The Quarterly Bulletin of the

CEAS

COUNCIL OF EUROPEAN AEROSPACE SOCIETIES

3AF–AIAE–AIDAA–CzAeS –DGLR–FTF–HAES–NVvL–PSAA–RAAA–RAeS–SVFW–TsAGI–VKI

Issue 1 - 2013
March

'nEUROn', THE EXPERIMENTAL STEALTH UCAV DEMONSTRATOR DEVELOPED WITH INTERNATIONAL COOPERATION LED BY DASSAULT AVIATION SUCCESSFULLY PERFORMED ITS FIRST FLIGHT ON 1st DECEMBER 2012 AT ISTRES TEST FLIGHT CENTRE: AN IMPORTANT STEP TOWARDS A FUTURE GENERATION OF AUTONOMOUS STEALTH FIGHTER AIRCRAFT.

WHAT IS THE CEAS ?

The Council of European Aerospace Societies (CEAS) is an International Non-Profit Association, with the aim to develop a framework within which the major Aerospace Societies in Europe can work together.
It presently comprises 15 Member Societies: 3AF (France), AIAE (Spain), AIDAA (Italy), CzAeS (Czech Republic), DGLR (Germany), FTF (Sweden), HAES (Greece), NVvL (Netherlands), PSAS (Poland), RAAA (Romania), RAeS (United Kingdom), SVFW (Switzerland), TsAGI (Russia), VKI ((Von Karman Institute, Belgium) and EUROAVIA.
Following its establishment as a legal entity conferred under Belgium Law, this association began its operations on January 1st, 2007.
Its basic mission is to add value at a European level to the wide range of services provided by the constituent Member Societies, allowing for greater dialogue between the latter and the European institutions, governments, aerospace and defence industries and academia.
The CEAS is governed by a Board of Trustees, with representatives of each of the Member Societies.
Its Head Office is located in Belgium:
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- A well-found structure for Technical Committees

High-Level European Conferences
- Technical pan-European events dealing with specific disciplines and the broader technical aspects
- The CEAS European Air and Space Conferences: every two years, a Technical oriented Conference, and alternating every two years also, a Public Policy & Strategy oriented Conference

Publications:
- Position/Discussion papers on key issues
- CEAS Aeronautical Journal
- CEAS Space Journal
- CEAS Quarterly Bulletin
- Aerospace Events Calendar – www.aerospace-events.eu

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- European Commission
- European Parliament
- ASD (AeroSpace and Defence Industries Association of Europe), EASA (European Aviation Safety Agency), EDA (European Defence Agency), ESA (European Space Agency), EUROCONTROL
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European Professional Recognition:
- Directory of European Professionals

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- Annual CEAS Gold Medal to recognize outstanding achievement
- Medals in technical areas to recognize achievement

Young Professional Aerospace Forum

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It is structured as follows:

- General Functions: President, Director General, Finance, External Relations & Publications, Awards and Membership.
- Two Technical Branches:
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  – Space Branch

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EDITORIAL

ABOUT THE RUSSIAN ASTEROID STRIKE

Editor-in-Chief
Jean-Pierre Sanfourche

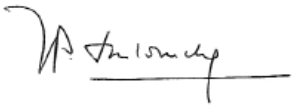
On 15 February a natural object entered the Earth's atmosphere over Russia at 03:20 UT, becoming a fireball. This fireball moving at a speed of 18 km/s passed over the Southern Ural region and exploded above the city of Chelyabinsk. Prior to entering the atmosphere, the size of the object was in the order of 17 meters and its mass comprised between 7,000 and 10,000 tons. It travelled through the atmosphere for approximately 30 seconds before breaking apart and producing a violent airburst explosion at about 20 km altitude. An intense light was created, casting shadows during broad daylight in Chelyabinsk and being observed in many other sites in Russia: Sverdlovsk Oblast, Tyumen Oblast, Orenburg Oblast, etc. The damages caused on ground are not due to fragments of the asteroid striking the Earth's surface but only result from the shockwave produced by this phenomenon, a shockwave whose energy to some 500 TNT kilotons, i.e. the force of explosion of a modern nuclear bomb. The first estimates give around 1,500 people injured, mainly by glass from windows shattered by the shockwave, and up to 4,300 buildings in six cities across the region.

The Chelyabinsk meteor is the largest object known to have encountered the Earth since 1908, when a meteor hit Tunguska, Siberia, and the only such event known to have provoked a large number of injuries.

Thomas Reiter, ESA's Director of Human Spaceflights and Operations said:

"*Today's event is a strong reminder of we need continuous efforts to survey and identify near-Earth objects.*"

In effect this 2013 Russian Meteor Event is the best possible justification of the ESA's Space Situational Awareness (SSA) programme which was launched in January 2009, a programme focusing on SST – Space Surveillance and Tracking of objects in Earth orbit, SWE – Space weather, and precisely NEO – Near-Earth-Objects. The Chelyabinsk event should incite efforts to actively continue and even intensify the works concerning NEO with the ambition to be able to spot near-Earth objects at least three weeks before closest approach. In addition to the sky searches currently conducted using the ESA's Optical Ground Station in Tenerife (Spain), it is quite important for Europe to develop the already defined system of automated one-meter diameters telescopes capable of imaging the complete sky in one night, to work in cooperation with survey efforts worldwide, and last but not least, to generate research ideas to help guide the development of the quite innovative US-European asteroid deflection mission (AIDA) now under study.



Jean-Pierre Sanfourche

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CEAS TRUSTEE RECEIVES A RUSSIAN AVIATION AWARD

In December 2012 the first "Aviation Industrialist of the Year" Award took place in Moscow organized by the "Union of Aviation Industrialists" (UAI) - the Russian aviation industry trade association - in partnership with the Central AeroHydrodynamic Institute (TsAGI) which is a CEAS member. It was the Russia's first ever Award aimed at giving high profile to the achievements of the Russian aviation community. Starting in 2012, the Award will be held annually in December.

The Awards ceremony was attended by top representatives from industrial and research organizations, airlines, government, business, media as well as foreign guests. Winners in 16 nominations were voted by the advisory council consisting of 64 leading representatives of the Russian aviation community.

The nomination "Best Foreign Partner of Russian Aviation Industry" was won by our colleague Mr. Georges Bridel, Trustee and former President of CEAS.

Mr. Bridel's victory in this nomination was not casual. He has always taken interest in the Soviet and Russian aviation. He is author of a number of articles in European journal dedicated to Russian aircraft. Georges Bridel took part in a number of projects with Russia. In 1996-1999 he advised the "Beriev" company on marketing, sales and operations of the Be-200 amphibian aircraft. While working for EADS, Georges Bridel was engaged in assessing possible use of the An-70 transport airplane in Europe. In 2003-2006 he studied ways of cooperation between EADS and "Sukhoi" and "MiG" companies on unmanned aircraft systems. Currently, Georges Bridel, acting as international consultant, is helping Russian aviation scientific organizations develop strategic R&D documents. Mr. Bridel also takes interest in Russian culture and history. His family has a history of ties with Russia reaching back as far as 1754 when his ancestor by the name of Noe-Louis Bridel arrived in Moscow to work as a personal teacher in the family of Count Orlov.

When receiving the Award, Georges made his speech in Russian which he speaks at a basic level. "The news about my nomination was a great surprise for me as well as a great honour. Russia was and remains one of the world aviation powers. Names of Great Russian aircraft designers such as Tupolev, Sukhoi, Mikoyan have long become common nouns. Even though I did not succeed in all my projects with Russia, I look with optimism at the future of the European-

Russian cooperation in aeronautics and accept this award gratefully", Georges said.

The Award was presented to Mr.Bridel by another member of the CEAS Trustees board - Sergey Chernyshev, who is executive director of TsAGI and also holds the position of deputy secretary general of UAI. "The Award is absolutely deserved. Georges's ancestors were connected with Russia and we thank him for continuing this tradition", Sergey Chernyshev said.

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CEAS Aeronautical Journal & CEAS Space Journal

Dear CEAS Board Members and Member Societies,

The CEAS Journals have been in circulation now for three years and I would like to take this opportunity to ask you for your support in further promoting and reinforcing this unique European aerospace platform.

As you are no doubt aware, the Journals are devoted to publishing new developments and outstanding results in their respective areas of interest. I have the honour of representing the CEAS Aeronautical Journal in the field of aeronautical science and technology as its Editor-in-Chief. The CEAS Space Journal covers astronautic topics. Its Editor-in-Chief is Constantinos Stavrinidis from the European Space Agency (ESA), who is also Chairman of the CEAS Space Branch.

I am fully convinced that both Journals have the potential to play a future strong role in representing European opinions in aerospace research. However, the biggest challenge still is to attract an acceptable number of high caliber scientists and engineers to send us articles for publishing. Therefore, publicizing your hard-earned results, I would appeal to you to contribute to the development of these Journals. You would also increase interest in the Journals by circulating this message amongst fellow members and CEAS colleagues to participate in promoting aerospace research in Europe.

Please visit http://link.springer.com/journal/13272, and http://link.springer.com/journal/12567, respectively, for further details.

Yours faithfully,

Rolf Henke

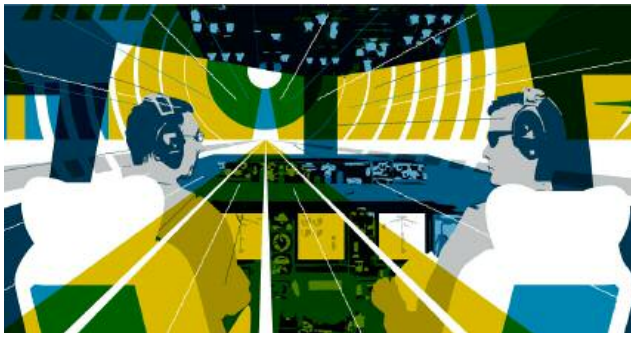
SAFRAN AND THE MORE ELECTRIC AIRCRAFT

SAFRAN wants to meet the challenge of developing "More Electric" aircraft. "More electric" aircraft will lower the total cost of ownership, enhance propulsion efficiency and reduce environmental impact? Safran is heavily investing to develop cost-effective technologies for these future aircraft. "Electric aircraft" means that the traditional hydraulic fluids and compressed air used to drive many aircraft systems will be replaced by electrically-driven systems, allowing a significant in weight and therefore fuel consumption. Safran gears up for this concept: already in 2004, it created the SPEC (Safran Power Electronic Centre), and recently it acquired the electrical power systems activities of Goodrich, the GEPS (Goodrich Electric Power Systems).

