eurocomp
The newsletter of the Space Components Steering Board

Introduction

Welcome to the sixth issue of *Eurocomp*, the newsletter of the Space Components Steering Board (SCSB).

We recently achieved a fundamental milestone for the European Space Components Coordination (ESCC): dignitaries representing the ESCC partners signed its Founding Act at the Headquarters of the European Space Agency in Paris. This event was much anticipated, and a great deal of effort went into ensuring that the principal cornerstones were in place in order for this to take place.

With its inauguration, the ESCC has a clear mandate to carry out its strategic mission. We look forward to an integral and successful system supporting the common objectives of its partners over the long term.

Mr Rodotà, Director General of ESA, at the inauguration of the ESCC

Also in this issue of Eurocomp, we highlight an emerging strategic components dossier formed around the microsystem technology (MST) domain. While the benefits for mass, power, volume and performance to space systems are obvious, the reliable use of miniaturised micro-electro-mechanical systems in these applications is not. However, the article will bring to the fore some of the studies underway that may pave the way for MST use in their intended applications. Though the dossier is in its early stages, it has great potential to yield promising results even in the short to medium term.

In keeping with the ongoing effort to update the existing standards, an ECSS standard for Hybrid Microcircuits is being prepared.

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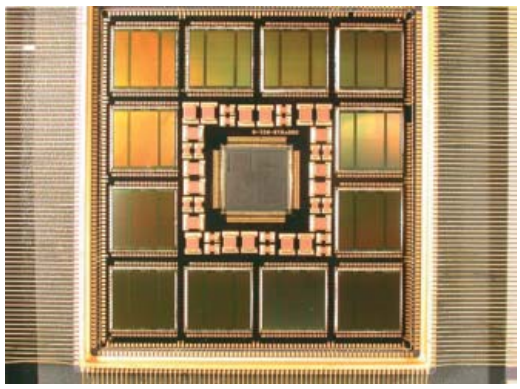
Upcoming events:
- Round table on Micro & Nano Technologies for Space
- RADECS 2003: Radiation and Its Effects on Components and Systems
- ESCCON 2004: European Space Components Conference

