in the Western world.

The Western world is able to supply the most advanced equipment. However, a disadvantage of such equipment, apart from the extremely high initial expense, is their susceptibility to frequency fluctuations. This type of equipment also requires competent operational handling, so specially trained personnel are needed.

Indonesia is an oil-producing country, so it should be possible to make use of this energy-source for kitchens and hot water supply, and oil has the advantage that it can be easily supplied, possibly even by plane.

Oil heating in the Netherlands has come into disuse, consequently oil-heated furnaces and hot water apparatus have become scarce, which means that such equipment must be of necessity be supplied by local dealers.

We discovered that previously the kind of smaller hospital under discussion here, fitted small oil-heated steam boilers which could also provide steam for sterilizers.

As a result of bad maintenance and probably also because of the lack of the right spare parts, such equipment was quite often dismantled especially in the more isolated areas. In these regions it is usual to use wood which is cheap, and readily available for cooking.

With the great number of sun-hours at this latitude, our advice to hospitals in such areas was to introduce solar energy installations with which to provide hot-water for kitchens and laundries. Series-produced standard sets would in my opinion make a generous application feasible. A remarkable fact is that x-ray diagnostic equipment, manufactured some forty or more years ago by well known manufacturers, is still functioning; and this is also true of some well-known brands of auto claves. This old fashioned X-ray equipment does not however meet the new safety regulations in relation to X-ray intensity and duration of the radiation. Such equipment would have to be replaced, conversion would be impractical if not impossible.

Need for basic, non-automatic equipment

There is however a need for basic, non automatic equipment, because manufactured goods are very much more expensive than labour in these countries, so it is in most cases much more expensive to dispose of goods than to repair them. The problem is that there are no spare parts or they are difficult to obtain because so few manufacturers remain, and we in the Western world are so familiar with disposable products. To prevent problems with equipment in hospitals in isolated areas there is an urgent need for simple, modern, equipment, which is reliable, robust and of the best quality. Many suppliers do not produce such basic models. For some applications it may be that completely new models will have to be developed.

Even such a simple item as an old-fashioned foot sewing-machine seems hard to find, yet they are to be preferred to the electric machines which are far too vulnerable and complicated. For X-ray purposes, for instance a universal unit for fluoroscopy and radiographic operation, equipped with a handtilting table, a rotating tube, a spot-film device, a Bucky-reciprocating diaphragm and with a two-pulse or six-pulse generator is sufficient. All diagnostic work can be done by such an X-ray unit.

Sterilizers of the old vertical type with central closing system on top seem to be most suitable. Fortunately these sterilizers are still on the market.

Mobile tables with hydraulic height-adjustment, but hand operated Trendelenburg- and other adjustments could serve as operation tables.

On the other hand, whenever incubators, with their simple system of lamp-heating are used, one must take care to prevent insufficient air circulation particularly if the local temperature is very high.

Some accidents have been discovered which could only be explained by a shortage of fresh air supply, a guaranteed constant supply of electricity and oxygen is essential.

Spare parts and instructions

In the Western world there has been little attempt at standardisation and models of instruments are frequently subject to alterations and improvements. Since instruments from Japan and Taiwan are sometimes introduced, the situation becomes very complicted from the point of view of maintenance, it also seems to be very difficult to obtain the right spare parts, and in many cases the time of delivery is extremely long.

Before delivery of goods and special bio-medical instruments to these countries, care must be taken to ensure that these instruments are installed within a reasonable time. After arrival, buildings, installations and special electrical connections must be completed as soon after the time of arrival as possible.

The tropical climate, with its unusually high degree of moisture is most effective in destroying the materials, if these are stored for long periods!

Equally, equipment for tropical conditions must be easily handled and well packed. Care must be taken that these apparatus are of the right voltage and not sensitive to current fluctuations. Instructions for handling and maintenance must be written not only in English but also in the local language.

