

S2C2


THE CLEANROOM


MONITOR

The Scottish Society for Contamination Control

October 2005

Issue 54

 MICROBIAL DETECTION

 RISK MANAGEMENT

 ISO STANDARDS

 ICCCS

 CERTIFICATION

 CLEANROOM TESTING

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International Confederation of Contamination Control Societies

Council of Delegates Meeting

Moscow, Russia, September 2005

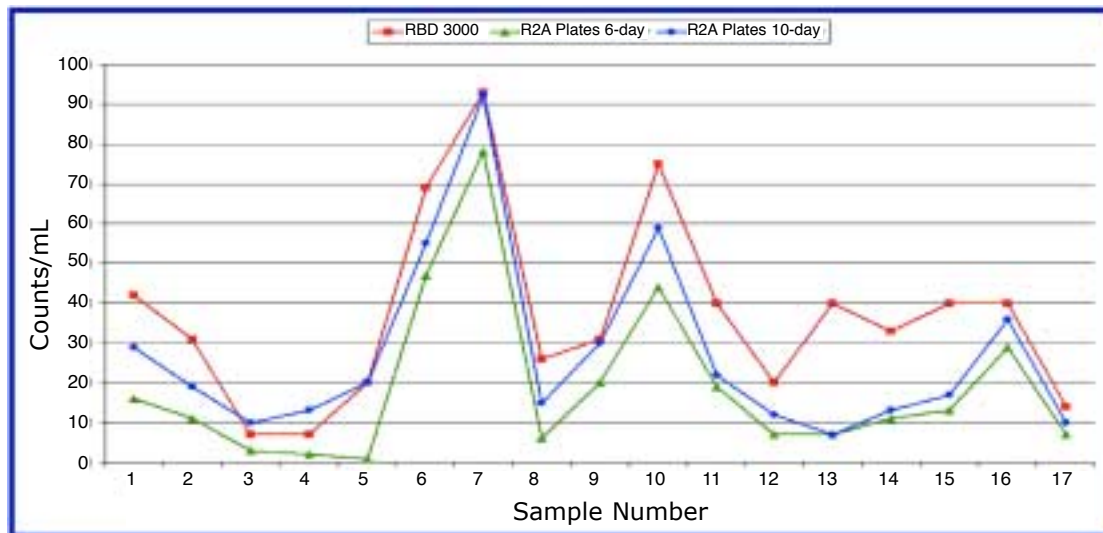
Back row: Hans Zingre, Dr Alexander Fedotov, Gernod Dittel, Robert Mielke, Paul van Rij and Andrew Tweedie

Middle row: Conor Murray, Dr Susumu Yoshizawa and Frans Saurwalt

Front row: Prof Wang Yao, Tu Guangbei, Fabien Squinazi, Gaetano Lattanzi, Prof Myung-Do Oh, Bill Whyte and Dr Tatiana Ivanyuk

RAPID MICROBIAL DETECTION SYSTEMS

Figure 1: RBD3000 Counts vs. R2A Plate Counts for Sample Point.



Discussion

Purified water monitoring requires the ability to detect low levels of contamination; therefore it is important that objective background criteria be established. After analysing 96 background samples of 0.2 μ m filtered de-ionised water, it was determined that counts ≤ 6 per 0.25mL were acceptable. If background counts per 0.25mL were 7-8, the samples should be repeated. If background counts per 0.25mL were ≥ 9 , the samples should be discarded, as the data would be considered unreliable.

Plate counts were recorded at day 5, but additional growth was observed through day 10, so day 10 plate counts were also recorded. As seen in Figure 1, 10-day plate counts are higher than the 5-day plate counts. For the 17 sets of test samples analysed, RBD 3000 counts trend with the plate counts.

The following is a real world application for this study. If an alert limit were set at 50cfu/mL, the RBD 3000 would have indicated a problem within 20 minutes of sample collection on days 08/16/04, 08/17/04, and 08/26/04. The 10-day plate count data for these days also showed levels above 50cfu/mL. This would have allowed for a proactive solution as opposed to reactive, as a potential problem would have been detected 10 days sooner than by the R2A standard plate count method.