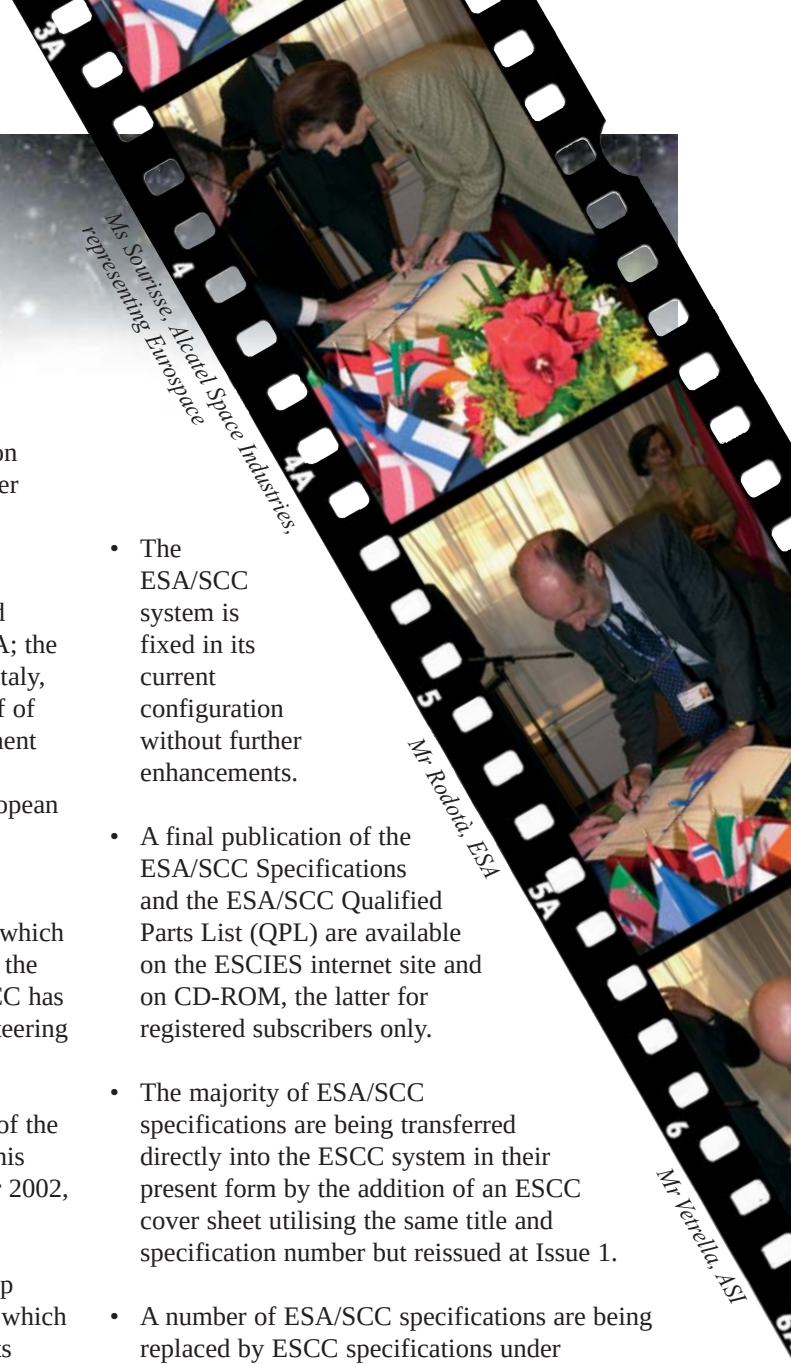


Input Output Processor (IOP) MCM Hybrid, courtesy Alenia Spazio (I)

This is the first of a planned series of standards and specifications for these technologies. The working group report will outline the efforts in this arena.

There are also a number of events coming up soon that are relevant to components, and you can read about these towards the end of the newsletter. We hope you will take these opportunities to either present your results to the space components community or to catch up on the latest developments in the field.

Signature of the Charter



The European Space Components Coordination (ESCC) was formally inaugurated on 8 October 2002.

This was occasioned by the signing at ESA Headquarters in Paris of the Founding Act and Charter of ESCC. The signatories include ESA; the national space agencies of France, Germany, Italy, and the United Kingdom; Eurospace on behalf of the user industries; and representative component manufacturers. These organisations have been working over recent years to improve the European space sector component (EEE parts) market.

The Founding Act is an agreement by the signatories to the terms of the ESCC Charter, which sets forth the terms of operation of ESCC and the obligations of the participating members. ESCC has a pre-eminent body, the Space Components Steering Board (SCSB).

One element of the ESCC is the transfer to it of the ESA/SCC system. The key consequences of this transfer, which became effective on 8 October 2002, can be summarised as follows:

- The Space Components Coordination Group (SCCG), together with its working groups, which advised ESA for many years on components policy and in particular on the implementation of the standardisation embodied in the ESA/SCC specification system, is relinquishing its role to the SCSB. The SCSB will operate the ESCC specification system in its own right, with ESA as a member on an equal footing with all other members. The SCCG, after transfer of its operations to the ESCC is completed, will be disbanded.

Ms Sourisse, Messrs Rodotà, Elaerts (ESA), Brachet (CNES), Tegnér (Head of Council, S)

- The ESA/SCC system is fixed in its current configuration without further enhancements.
- A final publication of the ESA/SCC Specifications and the ESA/SCC Qualified Parts List (QPL) are available on the ESCIES internet site and on CD-ROM, the latter for registered subscribers only.
- The majority of ESA/SCC specifications are being transferred directly into the ESCC system in their present form by the addition of an ESCC cover sheet utilising the same title and specification number but reissued at Issue 1.
- A number of ESA/SCC specifications are being replaced by ESCC specifications under corresponding specification numbers covering the same topic. These are in a distinctly different format of presentation and may additionally have small changes in specification title, together with updated content.
- Gradually the cover-sheet-based ESCC specifications will be transferred into full ESCC specifications, to incorporate policy, technical and editorial changes.
- The ESA/SCC QPL will be replaced by the ESCC QPL. ESA remains the Certification Body, and the qualification symbol, the small ESA logo, remains unchanged.
- A first publication of the ESCC Specifications and the ESCC QPL is available both on ESCIES and on CD-ROM, the latter for the existing ESA/SCC registered subscribers only.
- Qualified manufacturers under ESA/SCC are automatically qualified under ESCC, with the current validity period remaining unchanged.

- New ESCC qualification certificates will be issued by ESA to qualified manufacturers at their next successful application for extension.

- Qualified manufacturers should initially only add a note to their Process Identification Documents (PID) to indicate “for ESA/SCC references read ESCC”. The PID should be aligned fully with ESCC at the next renewal of a qualification certificate.

- During the transitional phase from ESA/SCC to ESCC the system contact points for people remain unchanged, i.e. the national space agency personnel previously supporting the ESA/SCC where applicable or the Secretariat at ESA. The Secretariat is now addressed as the ESCC Executive Secretariat and its contact information is:

ESCC Executive Secretariat
ESA/ESTEC (TOS-QCS)
P.O. Box 299
2200 AG Noordwijk
The Netherlands
Fax +31-71-565-6637

Further information will appear in due course on both the ESCC and ESCIES websites:

https://spacecomponents.org
https://escies.org

There are feedback form possibilities on both these sites, should there be questions in the interim.