The present paper intends to provide the reader with some information about those two very important research entities.

THE SAFRAN POWER ELECTRONICS CENTRE (SPEC)

To meet the challenge of developing "more electrical" aircraft, SAFRAN is pooling its strengths in the Safran Power Electronics Centre – SPEC – which also calls an outside expertise. This new operating entity was created as part of Hispano-Suiza, the Safran Group subsidiary specialized in onboard electrical power applications.



Air transport faces two daunting challenges today, namely rising oil prices and environmental constraints. One of the solutions chosen by industry is the "more electric" aircraft, in which electrically-driven systems replace the hydraulic or pneumatic systems traditionally used. This ambitious project demands a transformation of our conception of these systems, as well as their constituent components. In order to enhance its overall efficiency, Safran created the SPEC in 2004, bringing together experts from eleven Safran Group companies (*Aircelle, Hispano-Suiza, Labinal, Messier-Bugatti, Messier-Dowty, Sagem, Snecma, Snecma Propulsion Solide –which has become Herakles since–, Technofan, Techspace Aero, Turbomeca*). SPEC identified five major areas of research: (i) electrical networks; (ii) power electronics cooling systems and environment; (iii) power components and converter design; (iv) electrical drive architectures; (v) integration of power electronics in the jet engine environment. These were further broken down into fifteen flagship initiatives. Over the course of its research work and during its biannual symposiums, SPEC has established relations with the worlds of academia and research, starting with the French Scientific Research Agency - CNRS (*Centre National de la Recherche Scientifique*) - , then research laboratories in Switzerland, Germany and North America. Today it is actively involved in more than twenty partnerships.

AMPERES

While these technologies are being developed through SPEC, a Safran programme named "Amperes" – French acronym for "more electric modular aircraft" - demonstrates their maturity. 'Amperes' is a Group-wide initiative conceived to optimise architectures and integrate innovative solutions in future airplanes, especially for the engines, landing gear, flight controls and energy management. Simultaneously, SPEC experts are forming partnerships with manufacturers in Europe with a view of meeting three main objectives:

- Benefit from research in the most advanced sectors;
- Identify partners able to produce the required components;
- Perform tests.

Carried out in close cooperation with European Programmes such as Joint Technology Initiatives (JTIs), this approach has breathed new life in Copper Bird, the test rig dedicated to the integration and characterization of aircraft electrical networks.

THE GOODRICH ELECTRICAL POWER SYSTEMS (GEPS): KEY MISSIONS, KEY TECHNOLOGIES, KEY TALENTS

THE ACQUISITION OF GOODRICH ELECTRICAL POWER SYSTEMS (GEPS): A DECISIVE STEP IN THE IMPLEMENTATION OF SAFRAN'S STRATEGY REGARDING "ALL ELECTRIC" AIRCRAFT

In October 2012, Safran entered into a definitive agreement for the purchase of Goodrich Electric Power Systems, a subsidiary of Goodrich Corporation, with a view to creating a world leader in aerospace electrical power systems. GEPS brings new capabilities to Safran's product offering, including the critical electrical generation know-how and experience. One year after the first gain by Safran of a global electrical distribution system on the Embraer KC390, this acquisition of GEPS brings to Safran key additional capabilities in electrical technologies. Thanks to the combination of electrical power generation and distribution capabilities thus acquired, Safran achieves a decisive breakthrough in the more electrical aircraft strategic roadmap.

The More Electrical Aircraft opens opportunities

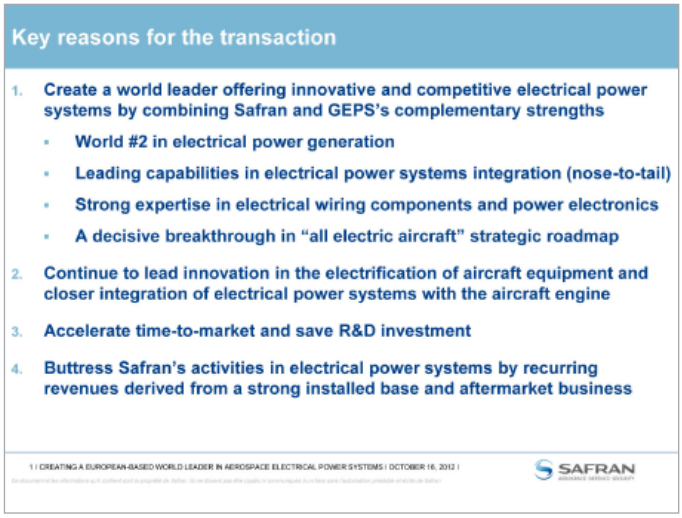
The accelerating trend towards More Electrical Aircraft is a priority for the airframe manufacturers. The replacement of hydraulic and pneumatic power systems present in today's aircraft electrical systems creates in turn a requirement for a significantly larger power generation and distribution sys-

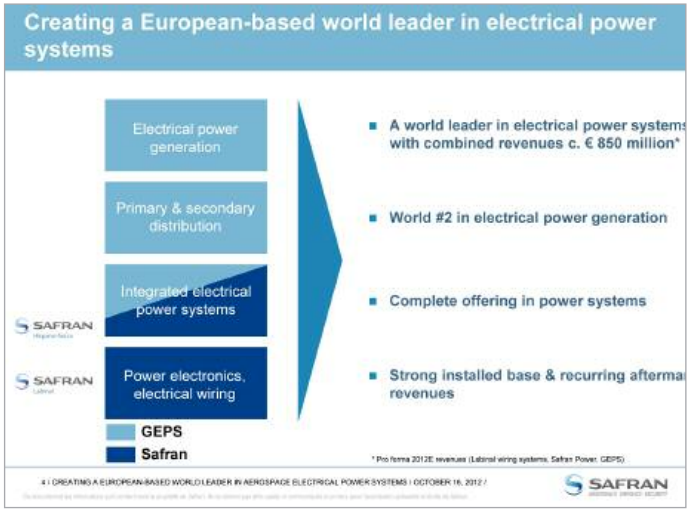
tem. The benefits of electrical power include improved safety, gains in weight and in volume, lower fuel consumption and consequently lower carbon emission, a reduction of aircraft assembly and maintenance costs, as well as an increase of their availability.

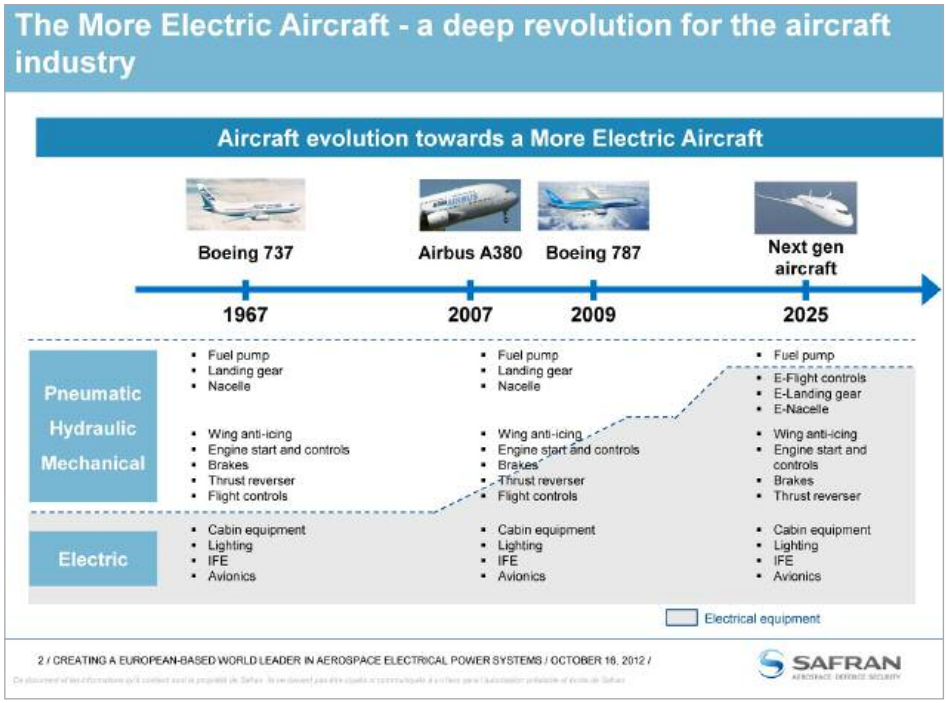
CREATING A EUROPEAN-BASED WORLD LEADER IN AEROSPACE POWER SYSTEMS.

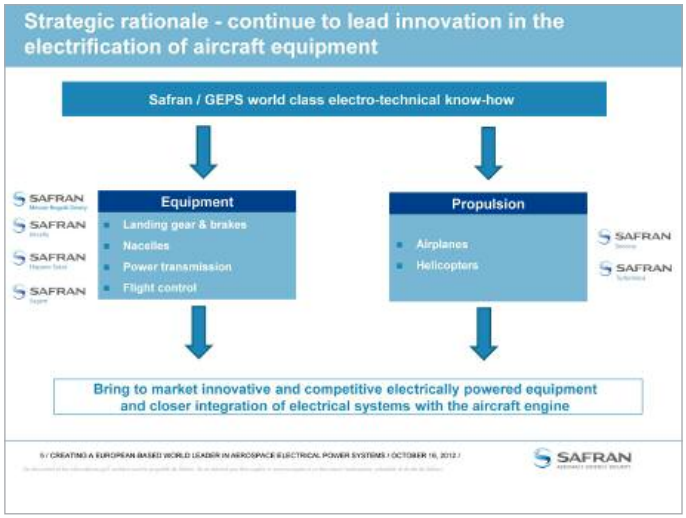
Acquisition of Goodrich Electrical Power Systems (GEPS)

The here below slides which were edited by the Communications Directorate in October 2012 constitute a clera synthesis of Safran-GPES transaction.