The higher counts observed on the RBD 3000 versus the plate count method are most likely due to enumeration of viable but non-culturable cells.

Conclusions

Rapid Microbial Detection Systems provide a fast and effective, 20-minute detection method for monitoring total viable organisms in purified water systems and should be considered an acceptable alternative or adjunct to conventional methods.

Further information:

Allen Humphries

PMT (GB) Ltd

Willow End Park, Danemoor,

Malvern, Worcs, WR13 6NN

CLEANROOM TECHNOLOGY CERTIFICATION

This distance learning course and examination on 'Cleanroom Technology' is based on an S2C2 course that has been run for over 15 years, and on the book 'Cleanroom Technology - Fundamentals of Design, Testing and Operation' by Bill Whyte. The course covers all aspects of cleanroom technology in a way that is applicable to all types of cleanrooms and industries. A certificate is issued to candidates once the written exam has been passed successfully.

For complete details on the syllabus and also for an application form either telephone the S2C2 office (0141 330 3699) or go to the website where the information and an application form can be downloaded:

www.s2c2.co.uk and click on 'CTCB' and then 'Cleanroom Technology'

If you want certification:

Registration

To go on this course you need to register first. This is so that candidate suitability can be assessed.

The Cost of Registration

Registration is £110 +VAT. This includes (1) being entered as a candidate, (2) a copy of the book 'Cleanroom Technology - Design, Testing and Operation' (if you already have a copy, the cost will be reduced to £60 + VAT), (3) sample questions and answers and (4) a certificate on successfully passing the exam.

The Revision Course and the Exam

This is over one day and includes a revision lecture course and a 2 hour written exam. The cost is £220 + VAT (incl. coffee & lunch).

The necessary revision course (and the opportunity to sit the exam) is October 26, 2005 (see right). This course is open to all but if you are a candidate for certification you attend this course along with everyone else.

If you do not want certification:

The next Cleanroom Technology course is
Wednesday 26th October, 2005

Erskine Bridge Hotel,
Erskine, Near Glasgow

(The S2C2 AGM will also be held at this time)

The Cost of this Course

Price per delegate including lunch and tea/coffee:

Members: £160 (£188 incl. VAT)

Non-members: £177 (£207.98 incl. VAT)

This course will be attended by two groups of people: those sitting for certification and those who are not sitting for certification.

CLEANROOM GARMENTS COURSE SEPT 21, 2005

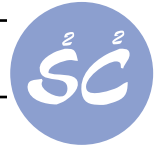
Nineteen people attended an S2C2 course given by Nigel Slater on 'Cleanroom Garments'.

Nigel has extensive knowledge of garment design, construction and fabrics as well as involvement with specific projects for major multinational companies. He has worked with most of the cleanroom laundries in Europe and knows about cleanroom garment processing including working practices, contract pitfalls and quality control management.

The photo on the right shows Nigel talking to the delegates in the Melville Room of Glasgow University.



RISK MANAGEMENT JOINT PUBLICATION



A joint publication with the Parenteral Society "Risk Management of Contamination (RMC) During Cleanroom Manufacture", Technical Monograph No. 14, (ISBN No. 1-905271-12-3) has just been published. It is written by W Whyte, University of Glasgow, Scotland, UK, and T Eaton, AstraZeneca, Macclesfield, UK.

This is a joint publication of S2C2 and the Parenteral Society and is published as a monograph and based on the authors' four recent publications in the *European Journal of Parenteral and Pharmaceutical Science*. These four papers discuss Risk Management and Risk Assessment as applied to microbial contamination during cleanroom manufacturing. In this monograph the publications have been combined, updated and additional information added.

This monograph mainly considers microbial contamination of aseptically prepared pharmaceutical products. However, the mechanisms of microbial contamination are also applicable to inert particle contamination, and the principles explained in this monograph can be utilised for this type of contamination. The earlier sections of this monograph deal with both types of contamination in all types of cleanroom production but the later sections are more clearly applicable to microbial contamination in aseptic pharmaceutical production. The method discussed can also be used to assess the microbial risk in other types of healthcare cleanrooms, such as those used for the manufacture of terminally sterilised and non-sterile products, and medical device products.