For more information, please contact:

John.Kaellberg@esa.int

Mr Huguet, UMS, representing GaAs manufacturers

Mr Guennoun, Atmel, representing silicon manufacturers

Mr Remondière, Alcatel Space, representing hybrid manufacturers

Mr Bensoussan, CNES

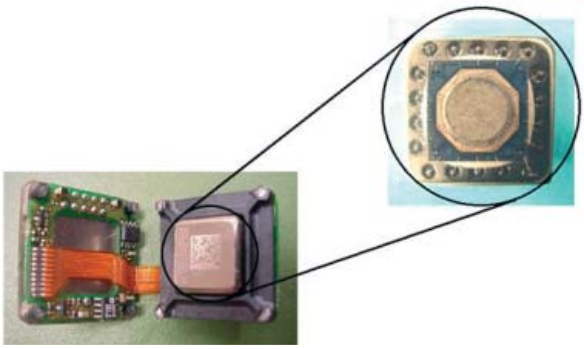
Mr Wittig, DLR

Dr Hicks, BNSC

Photos: P. Sebirot, ESA

A new tool for the Components Technology Board:
The Micro System Technology Working Group forms in 2003

The theme of electronics miniaturisation for consumer products, automotive and medical devices, and high-reliability applications has continued with advances in silicon integrated circuits and hybridisation. The functionalities of components are driven higher per square millimetre at a cost that the user markets can afford. Micro System Technology (MST) (or Micro Electro Mechanical Systems (MEMS) in the US) is another approach that takes the level of integration further in a device or equipment. It incorporates systems elements and components in one single package or structure, thus reducing the mass, physical size and cost of the overall system while still maintaining or even improving its functionality and performance.



MEMS-Based Single Axis Rate Sensor (Gyroscope) Manufactured by BAe Systems (UK)

MST has clear implications in many domains and in particular in the space industry, where technologies must meet stringent environmental requirements and system constraints, including low cost, superior performance and reliability, low power, and low mass. The development of micro-systems is generating great interest in the space community, where the technology advantages are actively being considered for asteroid landers, rovers and/or other exploratory missions. The long duration nature of these missions places demands on power, mass and cost. It is precisely for these required attributes that MST is almost becoming a mission or concept enabler. For micro- (10-100 kg) and nano- (1-10 kg) satellites or small satellite constellations, micro-systems will also offer attractive solutions. In the field of conventional spacecraft and launchers, the technology advantages are opening up the scope of increasing system reliability through the inclusion of multiple redundancies and new fault detection and error correction concepts.

It is therefore not surprising to see MST-driven changes happening in all areas of space research, and to note that MST-related studies have been (or will rapidly be) initiated in the following domains:

- Spacecraft propulsion (cold gas micro-thrusters & micro-xenon feed system)
- IR detection (cooled micro-bolometers, and micro-shutters)
- Sensing (micro accelerometers, pressure sensors, etc.)
- Mechanical systems (multi-function micro-, nano-systems, pyro initiators, etc.)
- Antenna equipment (RF micro-systems for adjustable antennae)
- Payload electronics (RF micro-systems, and micro opto electro mechanical systems: MOEMS)
- Launchers (micro-telemetry and micro inertial measurement units)

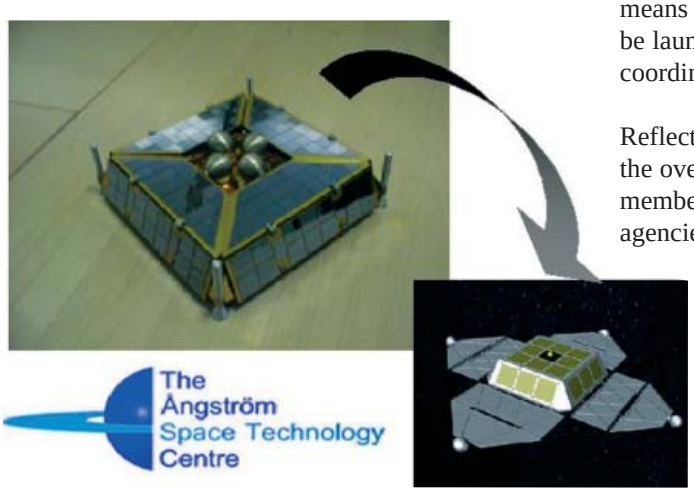
MST & CTB: a CTB MEMS Day as a first contact

The Components Technology Board (CTB) is a body subordinate to the Space Components Steering Board (SCSB), and is charged with the formulation of strategic needs for technology research and development in the area of European EEE space components. It coordinates the collectively funded activities in space component research, development, evaluation, qualification, standardisation and quality assurance.