Training Hospital Engineers

The maintenance of installations and equipment in these small hospitals must in most cases be executed by in-house technical personnel, because the cost of flights maintenance for manufacturer's staff would be far outside the hospitals's budget.

It is for this reason that hospital engineers from Western countries could be helpful and give assistance by developing training courses, or perhaps special schools, sharing their greater experience. It would undoubtedly be most effective if this training could take place in one or more central places in Indonesia. These training courses should be a simple and practical groundplan in the beginning, and aimed at the benefit of the hospital-engineers of the small Kabupaten hospitals.

If possible the courses could be developed to higher technical standards and levels in the future.

It is my conviction that this initiative would be accepted with great enthusiasm and be of great benefit to the health services of Indonesia.

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Product News

New boiler house

St John's Hospital's new boiler house was officially handed over by Trent Regional Health Authority and opened by Mr Peter Hodgkinson FFB FBIM FCSI, Chairman North Lincolnshire Health Authority on 25 January 1983.

The planning for this project began in May 1980 and was ready for building works to commence to June 1981.

The boiler house complex was completed on time even when the works were held up for one month during last winter. Credit is due to Haden Young the main contractor and the sub contractor Eccleshares, Wm Wright & Son Ltd and Tec Probe Chemicals Ltd.

The complex consists of three main buildings, the boiler house, coal delivery/storage building and the incinerator building. The cost of the project was £1.75 million pounds.

The boilerhouse has three 'Vekos' boilers which are coal fired and manufactured by Thorn EMI at their works in Dudley. Their total output is 20,000 kg of steam per hour.

Cadcam practical experience centre

A practical experience centre for the West Midlands has been set up by Delta Computer Aided Engineering Limited of Nechells, Birmingham as part of the Department of Industry's £6 million computer aided design and manufacture scheme.

The intention is to increase awareness of the ways in which advanced computer technology can benefit the engineering designer and production engineer, through a substantial reduction in the time and effort required to design, draw, interpret and subsequently produce a finished product.

The advantages apply particularly to the design and manufacture of small batches of components and components with a complex surface contour, such as dies and moulds for metal and plastics products.

Delta CAE's facilities are being opened for practical use by anyone from the engineering industry, particularly mechanical engineers, specialist or general, who is comtemplating taking advantage of Cadcam computer technology or, alternatively, wants to know precisely how Cadcam can help him improve the effectiveness of his design, draughting and manufacturing operation.

Most important, he will also be able to assess potential benefits in terms of the costs involved, either in purchasing and setting up his own Cadcam unit, or in making use of a time-sharing bureau service.

The centre's capabilities extend from product conception and prototype development through to precision machining and toolmaking.

Location of the new Cadcam practical experience centre is close to Junction 6 on the M6 motorway and within 3 miles of Birmingham New Street Station on the inter-city rail route.

A letter or 'phone call to Hugh Humphreys, CAE manager, Delta Computer Aided Engineering Limited, Argyle Street, Nechells, Birmingham B7 5TH; tel: 021-327 3401 will bring any additional information that might be needed.

New mountings for System 19

A series of surface-mounted housings has been introduced for the system 19 range of modular instrumentation, launched in June, 1982 by Kent Industrial Measurements. System 19 is designed to measure, condition, transmit, indicate, record, alarm and control many industrial parameters such as temperature, flow, pH, conductivity, suspended solids, level, humidity, voltage and current.

The new surface-mounted housings can accommodate one or two System 19 modules, enabling small instrument systems to be designed where the larger capacity or capability of the full 19in. rack is not required.