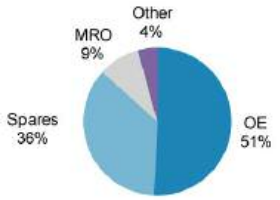
Key figures

Sustainable growth & improving margins

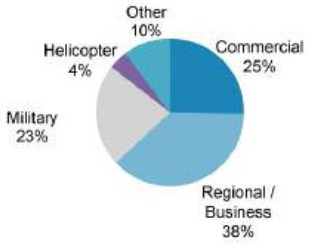
- 2012E key figures
  - Revenue: over USD 200 million
  - Low single digit operating margins
  - Includes GEPS's 60% equity interest in Aerolec (A380 & A400M programs)
- Growth drivers: OE & Spares
  - Strong installed base and sustained aftermarket revenue
  - Sole source, platform life on most programs
  - Growth from existing platforms and recent OEM wins
  - Long term growth potential from future platforms

Balanced revenue profile

2012E Revenue by channel



2012E Revenue by end market



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SAFRAN AEROSPACE · DEFENCE · SECURITY

Tremendous business potential

Growth from existing platforms in order book	Growth from new programs in order book			Long term growth 2015 - 2030
A320ceo	A320neo	EIS	2016	Cessna Latitude / Longitude
A380	A400M		2013	XAC MA700
C130J	CH53K		2017	Helicopters
Global 5000	S-76 D		2012	Regional NG
Business jets				Single aisle next generation
Boeing CH-47				

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SAFRAN

State of the art facilities

Pitstone Green, UK	Twinsburg, Ohio, US
c.460 employees	c.100 employees
State-of-the-art production facility built and opened in 2002	Custom designed facility built in 2005
Design, support, manufacturing, assembly and test and MRO capabilities	Focuses on design, development, sales and technical suppo
35 miles from Heathrow Airport	30 miles from Cleveland Hopkins International Airport
125,000 sq. ft. facility with c.70,000 sq. ft. for production	44,000 sq. ft. facility

Distinguished heritage : originally Lucas Aerospace

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SAFRAN

Positive medium and long term outlook

Medium term	Long term
Margin improvement through on-going continuous improvement initiatives	More competitive positioning in aerospace electrical systems as trend to More Electrical Aircraft accelerates
+	
Assured growth in aftermarket	Capture benefits of closer integration of electrical generation systems with aircraft engines
+	
Rising OEM sales	Continue to lead innovation in the electrification of aircraft equipment
2015/16 margins should be in line with overall Aircraft Equipment profitability targets	Broader offer: higher shipset value

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SAFRAN

Transaction process & closing

- Cash consideration of approximately € 310 Million
- Transaction expected to close late in 2012 or early in 2013
- Subject to regulatory approvals
- Satisfaction of other customary closing conditions

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SAFRAN

Article composed by J.-P. Sanfourche in collaboration with Safran Communications Directorate.

ABOUT CLEAN SKY

2012 HAS BEEN A BIG MILESTONE

2012 has been a big milestone for Clean Sky: we are half way through our Programme and the first full-scale, integrated demonstrators have just started. We are also proud to confirm that we are on track to achieve the initial objectives set for CO_2 and noise reduction; we have now reached a steady cruising speed. More than 500 participants are currently actively involved in Clean Sky.

2013 is also of utmost importance, because of the build-up of Clean Sky 2. Significant steps have already been completed, including a first Outline Proposal and fruitful public consultations. We are pleased that there is such great interest in the continuation of this successful programme, with a new set of objectives.

At the dawn of this New Year, I am glad to welcome the new Chairman and Vice-Chairman of the Governing Board, respectively Alessandro Franzoni from Alenia Aermacchi, and Ric Parker from Rolls-Royce.

I wish all our readers a good festive season and a Happy New Year!

Eric Dautriat
Executive Director of Clean Sky

CLEAN SKY 2: A SOLID ENCOURAGEMENT DURING THE ILA BERLIN

During the ILA Berlin, on 12 September 2012, the Clean Sky Joint Undertaking and the European Commission jointly held an Industry Consultation about the extension of Clean Sky under Horizon 2020. Gathering around 120 representatives and stakeholders from across the aerospace industry, it provided an excellent forum for discussion and attendees had the opportunity to get a better insight about the progress and current proposal on Clean Sky 2.

This consultation followed the review performed by a panel of experts who were tasked on behalf of the EC to examine the Preliminary Outline submitted to the EC by the industrial parties currently building a detailed proposal for a Clean Sky 2.

Alongside the Stakeholder Event and the Panel Review, the third core ingredient necessary in the evaluation of the case for a renewed Aeronautics Joint Technical Initiative was a public consultation, launched in July and closed on 4 October 2012.

Of the respondents, 95% considered it appropriate to set up a Public-Private Partnership (PPP) in aeronautics under Horizon 2020. Most of the participants agree (39%) or strongly agree (50%) with the fact that the PPP should focus on large-scale demonstration of promising new technologies. In addition, the majority of the respondents (41% favourable and 33% very favourable) are in support of the use of a dedicated 'vehicle' or Joint Undertaking (JU) with a lean and light administrative approach to executing the programme. The overall conclusion of the public consultation is therefore extremely positive with respect to a new aeronautical JTI programme, Clean Sky 2, under the management of an efficient and purpose-driven entity such as the Joint Undertaking (JU).

This great result was seen as a solid encouragement to continue with the detailed elaboration of Clean Sky 2 proposal.

THE THEMATIC CONFERENCE OF 10-12 DECEMBER IN BRUSSELS

In the course of the preparation of Clean Sky 2, a three-day conference was organised in Brussels from 10 to 12 December 2012, a thematic conference which gathered around 200 participants a offered a great opportunity to network and share information about companies' capabilities and possibilities to take part in Clean Sky 2.

Eric Dautriat, Executive Director of Clean Sky JU, introduced each day with a presentation of Clean Sky 2 general overview. ITD (Initial Technology Demonstrator) leaders and the Joint Undertaking gathered the inputs of Clean Sky participants and prospective core-partners regarding the current Clean Sky 2 Programme Outline. The latter describes the proposed programme at the level of key projects and demonstrators.

Face-to-face meetings were organised for stakeholders to discuss directly with leaders of different platforms about engines, fast rotorcraft, regional aircraft, large aircraft, airframes and systems.

From information provided by Clean Sky JU
www.cleansky.eu/content/news/

THALES IS PLAYING A MAJOR ROLE IN CLEAN SKY JTI

Here below is reproduced the text of an interview by Solly Side, VP Institutional and European Affairs for the Avionics Division.

Why is Thales involved in Clean Sky and what are we doing?

Thales entities have been coordinating and contributing to European and national research programmes for decades. This type of collaborative approach brings together industry players and the research community around a common project, in order to develop the technologies and in turn the operational equipment and systems needed to meet market requirements in the future. For example, Thales Avionics has conducted the initial

development work for a whole range of breakthrough technologies, such as the glass cockpit and integrated modular avionics. Based on our experience in systems engineering and large-scale programme management, Thales has often been chosen to coordinate research consortiums of this type. So it was quite logical for us to be involved in the launch of Clean Sky, the most extensive collaborative research programme ever launched by the European Commission in the aeronautical sector. As such, we were one of the first founding members of this unique public-private partnership.

What can you tell us about the programme itself?

Clean Sky is an opportunity to be more ambitious than we usually are in our more conventional projects, and to link the various research themes and content much more directly with EU policies. The programme runs for seven years, allowing us to develop and demonstrate innovative new technologies with a real sense of continuity and within the same contractual and budgetary framework. And of course, Clean Sky has a budget in line with its ambitions. These exceptional challenges and associated resources call for a greater level of involvement on our part, as one of the leaders of the Clean Sky programme, in terms of our financial commitment, responsibilities and direct participation in the governance of the Joint Undertaking.

What is Thales's strategy for Clean Sky 2?

Clean Sky has delivered excellent results so far, clearly demonstrating the value of this approach for all stakeholders. New objectives focusing on industrial competitiveness and benefits for society in terms of mobility and the environment have been established by the Advisory Council for Aeronautic Research in Europe (ACARE) and published in a strategic vision document called Flightpath 2050. The European Commission has asked the Clean Sky team to propose a new programme to achieve these new objectives. Thales is consolidating its European leadership by preparing a proposal in its dual capacity as co-leader of the system platform (building on Clean Sky 1) and as systems integrator on the flight demonstrators put forward by the major aircraft manufacturers. For this reason, we'll be maintaining and even increasing our high level of involvement in Clean Sky 2.

From Thales Magazine Q1 2013

ABOUT SESAR

THE HIGH-LEVEL CONFERENCE ON THE IMPLEMENTATION OF SINGLE EUROPEAN SKY TOOK PLACE AT LIMASSOL (CYPRUS) ON 11-12 OCTOBER 2012

SINGLE EUROPEAN SKY (SES): TIME FOR ACTION!

This Conference was jointly organised by the Cyprus Presidency of the Council of EU and the European commission.

OPENING SPEECHES

Opening speeches were delivered by Mr Efthemios Flourentzou, CY Minister of Communications and Works, Mr Siim Kallas, Vice-President of the European Commission in charge of Transport, and Mr Brian Simpson, Chairman of the Transport Committee of the European Parliament. Mr Flourentzou stressed the importance of moving forward.

Mr Siim Kallas stressed the European Commission's impatience that after ten years, the Single European Sky was not still delivering and he outlined the EC's plans for action in the coming year, in particular on performance and Functional Airspace Blocks (FAB). He also announced the intention to bring forward new legislation: SES 2+.
Mr Simpson developed these themes and made a strong attack on lacking FAB implementation, the role of Member States in this.

FOUR SESSIONS

Four sessions enabled in-depth discussion on progress towards the implementation of the SES and debate on the next steps to be taken:

1. Performance Scheme: are we on the right track?

The airspace users were deeply frustrated that the targets for Research Programme 1 (RP 1) already a compromise at European level were not going to be fully delivered by national plans. These targets are to be clearly understood as binding on Member States. The Commission stated that it would use its enforcement powers as appropriate.

2. Functional Airspace Blocks (FABs): 2012 make or break year?

FABs are central to implementing the SES. The major efforts have been made towards the establishment of all nine FABs by the deadline of December 2012. But it is unlikely that FABs would meet the requirements set out in the legislation. The work has run into difficulties, in particular because the absence of political willingness at Member State level. In addition, the FAB coordinator, Mr Jarzembowski, pointed out: the need for a clearer FAB business model to enable cross-border and cross-centre operations; the necessity for the FAB ministers to meet more often to develop a political "esprit de corps"; the necessity for the FABs to develop their own individual roadmaps for implementation, working with regulators to minimize overlap and duplication; the necessity for the FABS to work with airports to propagate efficiency improvements. The importance of a good social dialogue to address complex issue to ANSP (Air Navigation Services Provider) personnel and the necessary mobility of the

ATCOs (Air traffic Control Officers) were also highlighted.
But the strongest sense was that without the active, engaged support of Member States at the political level, there was a real risk that FABs would fail to deliver the potential benefits identified.