Although MST has made significant progress in terms of processing and prototyping, there are still a number of issues to be addressed before space-qualified micro-systems actually go into space. Among these issues are how best to:

- Handle in a controlled manner the diversity of the micro-systems
- Address the technological challenges which still require effort (e.g. packaging)
- Define and demonstrate an efficient process capability approach

- Develop and demonstrate reliability assessment & management methods
- Validate assessment methods
- Establish and apply space qualification procedures
- Prepare and publish European MST standards and specifications



A Nanosat Project using MST
(Courtesy of The Ångström Space Technology Centre in Uppsala)

ESA and the European space industry (through the CTB) have discussed a strategy that will address these issues. ESA has also initiated contact among universities and research institutes that are active in the MST domain and the industrial collaborators, the final users and industrial procurement specialists, in order to facilitate a prioritisation of the technology transfer from concepts to space applications. This has been done through ESA's participation in many forums, plus the organisation of the CTB MEMS Day.

The ESA CTB MEMS Day was held in May 2002 and was attended by more than 20 participants representing 14 different organisations, including the national space agencies, the equipment suppliers, the spacecraft and launch vehicle manufacturers, micro-systems experts, and the ESA Technical Officers active in this field.

The meeting included eight presentations covering a diverse range of applications such as micro-propulsion, micro-fluidic devices, RF micro-systems and payloads, MOEMS, micro-sensors, micro-pyrotechnic actuators, micro-mechanisms, MEMS Off The Shelf (MOTS), plus a wide variety of topics related to space and space applications from launcher, platform subsystem and payload points of view.

The CTB MST Working Group

The CTB, after an in-depth analysis of the technology maturity, the user needs and the existence of potential space missions (XEUS, NGST, etc.), concluded that it was justifiable to bring the MST devices to the forefront of CTB activities by means of establishing an expert Working Group to be launched in 2003. ESA accepted the role of coordinating the activities of the WG.

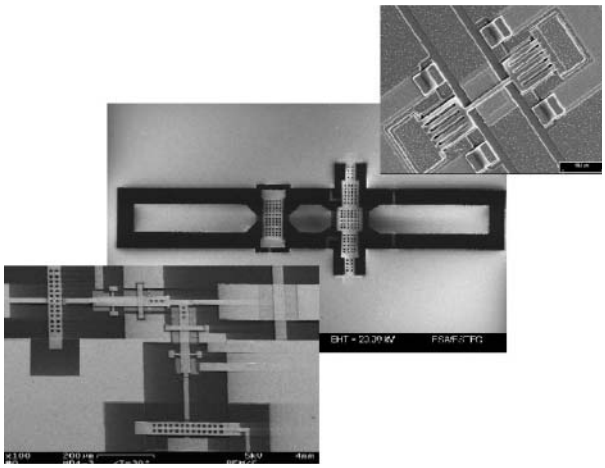
Reflecting the consultative approach of the CTB in the overall discharge of its responsibilities, the membership of this working group shall include agencies, user industries, SMEs, universities, and research institutes. The first mandate of the CTB MST WG will be to address the MST issues listed previously. Additionally, given that the area of MST is diverse, with some already on-going development activities, it was decided that the members would agree on their detailed terms of reference (ToR) during the first meeting of the CTB MST WG, provided they are commensurate with the general CTB terms of reference. The CTB ToR are:

- Together with system, payload and spacecraft experts, identify the strategically important MST devices and, where necessary, propose some means of improving their availability at a satisfactory quality level and affordable cost.
- Identify and evaluate advanced technologies that are anticipated to become standard requirements for future space projects.
- Assess technologies and components, manufacturer capabilities, technology trends.
- Establish plans to make qualified component technology available in time for user projects.
- Define the required component development, evaluation, study and MST research activities.
- Plan the implementation, control the status and technical achievements of the approved programme, and establish periodic progress reporting to the CTB core group and the SCSB.