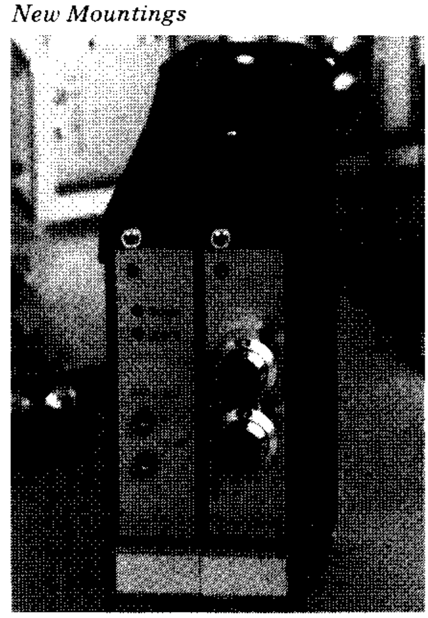
For instance, a System 19 temperature transmitter fed from a thermocouple or resistance thermometer can be housed in a surface-mounted housing with a trip/alarm module. Local alarm or control is thus achieved at low cost, and transmission signals from several such housings can be connected to rack-mounted indicating and recording modules installed in a central control room, from where the complete state of the process can be monitored.

Surface-mounted housings for System 19 modules can be supplied with a choice of three types of built-in power supplies for powering System 19 modules in the same housing or other surface-mounted housings.

A comprehensive range of transducers is also available from Kent Industrial Measurements, enabling users to obtain a complete instrumentation package from one source.

Further details are available from Kent Industrial Measurements Ltd, Foster Cambridge Industrial Instruments, Howard Road, Eaton Socon, St. Neots, Huntingdon, Cambs PE19 3EU. Tel: Huntingdon (0480) 75321 Telex 32676.

New Mountings



Corrosion resistant ball valves and dip pipes

A new range of ball valves, dip pipes and pipework accessories which the makers claim are capable of withstanding the effects of almost any corrosive material, has been added to the Campbell Hardy range of industrial valves.

The ball valves, manufactured by Naegelen of France, come in bore sizes from 1/2" to 6", and are available with a variety of corrosion-resistant liners, including: FEP, PFA and PVDF, designed to combat the most severe corrosive attack from acids, halogens and other aggressive media at temperatures as high as 180°C.

All wetted parts of the valve, including the ball itself, (also available in ceramic and some exotic metals) are protected with a lining thickness of 3-4mm, and for certain applications, especially within the pharmaceutical industry, the body cavity around the ball can be totally filled wtih two PTFE half shells to eliminate all dead space where media can deteriorate or crystallize.

Because operation of the Naegelen ball valve is a 90° turning action, and also due to its inherent low-torque characteristics, remote actuation by pneumatic, hydraulic or electrical control becomes simple and therefore relatively inexpensive.

Many versions of the ball valves can be supplied by Campbell Hardy to fit glass pipework or to suit polypropylene lines. Alternatively, the valves come flanged to ANSI 150 or DIN equivalents. Valves can be ordered from Campbell Hardy fitted complete with actuators, steam jackets and mounting kits etc, from any of the firm's 3 stockholding depots at Tunbridge Wells, Aberdeen or Manchester.

Valves may be locked in either the open or closed positions and the handle removed for safety. The valve design offers PTFE seats which can be replaced on site by maintenance engineers.

Other corrosion-resistant valves in the new Campbell Hardy range include a butterfly valve, for use where space is restricted, in bore sizes from 2" to 12", and a one-way check valve available in the same sizes as the ball valves.

Custom-made dip pipes which, when fitted to tanks, reactor vessels and vats etc. facilitate safe and easy filling, extraction, mixing or sampling also come lined with PTFE and will similarly cope with temperatures up to 180°C.

Not only does their use reduce the risk of corrosive media coming into contact with plant personnel, but they also prevent exposure to noxious, toxic and inflammable materials and gases.