3. SESAR: steps towards its deployment and the ATM system modernisation

The state of preparation of SESAR deployment has made significant progress in the last year. It is now recognised that three-level governance – political, deployment management and common projects – is needed to achieve an effective deployment. It is urgent that all the main actors – airlines, ANSPs, airports – to agree on a consolidated business case for SESAR deployment. Standardisation was also addressed: there was a call for a single regulatory agency for setting standards: it is essential to get high level of compatibility between NEXTGEN and SESAR.

4. Should the SES regulatory framework be updated and how?

The last panel discussed the ideas outlined by the Commission for a SES 2+ package. A strong plea was made for moving ahead and implementing the SES – including as jobs and growth package.

It was argued that given the monopoly of ANSPs, an efficient regulatory framework should be developed to ensure the public interest is protected.

SESAR INNOVATION DAYS 2012

The 2nd SESAR Innovation Days held in Braunschweig on 27 to 29 November 2012, attended by 160 guests who could listen to presentations and participate in workshops, information exchanges, discovery, etc. This event was promoted by SESAR JU under Work Package-E (projects expected to generate scientific knowledge that increases our understanding of the future ATM systems and to demonstrate the potential of novel technologies), and co-hosted by DLR and Technical University Braunschweig. SESAR innovation Days were also the occasion for young scientists to present their works and have a chance to win the SESAR Young Scientist Award.
This is Sergio Navarro from Barcelona University who was selected as the winner for his brilliant work within the framework of the STREAM project (STREAM = Strategic trajectory de-confliction to enable seamless aircraft conflict management).
The Board also encouraged Gonzelo Toberuela from Imperial College of London for the PhD work he performed for Work Package-E.

To be read : Position Paper from HALA! Research Network PHDS v.2.04.:
"Towards High Levels of Automation in ATM".
This document is available on the Web www.hala-sesar.net/sites/

Abstract written by J.-P.S.
From information provided by SESAR JU.

THE EUROPEAN ATM MASTER PLAN 2012 WINS PRESTIGIOUS IHS JANE'S ATC AWARD

Madrid, 11 February 2013 - SESAR Joint Undertaking (SESAR JU) and its Partners have been awarded Winner of the European ATM Award by IHS Jane's ATC Awards for the delivery of the European ATM Master Plan 2012, a work led by EUROCONTROL with the active contribution of all SESAR members.
The success of the Master Plan is the result of more than a year of collaborative work by all the SESAR JU's partners (airspace users, ANSPs, airport operators, military, network manager and staff associations). It demonstrates the relevance of SESAR JU business model for achieving concrete results.
The IHS Jane's ATC awards are an opportunity to celebrate the technical developments, product innovation, safety and efficiency initiatives that result in real savings for airspace users.

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FIRST FLIGHT OF THE NEURON

Thierry PRUNIER, Director of the nEUROn programme, Dassault Aviation

It was at the 2003 Paris Air Show that the French government appointed Dassault Aviation prime contractor for the nEUROn UCAV technology demonstrator prog-ramme. The nEUROn programme represents an innovative approach to industrial cooperation, providing European design offices with the means to develop their strategic skills in the years ahead.

A skills-based programme Partners were selected on the basis of:

- excellence and areas of competence,
- competitiveness,
- their government's financial commitment.

In this way, Dassault Aviation put together a team made up of industrial partners from five countries: Saab (Sweden) – Alenia (Italy) - EADS-CASA (Spain) - HAI (Greece) - Ruag (Switzerland).
It is a particularly open form of cooperation, with more than half the workload entrusted to non-French industrial partners. Through its role as prime contractor of the nEUROn programme, Dassault Aviation is promoting excellence in European industry through the development of:

- capabilities in the area of unmanned air systems,
- know-how for next generation European combat aircraft,
- experience in managing international cooperation programmes.

Technological challenges

The programme's demonstration objectives are ambitious:

- the development of a stealth platform in terms of both radar and infrared signature,
- the possibility to fire weapons from an internal bay,
- the execution of an air-to-ground mission.

nEUROn is a technology demonstrator. Its objective is to demonstrate the validity of command and control technologies in an unmanned vehicle the size of a combat aircraft, with all necessary back-up modes providing the required safety.
The main technological challenges relate to the aircraft's shape (aerodynamics, absence of vertical stabiliser, radar absorbers, internal weapon bay), the important role of software, its insertion into airspace and the sophisticated algorithms required to give decision-making power to the machine whilst keeping the human element in the mission loop.
Finally, the nEUROn is capable of firing weapons from an internal bay (currently all European aircraft rely on external loading capabilities for bombs and missiles).
A European cooperation project on such a scale calls for a PLM (Product Lifecyle Management) environment. The nEUROn is therefore following in the footsteps of the Falcon 7 X in becoming the first military aircraft in the world to be designed and developed on a "virtual plateau".

Tests on the ground

Electrical, hydraulic, landing gear, braking, fuel and air venting tests, carried out in normal and also in degraded conditions, demonstrated that the aircraft systems function correctly. Vibration tests helped determine the structure's eigen modes and confirm that there is no risk of flutter in flight. Parallel tests were carried out on the ground station and on the communication systems between it (ground segment) and the aircraft (air segment).
But before nEUROn could be left to taxi independently on the Istres taxiways and runway, "engine run-up tests" had to be carried out. The Adour engine, although "concealed" behind an air inlet to maintain the stealth of the nEUROn, responded perfectly to all throttle commands.
Finally, it was allowed to taxi, then execute acceleration-stops on the runway, gradually increasing speed until the nose lifted up!

Nearing first flight

The ground station operator does not fly the UCAV by "remote control". He only has control and monitoring over a set flight plan, can trigger it to taxi and can order it to stop. The aircraft is guided entirely through the established flight plan by the flight control system.

The nEUROn European UCAV technology demonstrator prepares for its first flight in Istres.
© Dassault Aviation - Ph. Stroppa

As is the case when opening a flight envelope, taxiing tests proceed one step at a time so that at any moment it is possible to return to a safe situation. They achieved a speed of 20 kt on the taxiway, and 140 kt on the runway.
Before proceeding with the first take-off, a few final stages were needed to perfect the aircraft performance. First, the "proof tests" to check the mechanical resistance of the aircraft structure under limit loads. Then the so-called "HIRF"

tests, to prove the aircraft is not affected by radar emissions around the site of Istres.
In order to obtain the Flight Permit a safety file had to be compiled containing the different proofs that the drone met airworthiness requirements. These proofs (50 forms + 400 documents) were passed on to DGA (French Defence procurement agency) gradually and the latter, after analysis, issued the Flight Permit on 28 November 2012.

First flight

Finally, despite the erratic weather conditions of late November, a propitious slot presented itself:
On Saturday 1st December 2012 at 7.55am, the engine was ignited and nEUROn began taxiing to the top of the runway. The accompanying Rafale took off and flew into place to escort the nEUROn. 8.20 - brakes off, acceleration and take-off – the aircraft, very stable, soars skyward and follows its flight plan perfectly.
After 25 minutes flight, it makes a perfect landing, the tension is released and applause breaks out. Some observations:

- Magnificent, "textbook" first flight. The pilots all agreed that "they had never seen a first flight as close to forecast".
- All air segment and ground segment systems functioned perfectly.

The nEUROn European UCAV technology demonstrator taking off from Istres airbase. © Dassault Aviation – R. Michelin

- Flight area covered: 200 kt / 7,000 ft / 1.3 g.
- Localisation: "pinpoint" accuracy.
- An excellent flight, strong emotions, beautiful photos, beautiful videos, a memorable experience!

nEUROn in flight at Istres airbase. © Dassault Aviation - M. Brunet

The technical team of the six European countries at nEUROn's presentation in Istres on 1st December 2012. © Dassault Aviation – Ph. Stroppa

Future tests

The aircraft radar signature will now be measured at the DGA Solange measurements base in Brittany, France, in order to ensure that the ambitious stealth goals have been met, or even exceeded. From mid-2013 on, tests will be devoted to opening up the flight envelope and finalising development of the nEUROn in Istres.
In 2014, the nEUROn capabilities will be demonstrated in flight. First in Istres then, after road transfer, in Vidsel, in the North of Sweden, then Perdasdefogu in Sardinia. Bombs will be fired from the bay, attacks simulated in liaison with a command centre, radar and infrared signatures identified in-flight and nEUROn's stealth during operational flight verified through confrontation with different operational radars (Rafale, ground-to-air battery, etc.).

See without being seen

The nEUROn European UCAV demonstrator. © Dassault Aviation - Ph. Stroppa

nEUROn's stealth - it is "no more detectable than a sparrow" - is achieved thanks to its characteristic shape and the use of radar absorbers. Nonetheless, the slightest flaw must be tracked down (cracks, bad joints, drainage holes, slight overthickness, etc.), the devil is in the detail! Partial Proofs of Concept tests took place at the beginning of the programme in order to verify that the specified level of stealth was attainable. These tests enabled such "devilish details" to be included in nEUROn's design.
To allow nEUROn to transmit and receive without giving away its presence, four specific types of flush antennas for communication and positioning were developed and successfully tested.

An optronic sensor is built into the airframe. Using innovative recognition algorithms, it enables autonomous detection, positioning and recognition of various ground targets. By assimilating the stealth requirements of the aircraft and constraints linked to the sensor's field of vision, technico- operational scenarios will be optimised. In 2014, they will be tested in flight against an operational radar. It will be the culmination of years of efforts to realise the dream of "seeing without being seen".

The AVE-N: Experimental Validation Aircraft dedicated to nEUROn

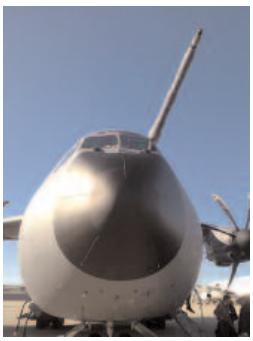
The nEUROn programme incorporates many technical innovations related to stealth. One of the visible effects on the shape of the aircraft is the elimination of vertical stabilisers. The aerodynamic effect of this on the aircraft is to make yaw naturally unstable. This means that at the slightest disturbance, the aircraft will begin to side-slip uncontrollably. One of the aims of the flight controls must therefore be to ensure artificial stabilisation in yaw.

Artificial stabilisation methods have been used for many years on the longitudinal axis, on the Rafale for example, to improve performance. The process of opening the flight envelope of an unstable airplane begins by testing control laws in a stable configuration so as not to take all risks at once.