On-going MST studies

The following MST activities are currently in progress at ESA, and were presented to the CTB during the MEMS Day:

- Development of RF micro-switches and switching matrix.
  ESA ARTES activity managed by the ESA Payload Systems Division.
  Industrial partners: Alenia Spazio (I), Daimler Chrysler (D) and IMEC (B)



ARTES V RF micro-switches (SPST and SPDT)
(Courtesy of Daimler Chrysler, Alenia Spazio and IMEC)

- MEMS-technology-based components for Earth observation programmes.
  ESA EOEP activity managed by the ESA Components Division.
  Industrial partner: IMEC (B)

- Development of cold gas micro-propulsion system.
  ESA GSTP and TRP activity managed by the ESA Propulsion & Aerothermodynamics Division.
  Industrial partner: Ångström Space Technology Centre (S)

- Evaluation of MEMS-based propulsion systems for Earth Observation Missions.
  ESA EOEP activity managed by the ESA Components Division.
  Industrial partner: Ångström Space Technology Centre (S)

- Development of a micro-mechanical xenon feed system.
  ESA TRP managed by the ESA Propulsion & Aerothermodynamics Division.
  Industrial partner: Ångström Space Technology Centre (S)

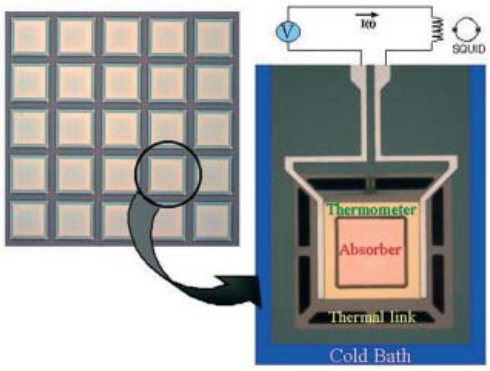
- Development of miniature pyrotechnic initiators.
  ESA TRP managed by the ESA Thermal Control & Life Support Division.
  Industrial partner: Mechatronic (A)

- Evaluation of micro-angular rate sensors for space applications, study of MEMS failure mechanisms.
  ESA Corporate activity managed by the ESA Components Division.
  Industrial partner: Astrium Toulouse (F)

- Micro-gyroscopes feasibility study.
  TRP activity managed by the ESA Control, Data and Power Division.
  Industrial partners: SEA Ltd (UK) and Astrium Stevenage (UK)

- Micro-photonic ICs.
  General study managed by the ESA Mechanical Systems Division.
  Industrial partners: IMEC/INTEC (B), MPB (CDN)

- Cooled micro-bolometers for cryogenic imaging spectrometers.
  ESA-TRP managed by the ESA Science Payload & Advanced Concepts Team.
  Industrial Partners: SRON (NL), MESA+ (NL), Univ. of Jyväskylä (FIN), VTT (FIN), Metrorex (FIN), Univ. of Leicester (UK)



Micro-bolometers for cryogenic spectrometers
(Courtesy of MESA+ and SRON)

- Scanning micro-mechanical mirror system.
  ESA TRP-GSTP activity managed by the ESA Mechanical Systems Division.
  Industrial Partners: VTT and Patria Finavitec (FIN)

- Low-cost telemetry subsystems using smart MEMS-technology-based sensors.
  ESA corporate activity managed by the ESA Components Division.
  Industrial partner: EADS LV Les Mureaux (F)

Readers interested in further information can contact the author at:

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Review of ESCCON 2002, Toulouse (France), 24-27 September 2002

The second Space Components Conference (ESCCON 2002), organised under the auspices of the European Space Component Coordination (ESCC) was held in Toulouse in September and was organised by CNES in cooperation with ESA.

The international flavour was maintained in 2002 with contributions from Europe, the United States, Israel and Japan. 187 participants, slightly fewer than at ESCCON 2000 due to the poor economic situation in the space business, came from 17 countries, spanning North and South America, Russia, the Far East and Europe.

Jean-Jacques Favier, Deputy Director of Space Techniques in CNES, opened the 3½-day programme. He recalled the problems of space components, which have to meet highly demanding specifications in terms of reliability and resistance to radiation, while the quantities used remain very limited in relation to other sectors.

This means that the major world suppliers are only marginally interested in them. Some of them have recently withdrawn from the market, leading to a need for the introduction into space hardware of commercially produced high technology components (COTS).

The conference featured four technical oral sessions and a supporting poster session.

A specific session was held to present the progress made in the field of the European Space Component Coordination (ESCC) initiative. The ESCC overall structure and its subordinated bodies, such as the Component Technology Board and Implementation Team, were described. In particular attention was focused on the European Space Component Information Exchange System (ESCIES) and on the European Preferred Parts List (EPPL).

64 papers were presented, covering component engineering and technology, component assurance, costs and procurement, packaging and radiation.

In the oral sessions, invited papers and introductory papers were presented, giving the state of the art in diverse and competing technology fields and in the component assurance and procurement methodologies.

An industrial exhibition with 14 exhibitors showcased rad-hard and rad-tolerant components, databases, software tools and test house facilities. Many contacts were made between conference attendees and exhibitors, which will certainly generate collaboration or future business after the conference.