The risk management system described here, and known as the Risk Management of Contamination (RMC) system, is a method where the microbial risks to a product are identified, their risks assessed and, where necessary, reduced. Risks, or their methods of control, are monitored and limits set to ensure that contamination is correctly controlled. The RMC system is then verified on a continuing basis to ensure that it is working effectively. Associated documentation and

training requirements are also managed using this system.

In the first preface, risk management systems that are currently available are considered. Modifications to the HACCP risk management system for application to contamination during cleanroom manufacturing are then discussed. In the second preface, the fundamental equations that determine microbial contamination of products are derived so that the correct risk models can be used for the risk assessment of air and surface contact contamination. The correct use of the FMECA method of risk assessment is also discussed and explained. In the ensuing six sections, the RMC system is described and practical examples are provided.

The risk to a patient, resulting from a contaminated product, is dependent on the likelihood of a micro-organism being present after manufacture and the chance of growth during shelf life. This chance can be calculated by a method detailed in the seventh section of the RMC method, and may be used to determine the level of control required during the associated manufacturing process.

An Appendix is included that contains information recorded in official publications on the limits of contamination and other variables used to control and monitor contamination.

The monograph contains 74 pages and costs £20. To pay by credit card go to www.s2c2.org/shop. It may also be purchased directly by making a cheque payable to Scottish Society for Contamination Control and forwarding it to:

Scottish Society for Contamination Control,
James Watt Building, University of Glasgow,
Glasgow, G12 8QQ

Tel: 0141 330 3699 Fax: 0141 330 3501

Email: s2c2@mech.gla.ac.uk



CTCB CLEANROOM TESTING JUNE 21-23, 2005



This 3 day course run by the Cleanroom Testing and Certification Board (a body which runs courses for people in the cleanroom industry) was attended by 16 delegates. Some of these delegates were seeking Professional certification and some were seeking Associate certification.

The *Roll of Successful Candidates* can be found on the Society website at www.s2c2.co.uk/ctcb/Passed/.

The CTCB course in November in Ireland is full but the course in February 2006 in Sweden has places as well as the June 2006 course in Glasgow, Scotland.



ICCCS FORUM REPORT SEPT. 2004 - AUG. 2005

The International Cleanroom Forum is a forum on the internet* which was set up by S2C2 with the co-operation of ICCCS for the discussion of cleanroom issues and solution of cleanroom problems. It has been functioning well for several years. Currently, there are 778 registered users (436 last year), and many regular guests who haven't bothered to register. There are also many regular viewers as shown in the tables.

Usage Statistics

The following is a summary of the usage of the Forum.

1. There were about 1 million hits per year, where a hit is request for an item (file) and may include a web page, a graphic or other item for a web page, so when a reader reads one page this may involve several hits. However, it is also known that every year about 91,000 people visit the Forum.
2. Most users spend between 4 and 10 minutes in each session on the Forum during which time they read between 1 and 5 pages.
3. A significant number of readers find the site through a search engine. It may be seen from the table that Google is by far the most common one.

4. The majority of activity comes from the USA (California in particular), followed by the UK, then India, after which there is a significant gap in the list of other countries.

Breakdown of use of Forum by countries

Country (or part of)	Sessions	% of all sessions
United States: California	40577	44.4%
(Un-resolved)	7573	8.3%
United States: Virginia	6203	6.8%
Great Britain	4382	4.8%
United States: Washington	4129	4.5%
India	3271	3.6%
Australia	1632	1.8%
United States	1485	1.6%
Singapore	1358	1.5%
China	1015	1.1%
Germany	913	1.0%
United States: Colorado	771	0.8%
Netherlands	739	0.8%
Ecuador	640	0.7%
United States: Texas	617	0.7%
United States: New Jersey	595	0.7%
Uruguay	583	0.6%
France	577	0.6%
United States: Missouri	573	0.6%
Belgium	567	0.6%
(EU)	563	0.6%
Taiwan	489	0.5%
Ireland	466	0.5%
Italy	426	0.5%
Spain	421	0.5%