In the case of an aircraft that is unstable longitudinally, it is enough to weigh down the front of the plane slightly to move the centre of gravity forward thereby procuring natural stability. There is no such solution for an aircraft with unstable yaw, unless you put the vertical stabiliser back on! So it was decided to fly a scaled down (about 1/4), dynamically similar version, with the nEUROn control laws. Four flights were successfully carried out in early 2012 in Istres, enabling validation of the artificial nEUROn yaw stabilisation.

This article was published in French and British languages in the January 2013 issue of the Air and Space Academy Newsletter.

A400M COMPLETES FLIGHT TEST MILESTONE



On 10 December 2012, the A400M military transport aircraft has completed the 300 hour function and reliability (F&R) flight-test phase.

With F&R testing now complete, it is expected that the A400M will receive its full civil Type Certificate (TC) and Military Initial Operating Capability (IOC) before the end of the first quarter of 2013.

Despite the delay to the flight test programme, delivery of the first production aircraft to France will take place in the second quarter of 2013.

Beside France (three aircraft), Turkey is also scheduled to receive his first aircraft in 2013.

First deliveries for the UK, Germany and Malaysia are planned to take place in 2014, while the first aircraft for Spain and Belgium/Luxemburg will occur in 2018.

In 2015, the full-scale production rhythm should mount to 2.5 aircraft per month.

From information provided by OCCAR
www.occar.int/248

FIRST EUROFIGHTER TYPHOON METEOR FIRING TRIAL: A SUCCESS

On 6 December 2012, the Meteor beyond visual range air-to-air missile manufactured by MBDA has been successfully launched from a Eurofighter Typhoon as part of the Future Enhancements Flight Test Programme.

The missile was ejected launched from a rear fuselage missile station, which on Typhoon is semi-conformal for aircraft drag and radar signature reduction. The missile motor was fired, providing data that will allow the missile launch envelope to be expanded.

This builds on an earlier series of flight trials, carried out by partner company BAE Systems on behalf of the Eurofighter programme, where unpowered missiles were used to demonstrate safe separation on the missile.

This current package of work begins the full integration of the Meteor missile with all Eurofighter Typhoon systems.

The flight trials were conducted with integrated support from QinetiQ and MBDA.

BAE Systems Typhoon Test Pilot Steve Long said: "By completing these initial Meteor's flight trials, typhoon has taken a significant step forward in operational capability."

Meteor will provide the Eurofighter Typhoon aircraft with the next generation of cutting edge weapons capability.

From Press Eurofighter Typhoon Press Release
www.eurofighter.com/media/

NEW SPACE SYSTEM ARCHITECTURES CAN PROMOTE INTERNATIONAL COOPERATION

By James D. Rendleman, Member, AIAA International Activities Committee, Colorado Springs, Colorado, USA *

Economic issues confronting the U.S., European and some Asian economies make it likely that many national space systems' R&D, design, acquisition, operation, and sustainment budgets will decrease, perhaps by 5% to 20% or more. The space community didn't cause these economic problems, but it will be affected by any spending reductions in government sponsored systems, and the potential for moderate growth in commercial missions will not be enough to offset lower government spending.

This challenging environment may, however, offer some unexpected opportunities to improve the acquisition process, thereby achieving mission goals more efficiently and effectively and helping to promote increased international cooperation in space.

Currently, the space acquisition community faces a complex "vicious circle," with each part compounding problems for the next. For example, it makes sense to aggregate initial mission requirements – it builds stronger cross-mission advocacy, and minimizes the number of new starts. If funding is hard to secure for a new space acquisition, it makes sense to try to get everything out of the few that can be funded. However, this generates complex technical requirements – sometimes working at cross purposes – for the resulting program. Moreover, complicated payloads are expensive to build and operate, making it harder to fund robust ground systems and spare satellites. With no spares, there is pressure to significantly increase overall system reliability, further increasing cost. The result is very complex and expensive payloads, with long development cycles and no spares, that cannot afford a launch failure, although the technical and environmental challenges ensure that failure will sometimes occur.

There is no *unobtainium* – the inexpensive, weightless, frictionless, temperature and radiation resistant material that can solve all technical issues. And there is no *handwavium* – the perfect process that can slash manufacturing and operating costs. With no magical solutions to budgetary challenges, global space leaders are moving toward acquiring disaggregated, mixed constellations, and leveraging hosted payload options. Not only does this make sense, but it offers a great opportunity – of contributing to major goals with affordable and resilient space systems.

What do affordability and resilience mean in the current space acquisition environment? And how do we reconcile these imperatives?

"Affordability" demands that we reduce the total cost of space systems to what a nation, international organization, or commercial operator can and will pay. For decades, space leaders have tried to save money – sometimes by trimming acquisition costs by overhead reductions, sometimes by defunding and de-scoping mission assurance and systems engineering (MA and SE). But if these steps saved a little around the edges of very expensive programs, they also significantly increased programmatic risk by skimping on essential engineering.

In essentially buying the same type of systems, we continued to do business as usual – buying more and more expensive and complex systems, sometimes with compromised engineering that created new problems, adding cost and delay. With reduced MA and SE, some efforts failed altogether, while others merely drained national treasuries and corporate reserves. Complexity and high cost also burden launch, operation, and sustainment systems as they try to ensure 100 percent reliability, causing upward price spirals on all but the least capable microsatellites.
In sum, while space systems provide great economic, scientific, and national security capabilities, the international community can no longer afford first-tier space capabilities at current prices. We need to rethink how to achieve affordability.

In a contested, congested, and competitive space domain, "resilience" demands that nations retain access to vital space capabilities, even if those capabilities are targeted by adversaries or compromised by the space environment, on-orbit debris, or unintended electromagnetic interference. Realistically, space operators need more systems on orbit, and more systems readily deployable as spares, even in a reduced budget "affordability" environment.

To achieve both affordability and resilience, program managers might deploy and operate mixed constellations: augmenting the current complex satellites with lower cost, disaggregated satellites with shorter mission lives, where cost and schedule are primary programmatic drivers. This could reduce total mission costs, but it would require near-term investment to achieve the hoped-for savings. Although those who benefit from current systems will resist any changes, new systems must be responsive to economic realities, and many people are coming to realize that spending a little more now will save significantly in the future, increasing resiliency by having more satellites on orbit and decreasing the impact of losing a single (or several) systems.

While aggregating missions has been done in good faith, to help programmatic advocacy and lower costs, the actual cost result has been the opposite. A disaggregation approach can reduce the technical complexity of entire space segments and shorten program development cycles, and the greater volume of acquired systems could enable industry to improve production rates and mission survivability. While the space community will always need some large complex space systems, supplementing them with disaggregated systems can address both affordability and resilience.

Commercial bus and hosted payload opportunities can augment disaggregation and mixed constellation architectures

Even with disaggregation, governments still need to leverage the commercial space industry. Commercial satellite buses, and commercial or other rideshares, offer significant opportunities to disaggregate, reduce cost, and increase mission responsiveness.

Commercial space has shown itself to be highly reliable and to build products at a relatively moderate cost. Employing plug-and-play buses has helped achieve this result. While governments have talked about plug-and-play bus approaches for years, the volumes of systems purchased, unique requirements, and inability to turn inside a commercial decision loop has left this a largely untapped opportunity. Nonetheless, it can be a viable part of the future architecture design space, since it would not be difficult to design civil space exploration and military payloads to fly on commercial buses.

One program that has led the way on this concept is American Government Services' Commercially Hosted Infrared Payload (CHIRP). Designed to reduce risks in developing wide field-of-view starring infrared sensors, CHIRP was developed by SES Americom, Orbital Sciences Corporation, and Science Applications International Corporation (SAIC). The U.S. Air Force–funded payload is now hosted on board a commercial communications satellite, SES-2 (an SES World Skies system)[1]. Similarly, the Australian Defence Force placed a hosted payload on Intelsat 22 to provide UHF communications for Australian and American military forces in the Middle East and Afghanistan[2].

The opportunity commercially hosted payloads offer is tremendous. Nearly 200 launches to geosynchronous orbit are planned over the next decade, and many space operators would welcome hosted payloads. If only half of these satellites have buses with enough weight and power capacity to accommodate additional payloads: still 100 available platforms. Commercial providers will work with governments if the business plan matches the risks and rewards of other investment options.

Using standardized commercial buses as dedicated platforms for payloads is another significant option that would allow customers to focus on developing their payloads, and significantly reduce the risk of custom satellite bus builds.

Employing commercially-hosted architectures will demand more responsive government decision making, and shorter and more flexible development timelines. Institutionalizing such an approach, so that government and industry can provide agile solutions to problems, will produce the best value and capability for the government.

International cooperation opportunities

What does this mean for international space cooperation? Disaggregated satellite systems, mixed architectures, and hosted payload concepts offer significant business opportunities. Components of larger allied systems can be proposed by industry and their sponsoring governments. As with the CHIRP and Australian initiatives, hosted payloads can be integrated onto satellite systems, use international systems, and still maintain security.

Of course, international cooperation on space missions has existed since the beginning of the space age, and support for international collaboration continues to grow. Cooperation leverages resources, reduces risk, improves efficiency, expands international engagement, and enhances diplomatic prestige. The global space community performs a wide variety of missions in space, some more strategically critical and subject to more stringent requirements than others. This provides a wide range of opportunities.

We are at a seminal moment in the evolution of space. Budgets are under pressure, while users need more capabilities. The space community needs to forge new architectures that allow it to address both affordability and resilience. Disaggregated and mixed-constellation acquisition models, including use of commercial buses and hosted payload approaches, present significant opportunities for government and commercial space operators, and for meaningful international cooperation.

** Given the importance of international cooperation, the American Institute of Aeronautics and Astronautics (AIAA) works to foster professionalism and improve the capacities of the global space community. It does this through sponsored and cosponsored conferences, workshops, symposiums, training and education programs, and networking events in the United States and around the globe. Many of AIAA's own International Activities Committee members are globally recognized aviation and space experts and leaders.*

1. Thomas D. Taverney, "Resilient, disaggregated, and mixed constellations," The Space Review, August 29, 2011, http://www.thespacereview.com/article/1918/1

2. Jeff Foust, "An opening door for hosted payloads," The Space Review, October 29, 2012, http://www.thespacereview.com/article/2179/1.