A round table was organised with the subject “Future supply for space components in Europe”. The discussions with participants from user industry, space agencies and component manufacturers were focused on space component availability in Europe, usage of COTS, export limitations and the cost of ownership of components.

The breaks, lunches and a nice social programme saw a considerable exchange of views between participants.

In closing the conference, Mr Linder, Programme Committee Chairman, was able to pronounce the 3½-day meeting a success in terms of technical advances, fruitful contacts and discussions among attendees.

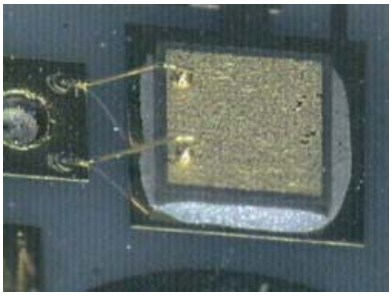
The ESA Publications Division will publish the proceedings of ESCCON 2002 shortly, as ESA SP-507. The papers and the transparency presentations will also be made available via ESCIES *(https://escies.org)*.

For more information, please contact:

francois.linder@cnes.fr

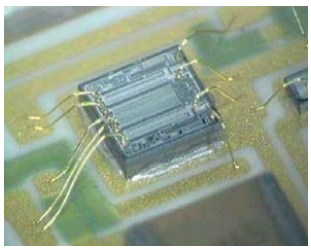
The Space Hybrid Microcircuits Standard ECSS-Q-60-05

Standard ECSS-Q-60-05 “Generic procurement requirements for hybrid microcircuits” is part of the Component Product Assurance branch (Q-60) of the ECSS standards. This level 3 standard will replace ESA PSS-01-608 “Generic specification for hybrid microcircuits” issued in April 1987, which obviously needs to be updated, taking into account fifteen years of background on high reliability hybrid microcircuit manufacturing and use.

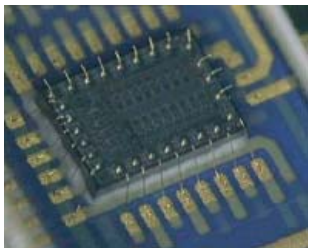


This standard describes basic rules, requirements, mandatory test methods and accept/reject criteria during the different phases of a hybrid microcircuit, from the design activities to the delivery, as follows:

- Design activities: demonstration of the reliability of the electrical function (circuit type approval)
- Active and passive component procurement activities: demonstration of the reliability of chips in the hybrid environment
- Final production test: hybrid microcircuit screening to eliminate ‘infant mortality’ defects
- Lot acceptance testing of hybrid microcircuits: demonstration of the reliability of the hybrid microcircuit assembly
- Delivery requirements

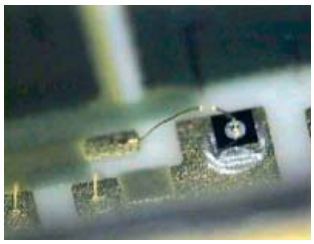


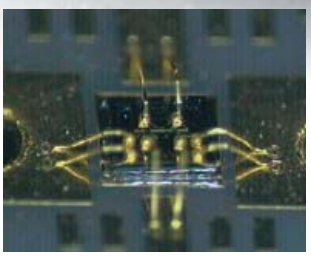
This hybrid specification working group is composed of space agency representatives (ESA, CNES) along with hybrid microcircuit manufacturers (Alcatel Space (F), Alcatel ETCA (B), Alenia Spazio (I), Astrium (F), HYMEC (NL), LABEN (I), Radeberger (D), Tesat Spacecom (D)). This work started in May 2001, and the final draft was issued in summer 2002 and recently sent to the ECSS Secretariat for the next phase (public review).



A hybrid microcircuit is an assembly of substrate, active and passive components in chip form inside a hermetic package designed to realise an electronic function. It can also be considered as a component. For this reason, it is very important to have a product assurance approach with a consistent and global point of view at the hybrid microcircuit level. Therefore, the first work of the group was to identify clearly the real goal of the different quality assurance requirements and tests, the associated level of confidence, and the possible consequences of the reduction of tests on the reliability of the end product.

A second point which has to be emphasised is that even if the ‘old’ ESA PSS-01-608 has to be updated and sometimes lightened, all working group participants considered that document to be globally satisfactory. The CNES document MPM-52-20-03 “Procurement of hybrid circuits” was





also used as a reference document (being more recent and more complete in some aspects). Work done by the French-speaking hybrid manufacturers' group in the early 1990s was also taken into account. Finally, the MIL-PRF-38 534 "Hybrid microcircuits, general specification for" document was used for comparison and 'inspiration', to introduce new or alternative methods and to try to bring together the European and American approaches.