Referring Search Engines

Google	15435 referrals
Yahoo	698 referrals
MSN	335 referrals
AOL	106 referrals
AltaVista	30 referrals
All the web	7 referrals
Ask Jeeves	3 referrals
Lycos	2 referrals
Excite	1 referral
Infoseek	1 referral

* Forum page:
<http://www.s2c2.org/dc/dcboard.php>
 (Site home page is www.s2C2.org)

FORUM EXAMPLE

Topic: Particle Fallout

Question: I work in an ISO-7 Class aerospace cleanroom where particle fallout is a concern. Does anyone have experience relating air cleanliness classes to particle fallout (MIL-STD-1246)? [DB 2005-08-29]

Reply: IBM gathered vast data in the 1980's in an attempt to make a coorelation. They were unsuccessful. In August 1991, Solid State Technology, Milberg, Fischbacher, and Engel reported particle deposition is related to air turbulence intensity. If air turbulence is reduced one order of magnitude, only 40% as many particles will be deposited on a surface. You can try this yourself by placing two witness plates side by side in a cleanroom. Support a clean, round rod approximately 3 - 5 cm above one plate. You should find significantly more particle deposition on the plate under the rod due to the increased turbulence. [DM] 2005-09-01]

UPDATE: PROGRESS with ISO CLEANROOM STANDARDS

ISO Technical Committee 209, which is the ISO committee responsible for the writing of the cleanroom standards, met in Moscow on the 14th and 15th September, 2005. It is a committee with representatives from all over the world, and the UK representatives at the meeting were Gordon Farquharson and Bill Whyte. One of its functions is to review the progress of the ISO cleanroom standards and make decisions as to which standards need to be written and revised. Readers of *The Monitor* will be interested to know the current position of the various cleanroom standards. The ISO/TC209 documents are at the following stages:

ISO 14644-1: Cleanrooms and Associated Controlled Environments, Part 1: Classification of air cleanliness.

ISO 14644-1: 1999, was published in 1999. The technical committee responsible for the writing of ISO 14644-1 and ISO 14644-2 is Work Group 1. Work Group 1 have completed an initial review of the standard and consider the most important features requiring detailed review are:

Classification Table 1. Consider removing the low count requirements (less than 10 particle/m³) as they suggest unreliable low limits are good practice for classification.

Informative Annex A. Consider removing the graphical illustration of class as this has no real value. Consider replacing with a new table to illustrate the decimal classes.

Sample locations. Consider whether a new algorithm should be established that makes the number of sample locations dependant on the cleanliness class.

95% UCL evaluation. This statistical approach assumes an even distribution of contamination in a cleanroom. This is frequently not the case in fact. Consider re-casting this annex as informative and drop the normative requirements for the 95% UCL evaluation.

Annex F on sequential sampling. This procedure is considered effective. However, the method given in Annex F is difficult to follow and requires improved presentation and possible addition of an example.

ISO TC209 agreed to a revision of ISO 14644-1 and therefore work will start soon on this document to produce a revised edition in about 3 years' time. Readers may like to know that ISO TC209 is seeking statisticians to aid in the rewriting of this document, and if they know statisticians with a good practical knowledge of sequential sampling and 95% UCL in cleanrooms they should get in touch with S2C2 who will offer their services.

ISO 14644-2: Cleanrooms and Associated Controlled Environments, Part 2: Specifications for testing and monitoring to prove continued compliance with ISO 14644-1. ISO 14644-2:2000, was published in 2000. Work Group 1, having completed an initial review of the standard, consider the most important features requiring review are:

Classification vs. Monitoring. The normative section is unclear about this and the text requires clarification.

Initial classification compared with re-classification. Some experts believe there should be a difference between

stringency of testing required in these two situations. This should be considered.

Table of test frequencies. The normative section is unclear and some parties don't agree with the frequencies. Consider whether to expand this guidance and place it all in a single informative annex.