ESA ACTIVITIES IN 2013

• SOLAR MAXIMUM

In 2013, the Sun will reach a maximum in its 11-year cycle of activity. The Sun and the influence of solar activity on three planets of the Solar System will be observed at the same time throughout the year by ESA's fleet of satellites currently operating: SOHO, Cluster, Swarm, Mars Express, Venus Express.

• PROBA-5

PROBA-5 is a miniaturised satellite for a full-scale mission tracking global vegetation. It will be launched on a Vega rocket from the Guyana Space Centre. Along with its main mission, the satellite will also host five promising technologies from across Europe to be demonstrated in space. In addition the flight will demonstrate Vega's capability to carry several payloads for delivery in two different orbits. Expected launch date: April 2013.

• ATV ALBERT ENSTEIN

The fourth ATV (Automated Transfer Vehicle), ATV-4 named Albert Einstein will be launched on Ariane 5. Expected launch date: April 2013.

• EXPEDITION 36 TO ISS

ESA astronaut Luca Parmitano, the first astronaut out of the new generation selected in 2009 will fly on the International Space Station (ISS) from May to November 2013, serving as a flight engineer for Expeditions 36 and 37. The launch of Expedition 36 from Baikonur cosmodrome is expected to take place on 29 May 2013.
After completing his 6-month mission on board of the ISS, Luca Parmitano will land in November on the steppes of Kazakhstan.

• SWARM

The multi-satellite SWARM (a constellation of 3 satellites to measure precisely the magnetic signals from Earth's core, mantle, crust and oceans, as well as the ionosphere and magnetosphere) mission will make the best survey yet of earth's magnetic field and its evolution, and will improve our knowledge of earth's interior and climate. SWARM is a constellation of three satellites in three different polar orbits between 400 km and 550 km altitude. High-precision and high-resolution measurements of strength and direction of the magnetic field will be improved by each satellite. The launch of SWARM from Plesetsk cosmodrome (Russia) is expected to take place in June 2013.

• ALPHASAT I-XL

The Alphasat mission is a public-Private Partnership (PPP) between ESA and Inmarsat Global ltd. ESA is providing the first flight model of the new Alphabus platform. The Alphabus product line allows European industry to extend its telecommunication satellite range beyond the capabilities of the presently existing platforms, improving Europe's position on the high-power payload telecommunication satellite market. Alphasat will also carry four ESA technology demonstration payloads. The launch from the Guyana Space Centre is expected to take place in summer 2013.

• NIRSpec for the JAMES WEBB TELESCOPE

The James Webb Space Telescope – successor of the Hubble Space Telescope – will feature major ESA contributions, including the Near-Infrared Spectrograph (NIRSpec). This instrument will perform the continuous observation of 100 faint galaxies to determine their chemical composition, and to determine the rate at which stars are forming. For the first time the astronomers will also be able to detect water on planets around other stars. EADS Astrium (Ottobrunn, Germany) is expected to deliver NIRSpec in July 2013.

• GALILEO FOC SATELLITES

Following the In-orbit Validation (IOV) phase, four satellites will qualify the Galileo space, ground and user segment though intensive testing. In 2013, the four first FOC (Full Operational Capability) satellites of the complete constellation - 27 satellites plus 3 spares in orbit – will be launched in the second half of 2013 from Guyana Space Centre. Two FOC launches are planned, each on a Soyuz launcher with two satellites each.

• SENTINEL-1A

Launching the Sentinel-1A mission will be the first step in the new family of satellites for the GMES (Global Monitoring for Environment and Security) programme conducted in cooperation with the European Commission. Sentinel-1A will be launched on a Soyuz rocket from Guyana Space Centre in the second half of 2013.

• GAIA

GAIA is a global space astronomy mission that will make the largest, most precise 3D map of the Milky Way Galaxy by surveying an unprecedented number of stars – more than one billion. It follows the footsteps of Hipparcos, ESA's first mission to measure the position, distance and properties of stars. The scientific instrument, built by Astrium (Toulouse), features the largest digital camera ever to be flown in space. The launch on Soyuz from Guyana Space Centre is expected to take place in the second half of 2013.

• END OF GOCE

Launched in 2009, the successful GOCE (Gravity field and steady-state Ocean Circulation Explorer) satellite will end its mission by de-orbiting in November 2013.

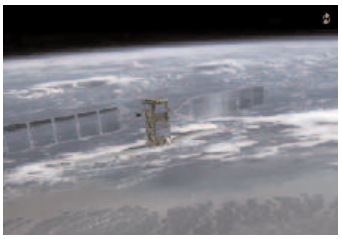
• PHOBOS

Mars Express will perform the closest ever fly-by of Martian "moon" Phobos, passing only 58 km from the centre of Phobos (i.e. around 47 km of its surface), which will allow

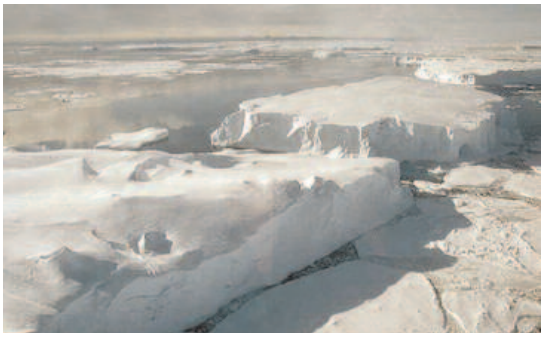
to provide an unprecedented determination of its mass distribution.
This fly-by is expected to take place on 29 December 2013, with results available in early 2014.

SOME WORDS ABOUT SENTINEL-1

The Sentinel-1 mission is a polar-orbiting satellite system aimed at continuing the Synthetic Aperture radar (SAR) operational applications. It is a C-band imaging radar mission to provide an all-weather day-and-night supply for GMES user services. It will ensure the continuity of C-band SAR data, building on ESA's and Canada's heritage SAR systems on ERS-1, ERS-2, Envisat and Radarsat.



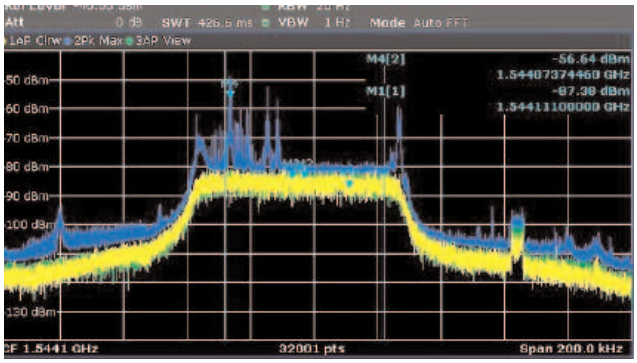
The SAR sensor will operate in two main modes: (i) Interferometric Wide Swath (swath width of 250 km, ground resolution 5x20 m); (ii) Wave. Two other mutually exclusive modes are provided for continuity with other SAR missions and also to accommodate emerging user requirements.
Revisit time, geographical coverage and rapid data dissemination are keys to providing data for GMES. The Sentinel-1 pair is foreseen to provide coverage over Europe, Canada and main shipping routes in 1-3 days, regardless of weather conditions. Radar data will be delivered within an hour of acquisition.
An example of the numerous services: sea-ice monitoring.



This service relates to the monitoring of Arctic sea-ice extent, routine sea-ice mapping, surveillance of the marine environment, including oil-spill monitoring and ship detection for maritime security, monitoring land-surface for motion risks, mapping to support humanitarian aid and crisis situation.
Sentinel-1 is being realized by a an industrial consortium led by Thales Alenia Space Italy as Prime Contractor, with Astrium Germany for the C-SAR payload incorporating the central radar electronics subsystem developed by Astrium UK.

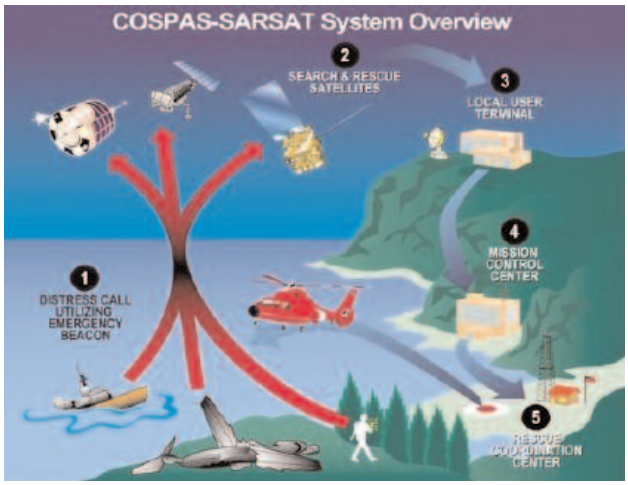
SOME WORDS ON GALILEO'S SEARCH AND RESCUE SYSTEM

The second pair of IOV Galileo satellites launched together on 12 October 2012 are the first of the constellation to host SAR search and rescue repeaters, being able to pick up UHF signals from emergency beacons aboard shops and aircraft or carried by individuals, and then to pass them on to local authorities for rescue. Once the satellites reached their 23 222 km- altitude orbits, the test campaign began. The turn of the SAR repeater aboard the third Galileo satellite came on 17 January 2013. This first switch-on of a Galileo Search and Rescue packages showed it to be working well. The first day was a matter of turning the repeater on and checking its temperature and power profiles were as predicted. The following day involved sending a signal to the UHF antenna at ESA's Redu Centre (Belgium), then picking up the reply from the L-band antenna. Redu's antenna is 20 m in diameter, so the shape of the relayed signal was captured in great detail, out of proportion to surrounding noise (see figure).



Galileo search and rescue repeater signal

More detailed testing is to be performed in order to completely prove this new type of SAR payload in orbit.
This is the beginning of a major expansion of the space-based COSPAS (Russian acronym for Space System for the Search of Vessels in Distress)-SARSAT (Search And Rescue Satellite-Aided Tracking) network, which brings help to air and sea vessels in distress. Ground stations (local user terminals) pinpoint the source of distress calls using signals relayed by participating satellites, then alert local authorities.



The Cospas-Sarsat system has been taking the search and rescue for more than three decades, saving 31 000 lives along the way.

J.-P. S.
From information provided by ESA.
www.esa.int/For_Media/Press_Releases/

RUSSIAN ASTEROID STRIKE

THE FACTS

- Date and time: 15 February 2013 at 03:20 UT
- Location: Russia. Chelyabinsk Oblast – Orenburg Oblast – Bashkortostan – Sverdlovsk Oblast – Tyumen Oblast – Kazakhstan – Aktobe Province – Kostanay Province
- Coordinates: 55.15° N 61.41° E (Figure 1).