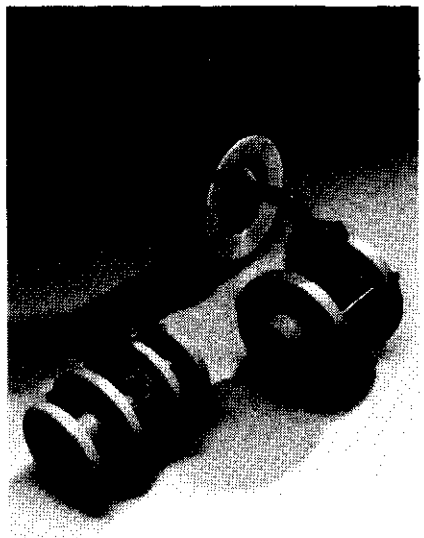
They will accept a range of different nose pieces for diffusion, thermometer pockets, pH probes or level control, and the pipes themselves can be designed and made to any length or curvature.

Dip pipes can be supplied suitable for agitated vessels and can be manufactured suitable for vacuum duties.

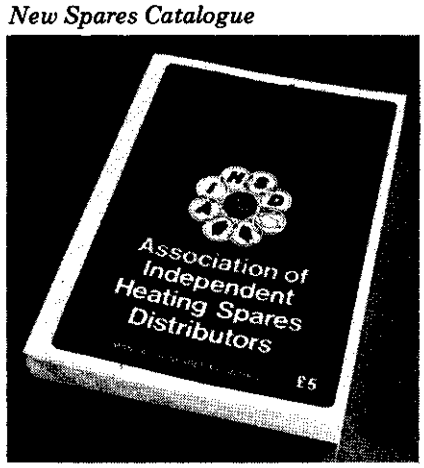
To make up the complete system to carry the most corrosive fluids are sight glasses, tank outlet valves, instrument adaptors, gaskets, bellows and strainers.

More details, literature and prices on the Naegelen valves and accessories are available from the sole UK distributors: Campbell Hardy Limited, P O Box 25, Tunbridge Wells, Kent. Tel: (0892) 42944, Telex: 95273.

Corrosion resistant valves.



New Spares Catalogue



New Spares Catalogue

The Association of Independent Heating Spares Distributors has published its first catalogue.

The catalogue is the result of two years careful planning and is a comprehensive reference to the full range of products carried by member companies within the Association.

The range of products listed in the catalogue will be available to customers either 'off-the-shelf' or obtainable normally within 24 hours. The Association is served by a nationwide Securicor service to ensure fast and reliable delivery.

Copies of the new catalogue will be available through local members or from Mr J Barrett, AIHSD, c/o Haddendum (Bristol) Ltd, 2 Smyth road, Ashton, Bristol. Telephone (0272) 669501.

Illuminated suspended ceilings

A new service for the installation of illuminated suspended ceilings has been introduced by Cray Electrical.

The suspended ceiling which is made of a light transmitting plastic material with a textured finish is illuminated from above by means of coloured fluorescent tubes fitted to the existing ceiling. If desired, different coloured tubes can be used to give multi-coloured or rainbow illuminating effect. Alternatively, a few illuminated panels can be used together with acoustic panels, to form lighting patterns with a white or coloured effect.

The suspended ceilings, which possess thermal insulation properties, can be used to cover unattractive ceilings or to lower the existing ceiling height to reduce the level of heating required, and consequently lower heating costs.

The panels are not subject to corrosion and can be taken down easily for cleaning. They are suspended within a framework of lightweight rigid sections of stay bright satin anodised aluminium and the completed system does not require subsequent decorating.

The ceilings conform to the BS 2782 safety standard and can be quickly installed by Cray Electrical, without the usual mess associated with conventional ceiling refurbishing.

The panels are available in a variety of textured designs depending on customers' individual preference and measure 2ft x 2ft (305mm x 305mm).

Cray Electrical are offering to provide materials and install the ceilings at a cost of around £1.20 per square foot depending on the complexity of the room shape. Fluorescent lights will be fitted at an additional charge.

Further details are available from Cray Electrical, 44 Station Road, Sutton in Ashfield, Notts. Tel: Mansfield (0623) 517970.