The main improvements and modifications introduced into this new standard were:

- Introduction of the 'Category 1' (Qualified) and 'Category 2' (Non qualified) manufacturers and definition of the 'Category 2' specific survey
- Possibility of reducing the number of samples for Lot Acceptance Test of active and passive components
- Addition of requirements for procurement of materials and piece parts
- Introduction of the specific Lot Acceptance Test of hybrids to be performed by a 'category 2' manufacturer on the first flight model lot
- Definition of rework provisions
- Definition of two options for Lot Acceptance Test of hybrids for 'category 1' manufacturers:
  - Option 1 based on hybrid-type lot acceptance testing
  - Option 2 based on technology-family lot acceptance testing

During further processing of the document, the consistency between this document and other documents defining procurement requirements for active and passive chips shall be verified. In particular, different options at hybrid level imply, in consequence, different options at die level.

After release of this document, the next step will consist of writing the capability approval specification for hybrids (document to replace ESA PSS-01-605, ESA PSS-01-606 and PSS-01-612 specifications).

I personally wish to thank all Working Group participants for their active and always constructive cooperation.

Didier Dandurand, Alcatel Space, Convenor of the Hybrid Specification Working Group

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Issue 4 of the EPPL is released

A new release of the European Preferred Parts List is online at (*https://escies.org*).

A number of changes were made, ranging from introduction of new entries to removal of certain parts due to standardisation.

It is still early days for the EPPL. It is open to participation by the public, and by simply using the 'Entry Application' or 'Removal' forms, changes may be proposed.

Background

The EPPL is managed in accordance with ECSS-Q-60-01. There is a technical advisory group charged with supervising the correct implementation of the requirements of that ECSS document by the EPPL Manager. Currently the European Space Agency holds the chairmanship of this group. The contact point for this group in the first instance is Mr. G. Gallina of Top-Rel (I) (EPPL Manager). He can be reached through a link provided on the web page.

The purpose of the EPPL is to support space projects in their selection of EEE components utilising a standardisation policy.

An FAQ is also available now to answer some of the more popular queries. We are always looking to update these services, so keep those questions and requests coming in via the website.

For more information, please contact:

Michel.Haury@esa.int

First Announcement: 4th Round Table on Micro & Nano Technologies for Space

The 4th ESA Round Table on Micro & Nano Technologies (MNTs) for Space will be held on 20 – 22 May 2003 at ESA/ESTEC, Noordwijk, The Netherlands.

The event, which will be organised by the ESA Components Division in cooperation with the ESA Technology Harmonisation and Strategy Division, will emphasise MNT flight opportunities (past & future) and Micro-systems reliability & packaging issues, and will address the following aspects:

- MNT flight history and future in-space demonstration
- MNTs as Mission Enablers: associated mission concepts and architectures
- Devices, equipment, instruments and (sub)systems for space applications and demonstrators using Micro & Nano Technologies
- Design, technologies, micro-machining and novel fabrication processes
- European foundries, processing services (processing blocks) and rapid prototyping
- Micro-systems Off The Shelf (MOTS): availability and suitability for space use
- Technology transfer from and to other industrial sectors; adaptation to space
- Specific problems and solutions associated with the utilisation of MNTs in space
- Testing methods and procedures (including MNT radiation testing), reliability and qualification
- MNT programmes, trends and roadmaps

Nano-technology-related papers are very welcome, and may address the following topics:

- Emerging nano-technologies and materials
- Nano-lubrication & nano-coating materials
- Nano-tubes, nano-composites
- Nano-electronics, nano-imaging
- Technologies for nano-fabrication

There is no registration fee. Registration details will be announced in the Preliminary Programme, as well as hotel information. The Preliminary Programme will be published in April. The Call for Papers will be posted on the ESTEC Conference Bureau web page in early February 2003:

www.estec.esa.nl/conferences/

Over 150 experts participated in each of the previous Round Tables. The audience is expected to include members from national delegations, space agencies, space and MNT industries, research centres and universities in multiple roles as users and as providers of MNT-based equipment and systems.