Figure 1: The trail left by asteroid after it had passed over Chelyabinsk, Russia, 15 February 2013.

- Cause: Asteroid air burst
- Speed of entry in atmosphere of the object: ~18 km/s (Mach 64)
- Dimensions and mass of the object: ~17 m across - ~7,000 to 10,000 tonnes when it hit atmosphere.
- Time from atmosphere entry to meteor's airborne disintegration: ~32.5 seconds.
- Light and heat generated: the object created a dazzling light, bright enough to cast moving shadows during the morning daylight in Chelyabinsk (Figure 2). Eyewitnesses also felt an intense heat from the fireball.
- Force of the explosion: nearly 500 kilotons of TNT (~30 times Hiroshima) around 15 to 20 km around the ground.

Figure 2: the object created a dazzling light

- Injuries: about 1,500 people, two in serious condition, mainly by glass shattered by a shock wave. Normally some damage begins to occur at ~5 times the pressure at sea level. Widespread window damage is expected around 10-20 times this value.
- Damage: over 4,300 buildings in 6 cities were damaged by the explosion and impacts.

COMMENTS

- This Russian asteroid strike is thought to be the biggest reported object to enter Earth(s atmosphere from space since the 1908 Tunguska event, and the only such phenomenon to have resulted in a large number of injuries.
- Due to its small size, there is no way that with the technical means available presently, the Chelyabinsk asteroid could have been detected.
- It is quite sure that it was not related to the predicted flyby of Asteroid 2012 DA_{14}, which passed Earth at 19:27 UT the same day 15 February at just 28,000 km. As a matter of fact, the location of entry into the atmosphere on the one hand and the large time between the two events on the other hand clearly demonstrate the absence of relation: it was just an extraordinary coincidence.
- With experts' current understanding of near-Earth objects, events of Chelyabinsk magnitude are expected once every several of tens to 100 years.
- The event of Chelyabinsk is a crucial input for developing the ESA's asteroid hunting effort.

THE SPACE SITUATIONAL AWARENESS PROGRAMME OF ESA

The SSA (Space Situational Awareness) programme of ESA comprises three lines of action: SST (Space Surveillance and Tracking of objects), SWE (Space WEather), and NEO (Near-Earth Objects).

The NEO segment of the SSA programme

– Role: provide warning services against potential asteroid impact hazards, including discovery, identification, orbit prediction and civil alerts capabilities.
– Service Centre: SSA-NEO Small Bodies Data Centre (SBDC) at ESA/ESRIN, Frascati, Italy.
– Sensors: ESA's Optical Ground Station in Tenerife (Spain) – mix of professional/amateur telescopes supported by tracking data base + other assets – in the future a fully integrated monitoring and warning system of potential Earth impactors with tracking of newly discovered objects and global alerting capability.
– International cooperation: Data on NEOs are collected from telescopes and radar systems worldwide. Each of these submit observations to the Minor Planet Center operated by the International Astronomical Union at Cambridge, MA (USA), which acts as a central clearing house for asteroid and comet observations. The measurements collected are retrieved by ESA/SSA/SBDC. Orbits and miss distances are computed and in case of high-risk impact predictions the data are cross-checked with the Jet Propulsion Laboratory (NASA/JPL) before issuing alerts.

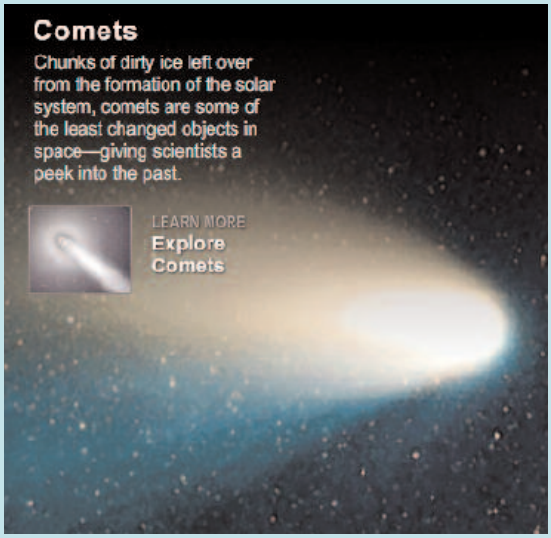
ASTEROIDS AND COMETS

Asteroids and comets are considered remnants from the giant cloud of gas and dust that condensed to create the Sun, planets, and moons some 4.6 billion years ago. Presently, most asteroids orbit the Sun in a tightly packed belt located between Mars and Jupiter.

Asteroids

Asteroids are essentially chunks of rock that measure in size from a few meters to several km in diameter. Small asteroids are called Meteoroids (in fact the Chelyabinsk object is a meteoroid). The largest asteroid, Ceres, is about 950 km wide. Like most asteroids, it lies in the Asteroid Belt between Mars and Jupiter. Scientists have found more than 90,000 asteroids in this belt.

Comets



Comets are chunks of dirty ice left over from the formation of the Solar system. They are some of the least changed objects in space, giving researchers a peek into the past. These balls of rock grow tails as they approach the sun in the course of their highly elliptical orbits. As comets heat up, gas and dust are expelled and trail behind them. The Sun illuminates this trail, causing it to glow. The glowing trails are visible in the night sky.

While there are perhaps trillions of comet ringing the outer fringes of the Solar System, bright comets appear in Earth's visible night sky about once per decade.

2012 DA_{14} ASTEROID

2012 DA_{14} is a near-Earth asteroid with an estimated diameter of 30 m and an estimated mass of 40,000 tonnes. It was discovered on 23 February 2012 by the Astronomical Observatory de La Sagra, Granada (Spain), operated remotely by astronomers in Mallorca, 7 days after passing 2,600,000 km from Earth.

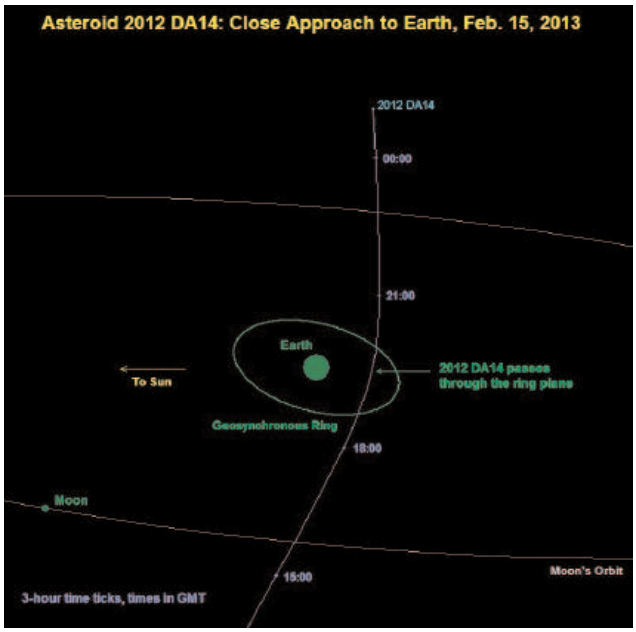


Diagramme of 2012 DA_{14} passing Earth on 15 February 2013

THE 2013 PASSAGE

On 15 February 2013 at 19:25 UT, the asteroid 2012 DA_{14} passed 34,050 km from the centre-point of the Earth, with an uncertainty region of about 15 km. It passed 27,743 km above Earth's surface, i.e. closer than satellites in geosynchronous orbit! It was not visible to the naked eye. The best observation location for the closest approach was Indonesia, Eastern Europe, Asia and Australia being also well situated for this observation. Goldstone Observatory observed 2012 DA14 with radar from 16 to 29 February.

Closest approach of asteroid drawn to scale

The 2013 Russian Asteroid event which occurred about 16 hours earlier than the 2012 DA_{14} passing is considered unrelated, with a significantly orbit.

0.2 < MA < 4.0
50 YEARS HIGH SPEED WIND TUNNEL TESTING IN THE NETHERLANDS

By Bram Elsenaar

In 1960 on the 16th of January the high speed wind tunnel HST of the National Aerospace Laboratory NLR in Amsterdam was inaugurated, followed a few years later by the supersonic wind tunnel SST. To mark this event DNW (German-Dutch Wind Tunnels, the organisation that is operating these facilities today) presented a paper in the Historical Section of an AIAA meeting in Orlando, Florida in 2010 (AIAA-2010-575). Bram Elsenaar, one of the authors and before his retirement responsible for wind tunnel testing in HST and SST, used this paper as a starting point for a book on the history of these facilities.
The book describes the history of high speed wind tunnel testing. The design of the tunnels, the development of the instrumentation and the tests that have been executed are discussed and illustrated with more than 200 photographs. A 'Short course on wind tunnel design and testing' has been added for the less experienced reader. About 65 objects discussed in the book (instruments and wind tunnel models) have been preserved and can be viewed in the Historical Museum of NLR in Amsterdam.

After WW II the Dutch Government wanted to restart the aircraft industry. NLR was tasked to expand the laboratory and as part of these plans a large high-speed and small supersonic tunnel were foreseen. In the original plans the maximum Mach number of the high-speed tunnel HST was limited to 0.95. Due to 'chocking' testing at transonic conditions could only be done with ventilated tunnel walls, a technique that was known in the US but kept secret. Theodore von Kármán, the founder of AGARD, suggested in 1952 to contact some Swiss engineers who new about this idea before it was made a secret. Ing W. Hausammann who worked at the 'Eidgenössische Flugzeugwerk Emmen' went in 1948 to the US and during this visit he met Dr A. Busemann (the inventor of the swept wing). Busemann told Hausammann about the concept of slotted walls (see fig. 1) and when returning to Switzerland he immediately built a tunnel to check it out. He started an engineering firm with the name Datwyler & Hausammann and this firm got the contract to build the transonic test section.