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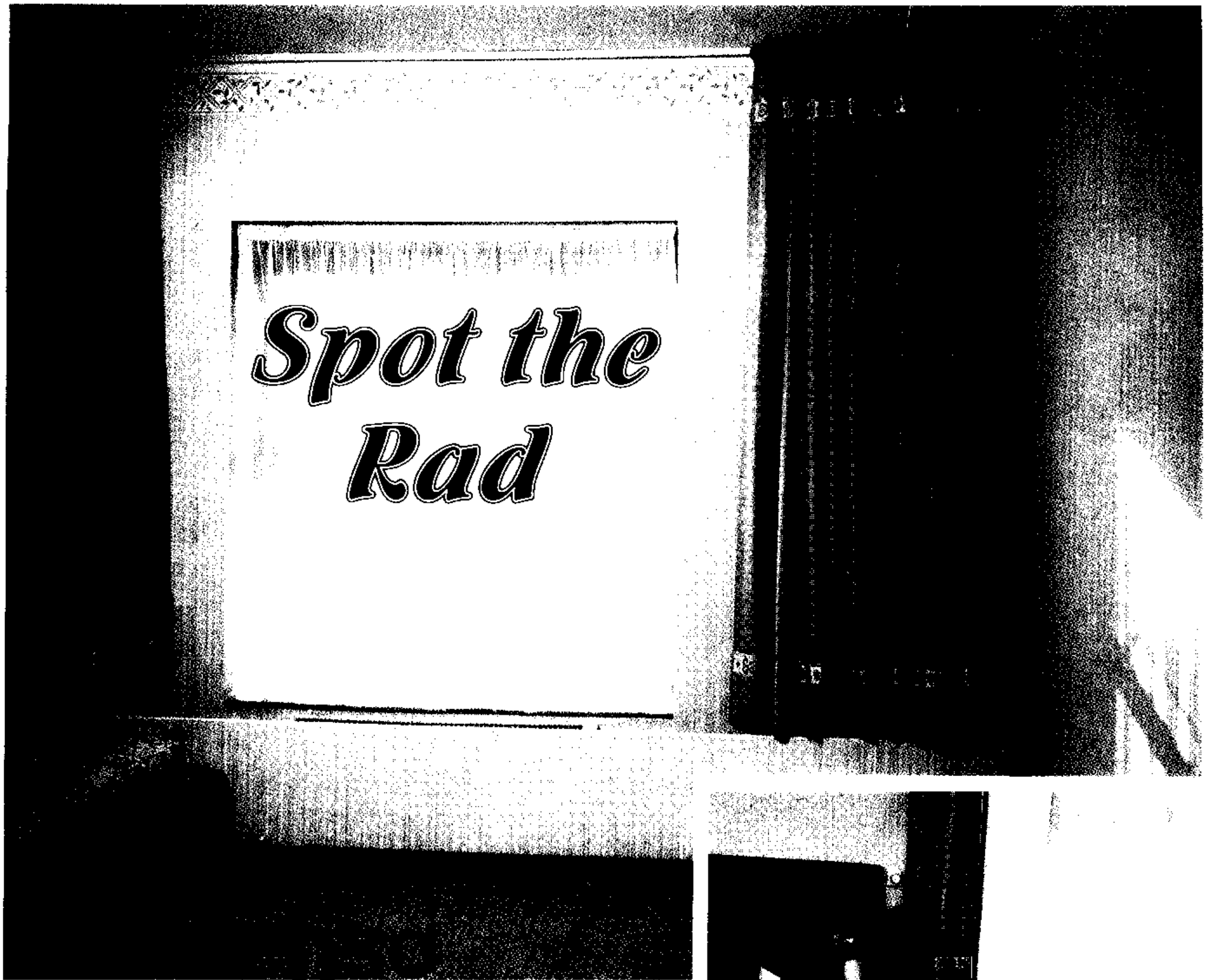

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