An MNT-related technical exhibition will take place in parallel with the Round Table, to give an opportunity for participants to promote their products, facilities and services. Interested exhibitors should express their intention to participate to the organiser, Laurent Marchand, at

Laurent.Marchand@esa.int

RADECS 2003: Radiation and Its Effects on Components and Systems

The 7th RADECS Conference will be held on 15 - 19 September 2003 in Noordwijk, The Netherlands. The conference, this time organised by ESA in collaboration with the RADECS Association, will address a broad field of radiation issues. The topics of the technical programme include:

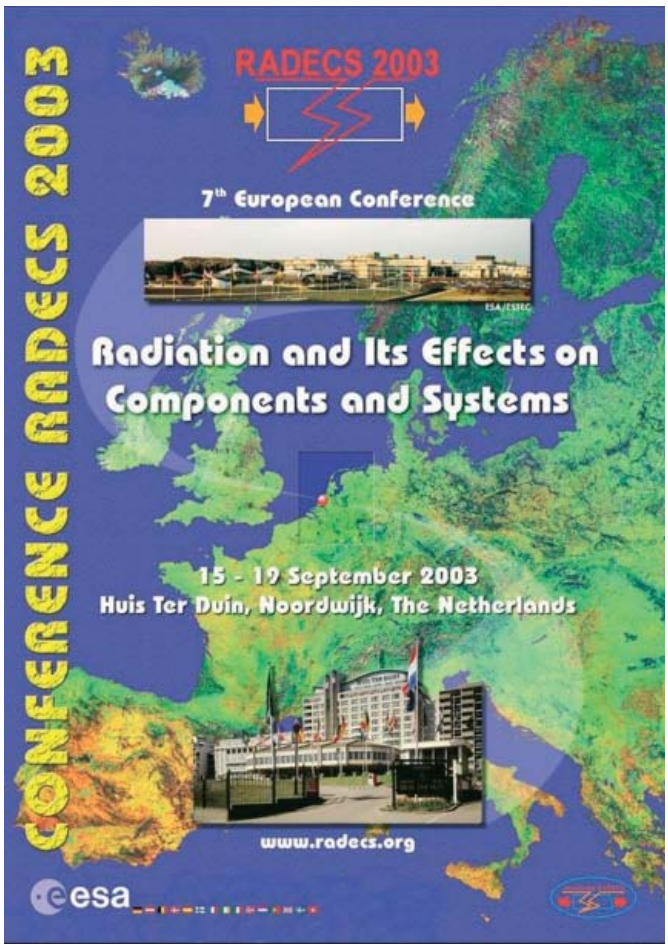
- Radiation environments in different industrial sectors as well as in space
- Radiation effects on materials
- Components and systems
- Radiation hardening and mitigation techniques on process, circuit design and system level
- Radiation test facilities and dosimetry
- Radiation hardness assurance, test methods and standards
- New developments of interest to the radiation effects community

Although not exclusively dedicated to space-related issues, the programme will feature a very large number of oral and poster presentations focusing on space application aspects.

The 2003 Conference is intended to emphasise the practical engineering aspects of radiation effects, which will be reflected in the short course to be held on the first day of the Conference. Under the title "Radiation Engineering Methods for Space Applications" a team of renowned experts will explain proven, pragmatic approaches to solving radiation issues commonly encountered in the course of space projects. Illustrated with practical examples, the presentations will span from the establishment of radiation requirements via component selection to radiation hardness assurance.

A technical exhibition, open from the 2nd to the 4th days of the conference, will be located adjacent to the conference areas, giving an opportunity to companies and organisations to promote their products, facilities and services in the radiation effects domain, thus creating a meeting point for providers and users.

Altogether this conference provides one of the best opportunities for all those involved with or concerned by radiation effects issues to contribute to and participate in on-going discussions or just to obtain a representative view on the state of affairs. Although it is the first time that the biennial RADECS Conference, which alternates with the RADECS Workshops, will take place outside France, it will adhere to the traditional style and conviviality known from past events, with an envelope programme of invited speakers and social activities.



Deadline for the submission of papers is: 4 April 2003.

For more details please visit *www.radecs.org* or contact

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ESCCON 2004: European Space Components Conference

ESCCON 2004, the European Space Components Conference, will be held during the week of 20 to 24 September 2004 in Lisbon, Portugal.

Formerly known as the ESA Components Conference, ESCCON is sponsored by the Space Components Steering Board (SCSB) and its members. The conference continues to be held every two years, and serves as a forum for the exchange of information and ideas concerning global technology developments and specific issues relating to space components.

ESCCON 2004 will be organised by Eurospace, the Association of European Space Industry. Its members comprise the main European industrial space companies from 13 Western European countries, covering all space disciplines and representing approximately 90% of total space turnover. It is the spokesman of its members vis-à-vis European space authorities, i.e. mainly ESA, CNES, DLR, ASI etc., and in general any organisation which uses or compels the use of space means, such as European governments or the European Union.

As soon as further information becomes available, it will be placed on *www.estec.esa.nl/conferences/*. You may also apply to Ms. Rosy Plet at Eurospace:

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