Real-time monitoring systems. Consider a new section to specify the essential requirements that should be considered for such systems.

Annex B Risk assessment. This section is very poor and limited and does not reflect current practice. It needs to be improved to identify Risk Assessment techniques and identify areas where risk should be assessed.

ISO TC209 decided at the Moscow meeting that a revised edition of the 14644-2 standard was required. Work will be starting soon on this document with a view to producing a revised edition in about 3 years' time.

FDIS ISO 14644-3: Cleanrooms and Associated Controlled Environments, Part 3: Test methods.

This final draft international standard (FDIS) 14644-3 has been approved for publication as a full standard and should be published soon.

ISO 14644-4: Cleanrooms and Associated Controlled Environments, Part 4: Design, construction and start-up.

ISO 14644-4:2001, was published in 2001. This will be reviewed in 2006 to see if it needs to be revised.

ISO 14644-5: Cleanrooms and Associated Controlled Environments, Part 5: Operations. This was published as a full standard in August 2004 as ISO 14644-5:2004.

CD ISO 14644-6: Cleanrooms and Associated Controlled Environments, Part 6: Terms and Definitions. This committee draft (CD) will be issued soon as a DIS document.

ISO 14644-7: Cleanrooms and Associated Controlled Environments, Part 7: Separative devices (clean air hoods, gloveboxes, isolators, and mini-environments). This standard was published as ISO 14644-7:2004 on October 2004.

DIS ISO 14644-8: Cleanrooms and Associated Controlled Environments, Part 8: Classification of airborne molecular contamination. This draft international standard (DIS) has been approved as a DIS document, and will be issued soon as a FDIS. Note: The working group that has written this document will be asked to consider producing a standard for molecular contamination on surfaces.

WD 14644-9: A working group has been set up to produce a standard on particle surface contamination and several committee working drafts (WD) have been produced.

ISO 14698-1: Cleanrooms and Associated Controlled Environments, Biocontamination Control, Part 1: General principles and methods. This standard was published as ISO 14698-1: 2003 in 2003.

ISO 14698-2: Cleanrooms and Associated Controlled Environments, Biocontamination Control, Part 2: Evaluation and interpretation of biocontamination data. This standard was published as ISO 14698-2:2003 in 2003.

ICCCS MOSCOW 2005

The International Confederation of Contamination Control Societies Council of Delegates meet every 2 years. This year they met in Moscow, Russia. The meeting was attended by contamination control societies representing 13 nations. It was hosted by the Russian Contamination Control Society ASEMCO.

Present were:

Dr Alexander Fedotov - Chairman ICCCS

Paul van Rij - General Secretary ICCCS,

Gaetano Lattanzi (Italy)

Dr Tatiana Ivanyuk (Russia)

Dr Susumu Yoshizawa (Japan)

Fabien Squinazi (France)

Gernod Dittel (Germany)

Robert Mielke (USA)

Wang Daqian, Prof Wang Yao & Tu Guangbei (China)

Conor Murray (Ireland)

Prof Myung-Do Oh (Korea),

Dr Åke Möller (Denmark, Finland, Norway & Sweden

Frans Saurwalt (Netherlands)

Hans Zingre (Switzerland),

Bill Whyte & Andrew Tweedie (Scotland)

It was reported that the 2006 Symposium would be held in the Military Museum in Beijing, China from Sept. 6-7th.

Information is now available, including a call for papers, on: www.iccsc.net/symposium.

The next symposia will be held in Ireland in 2008 and Japan in 2010.

A short report on the ISO/TC209 meeting held earlier in the week was given.

Bill Whyte gave a report on the ICCCS website 2005 and a report on the ICCCS Forum. It was commented that the website was "well done".

Most of the discussion at the meeting was in relation to a new role of ICCCS that focuses on education. ICCCS has been active since its foundation in 1972. In the first decades of its existence it was felt by many countries that there was a great need for an international contamination control confederation, and many Societies joined. Many activities and working groups were started, with the activities that worked towards producing international standards and running international symposia were particularly useful. The situation has, however, changed since early 1990.