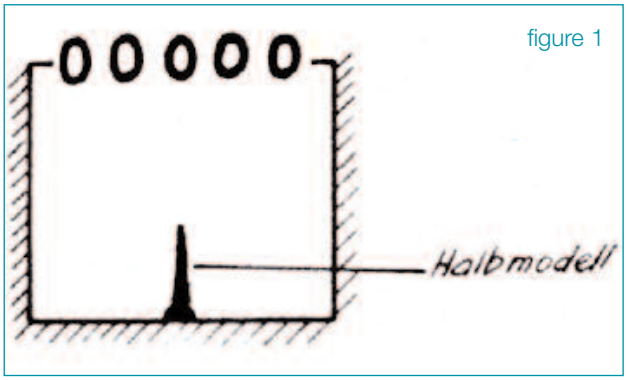


figure 1

The same company was involved in the design of the supersonic tunnel SST. NLR had experience in building subsonic wind tunnels but the design of a supersonic facility was far beyond imagination. Fortunately a representative of the Dutch military mission in occupied Germany got to know Dr. S.F. Erdmann who had been responsible for the supersonic wind tunnels at Peenemünde where the V2 was developed. Erdmann obtained a position at NLR where he started the design of a new blow-down supersonic tunnel. This design reflected a number of innovations, notably a very effective heat generator in the pressure vessel, a fast acting control valve and a flexible nozzle with a minimum of supporting jacks.

Compared to the original plans the HST section was decreased and the SST test section was increased such that the same models could be transferred between the two facilities. This strengthened the position of the tunnels at the European market and, equally important, it allowed the sharing of test equipment. Compared with existing subsonic facilities the aerodynamic loads were a factor of 10 higher. An external balance as used in the low speed facilities would have been very complicated. Internal strain-gage balances were about to be developed but there were serious questions with respect to the drag accuracy. Finally internal balances were selected and a special department was setup for its development. Fortunately at the end of the fifties American TASK Corporation offered a range of internal balances that were suitable for use both in the HST and SST.

Fig. 2 shows a picture of the control room of the HST in 1959. On the right side two precision manometers are shown to measure the static and total reference pressures. Between the two manometers and a big dial that displayed

figure 2

the Mach number, one can see a lighted panel, a multi-manometer with glass tubes for 162 pressures. This manometer was photographed and the pictures were read-out later. At the far left an observer in front of a Honeywell pen-recorder for the internal balances is just visible. About 12 observers were needed to execute the tests!

It was recognized from the beginning that these new facilities required automated data collection and reduction. In 1956 the first digital computer was ordered. A NLR developed encoder was added to the Honeywell pen-recorders. The multi-manometer was soon replaced by Scanivalves with transducers, coupled to AD-converters. In 1964 a competition was made involving the supersonic tunnels of ONERA, BAC (British Aircraft Corporation) and NLR for testing the ELDO launcher. The contract was granted to NLR because of its advanced data reduction.

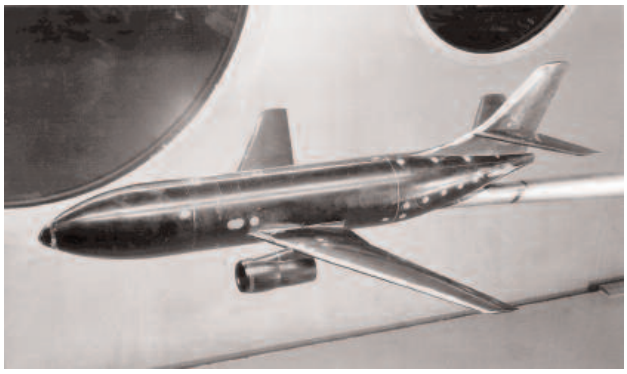


figure 3

AECMA (Association Européenne des Constructeurs de Matériel Aéronautique), the European organisation of aircraft manufacturers made an arrangement with NLR to use its facilities for wind tunnel tests. Mr J.N. Adenot, Secretary General, officially opened the HST in 1960. As a result of this arrangement European companies such as Sud-Aviation, FIAT, Bölkow, HFB and others were the first to use the HST and SST. Sud-Aviation made extensive tests on the Caravelle and Concorde. A very early version of the Airbus (fig. 3) was already tested in 1968. Right from the beginning the ELDO launchers were tested in the SST (Fig.4) followed by tests on all subsequent ARIANE configurations. And the tunnel was of course decisive in the development of Fokker aircraft.

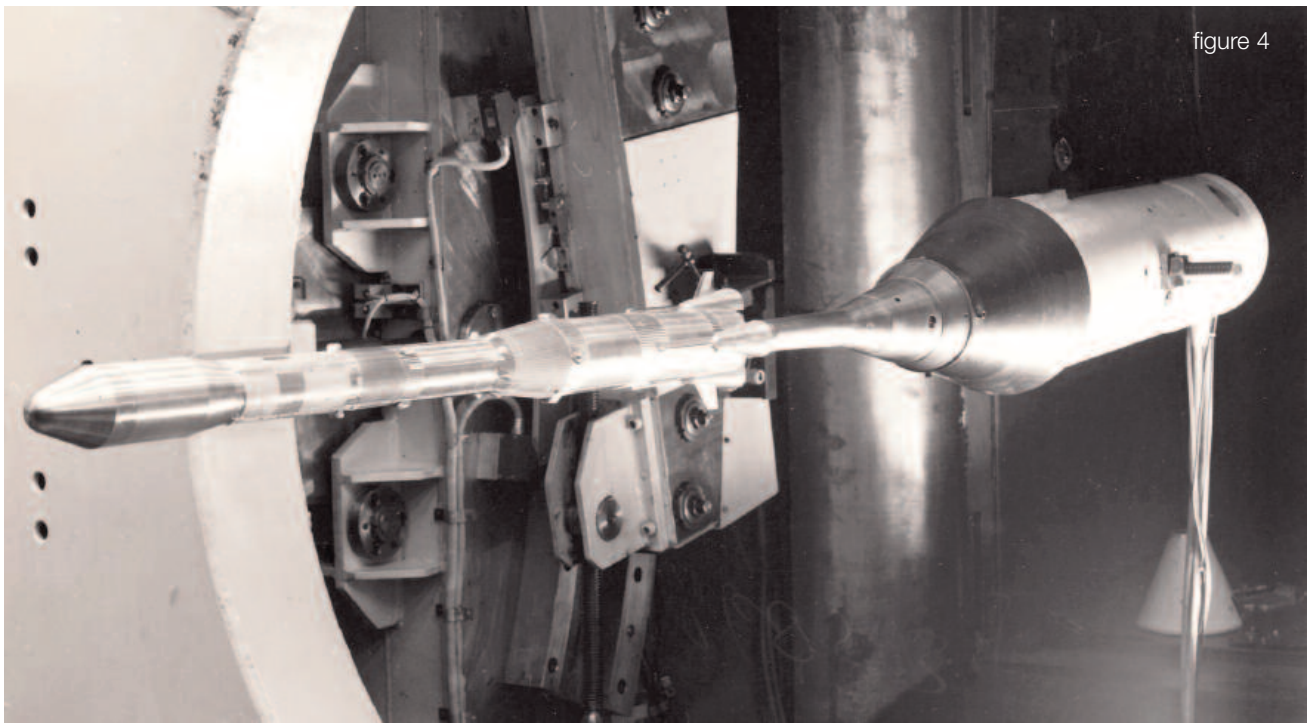


figure 4

Those interested in the history of wind tunnel testing can order the book at museum@nlr.nl
For a price of 30 € exclusive mailing costs.

THE CEAS/ASD AEROSPACE EVENTS CALENDAR

The CEAS and ASD have created an innovative tool so-called "CPMIS" (Conference Programming Management Information System), the aim of which is to facilitate the search of the different aerospace events in the world that are programmed at short and mid-term time horizon, and so allowing to optimise the scheduling of future events by avoiding possible overlapping and redundancies, but on the contrary to encourage co-operations and synergies between the actors concerned. Its role is therefore double: information on the one hand, conference programming enabler on the other.

THE ADDRESS IS: http://www.aerospace-events.eu

A search engine selects the events according to specific topics and key words. A graphic display (day, week and months view) eases the access and the view.

- 4 TYPES: Conference, Workshop, Lecture, Air Show
- 6 MAIN CATEGORIES: Aeronautical sciences - Aerospace (for events including all aspects of aviation and space) – Civil Aviation – Air power – Space – Students and Young Professionals.
- 64 SUB – CATEGORIES: aeroacoustics – aeroelasticity – aerodynamics, etc.

AUTOMATIC INSERTION OF NEW EVENTS BY THE ORGANISERS THEMSELVES:

- Go to http://www.aerospace-events.eu
- Click on the "introduction" text
- Redirected on the New Event Form, you have to click on this form and to enter your event related information, validate, click on Save and send.

CONTACTS:

postmaster@aerospace-events.eu is the general address for any question and requests;

– Marc de Champs, responsible for the CPMIS computerized tool management at ASD (AeroSpace and Defence industry associations of Europe): marc.dechamps@asd.europe.org

– Jean-Pierre Sanfourche, CEAS, responsible for the Events Calendar permanent updating and validation: jpsanfourche@dbmail.com

Luchtvaart- en Ruimtevaarttechniek > Organisatie > Afdelingen en Leerstoelen > Department of Control and Operations > Section Control and Simulation > CEAS EuroGNC 2013

CEAS EuroGNC April 10-12, 2013

NOTE: The online registration is now open. Check the registration page for details.

The CEAS EuroGNC Conference aims to promote scientific and technical excellence in the fields of Guidance, Navigation and Control (GNC) in aerospace. The European Aerospace GNC Conference 2013 will serve as a platform for communication and information exchange between specialists in these fields.

Scientists and engineers from industry, research institutes and universities involved in the development of novel GNC methods, applications or technologies are invited to attend the second EuroGNC Conference. Presentations should primarily be focused on technical and scientific aspects of GNC architectures, algorithms and methods as well as on actual experience gained from real-life applications in those fields.

As the European countries host a large community of scientists and engineers working in the many fields of aerospace GNC, the motive behind this international conference is to stimulate synergy among these fields.

To ensure scientific depth and a technological orientation, submission of papers of managerial nature such as project descriptions, strategies or plans is not encouraged.

The CEAS EuroGNC 2013 Conference is co-sponsored by the American Institute for Aeronautics and Astronautics (AIAA) and by the Institute for Electrical and Electronics Engineers (IEEE).

TU Delft Delft University of Technology

AIAA The World's Forum for Aerospace Leadership

AIAA American Institute of Aeronautics and Astronautics

GNC Guidance, Navigation, and Control

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CEAS 2013

Invitation & Call for Papers

Linköping University

Conference Language

The official conference language will be English.

Submission of Abstracts

Authors are invited to submit extended 3 page abstracts for full papers, or one page abstract for oral only presentations, before **February 15, 2013.**

Notification by **15th April 2013**

Full paper by **1st August 2013**

All documents shall be in PDF-format.

Further Information

Further information about the conference;

http://www.ceas2013.org

Pages will be updated regularly.

Contacts ceas2013@iei.liu.se