In the last few years some societies have questioned the value of membership in ICCCS and some countries have left, seeing little value in the current ICCCS activities. It was proposed by the Nordic Society at the Moscow meeting that



The host, Dr Alexander Fedotov (L), ICCCS Chairman, being thanked by S2C2 Chairman Andrew Tweedie.

the ICCCS starts work on international 'Quality Certification', for skills within certain fields of contamination control. A good example of such an activity, initiated by S2C2, is the CTBC (Cleanroom Testing and Certification Board) Certification. In February 2005 such a course was held in Stockholm, jointly by S2C2 and R3-Nordic. This course and examinations are also held in Scotland by S2C2, and in Ireland by the Irish Cleanroom Society. This is a very important 3-day course with theoretical and practical examinations for those associated with testing cleanrooms. Other examples are:

1) The 'Cleanroom Technology' course and examination run by the S2C2. This is a broad course based on the book 'Cleanroom Technology - Fundamentals of Design Testing and

Operation' with a written exam at the end.

2) Three years ago VCCN (Holland) developed a 1 day course 'Cleanroom Behaviour'. The target group is the people who infrequently enter a cleanroom e.g. maintenance personnel. Participants who pass a test at the end of this 1 day course receive a certificate and a 'cleanroom badge' which entitles them to enter a cleanroom, and gives the cleanroom owner an assurance that the person is aware of the typical do's and don'ts of being and working in a cleanroom. For the last 3 years many participants have obtained a cleanroom badge and slowly VCCN is experiencing that cleanroom owners are demanding a VCCN cleanroom badge before maintenance personnel are allowed to enter a cleanroom. At this moment VDI in Germany is developing the same course and it is the intention to recognise both Dutch and German cleanroom badges in each others' countries. Both Germany and Holland wish to extend the number of countries that cooperate in this system.

R3-Nordic proposed that an ICCCS Working Group be started, with its goals to ascertain what course resources are available in the various cleanroom societies and what fields of certification the cleanroom societies consider to be required. This will be the first step towards providing such teaching course on an international level.

Based on a proposal from the Russian Society it was agreed by the ICCCS delegates that the need for an International Cleanroom Certification Board be investigated and proposals be produced for the next meeting. The proposal to set up a Working Group was approved by 12 nations and 1 abstention (USA). Bill Whyte agreed to chair the Working Group which was to be limited to 6 nations, with the others being well informed by being included in all email correspondence. Russia, Netherlands, Ireland, R3-Nordic, Scotland and Germany would be represented.

ICCCS BEIJING 2006

The 18th International Symposium on Contamination Control & China International Exhibition on Contamination Control 2006

September 6th ~ 7th, 2006

The Military Museum of China, Beijing

See also page 10.

Introduction

Contamination control, known as clean technology in China, is a multi-disciplinary technology and accompanys the development of the high technology. This technology initiated in the 1990's in China applies to the fields of electronics, medical devices, pharmacy, biology, space, aviation, etc. It is estimated that the contamination control technology will earn a market of more than 16.5 billion RMB (Renminbi or People's Currency) during the Tenth Five Year Plan in China.

The International Symposium on Contamination Control is an international high-level academic event, which has been successfully held now for 17 sessions. In the year of 2006, the symposium will take place in China for the first time, when all the professionals and experts will be united in Beijing, giving information and directions for the development of the contamination control and cleanroom technology.

Meanwhile, 2006 China International Exhibition on Contamination Control will be held simultaneously which will present the latest technology and products so as to further promote the development of the technology.

The 18th International Symposium on Contamination Control and 2006 China International Exhibition on Contamination Control is an international academic event. We sincerely hope to promote the international development of the clean technology, shorten the gap between China and abroad, advance the application of the new products and technology and create a platform for international exchange and cooperation.

We cordially welcome you to participate in this event!

Symposium Topics and Exhibition Fields

- Air filtration
- Floor, wall and ceiling systems for cleanrooms
- Process media supply
- New production realized in cleanrooms (biomedicine, pharma, others)
- Computerized simulation
- Cleanroom measurement and testing
- International normalization (ISO 14644, 14698 etc)
- Qualification and validation management
- Plastic technology
- Biosafety technology

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Symposium

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E-mail: eaciecco@mx.cei.gov.cn

Call for Papers

www.icccs.net/symposium

See also page 10.

ICCCS BEIJING 2006 - CALL FOR PAPERS

The 18th International Symposium on Contamination Control & China International Exhibition on Contamination Control 2006

September 6th ~ 7th, 2006

The Military Museum of China, Beijing

DEADLINE IS DECEMBER 1, 2005

Information for Authors:

Duration of presentation

- 30 minutes of which 15 minutes are reserved for discussion
- Papers in Chinese or English

Submission of Papers

- Abstract Application Form can be downloaded from www.icccs.net/symposium/BeijingCallForPapers.pdf
- Abstract (max. 1 page DIN A4, 300 words)

Deadlines

- Abstract by 01.12.2005
- Notification of Authors is 01.02.2006
- Presentation of camera-ready manuscript for the CCCS report is 15.06.2006

Program:

The final programme will be published at www.cccs.org.cn in June 2006.

Contact:

27 Wanshou Road,
P.O.Box 307,
Beijing, 100840,
China

Dipl. -Ing. Wang Da Qian
+86 (-10) -68 20 75 05

Prof. -Ing. Wang Yao
+86 (-10) -68 20 75 05

Registration of Authors:

All accepted papers will be printed in the ICCCS report. Symposium admission fee will be reduced for authors.

ICCCS BEIJING 2006 - EXHIBITION



Courtesy of Lee Anderson

Experts from all engineering fields see the accompanying exhibitions by the CCCS as a chance to exchange knowledge and experiences and, at the same time, as a market forum for new ideas, products and services. Within the scope of these events, your company will have the opportunity to successfully participate and to make use of all the services.

Contact:

China Enterprises International Exhibition & Advertising Co., Ltd. (CEIEAC),
4th Floor, Hualian Office Building,
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Tel: +86 10 8836 1773/1764
Fax: +86 10 8838 2248

E-mail: eaciecco@mx.cei.gov.cn

www.ceieac.net/iscc

Exhibition space booking form (.doc): www.icccs.net/symposium.html

TWO EDUCATIONAL COURSES

CLEANROOM TECHNOLOGY and CLEANROOM TESTING

to be held at the 3C Exhibition, NEC, Birmingham

15th and 16th February, 2006

The following two courses will be presented by Bill Whyte. Members attending the courses may wish to attend the 3C Exhibition. Information about the exhibition and how to pre-register is given on: www.threec.co.uk.

Wednesday 15 February - CLEANROOM TESTING COURSE

This is for people wishing to understand how a cleanroom must be tested to comply with cleanroom standards. Those attending will receive a 90-page manual on cleanroom testing that is a valuable reference aid. It covers: • Reasons for validating a cleanroom and validation philosophy • Validation standards • Air volumes and velocities • Differential pressures • Infiltration of contamination into the cleanroom • Air movement control within a cleanroom • Air filter integrity tests • Particle measuring methods according to ISO 14644-1.

Thursday 16 February - CLEANROOM TECHNOLOGY COURSE

This is a basic course covering all aspects of cleanroom technology and is for those relatively new to the subject, or who wish to brush up their knowledge. Those attending the course will receive the 80-page course manual that is a valuable reference aid.

It covers: • Necessity for cleanrooms • Design of cleanrooms/workstations • Cleanroom standards • Testing a cleanroom • Cleanroom disciplines • Entry procedures • How cleanroom clothing works • Correct attire.

Price per delegate for each course is £100 (£117.50 including VAT)
For further information go to the website www.s2c2.co.uk or contact:

Scottish Society for Contamination Control
James Watt Building, University of Glasgow
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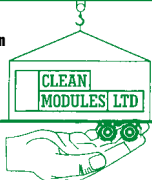
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- Clean Room components



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