

## Editorial

### WELCOME TO THE RUSSIAN AEROSPACE COMMUNITY

On 24 April 2009 in Madrid, at the 9<sup>th</sup> CEAS Trustees Board Meeting, after a presentation given by Dr Sergey L. Chernyshev, TsAGI, as representing the Russian aerospace community, was unanimously elected as new CEAS Member Society, the eleventh one. Considering the outstanding position of the Russian Federation in aerospace, this event obviously constitutes an important milestone in the progress of our Council.

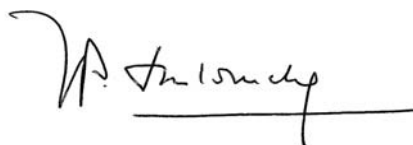
TsAGI is a transliteration of the Russian abbreviation for “Tsentralniy Aero-Gidrodinamicheskiy Institut”, the Central Aerohydrodynamic Institute. It was founded by the famous scientist and pioneer of Russian aviation, Nikolai Yegorovich Zhukovsky, on December 1st, 1918 in Moscow. In 1935 it was relocated to the city of Zhukovsky, Moscow Region.

TsAGI carries out fundamental and applied investigation in several directions: aerodynamics, propulsion, acoustics, strength, hydrodynamics, flight dynamics and measurements. As explained by Dr Chernyshev in his article published in the present bulletin (p. 7), this Institute has for some time been engaged in coordinated activities with European countries, but things are now going further.

In 2004, based on its long-standing experience in aeronautical research co-operation, the Russian Ministry for Education and Science appointed TsAGI as the National Point of Contact for Russia-EU collaboration in aeronautics research. As a matter of fact, TsAGI is involved in many projects of Framework Programmes of the European Union. And this contribution to these programmes is going to increase in the future. On 15-16 October, the 4<sup>th</sup> Workshop “EU-Russia Co-operation in Aeronautics Research” will be held in Moscow. This Workshop, organised by the European Commission and Ministry for Industry and Trade of the Russian Federation, precisely will aim at enhancing the synergies with European community in aviation science and technology.

Regarding space activities, the co-operation between Europe and Russia is long established since the end of the seventies, steadily evolving into a close partnership in almost all areas of ESA activities: human spaceflights, launchers, science... Presently the ISS programme gives particularly high momentum to the co-operation in human spaceflight: transportation of ESA astronauts to the ISS onboard a Soyuz spacecraft, ATV (Automated Transfer Vehicle) missions, etc. As regards launchers, the Guiana Space Centre is becoming a launch base for the Soyuz launch vehicles: the first launch is expected at the end of 2009.

So, the entry of the Russian aerospace community into our Council is very timely, all the more so as it will participate in the CEAS 2009 Manchester Conference of 26 – 29 October as the latest addition to the list of our distinguished Member Societies. The CEAS management board is determined to provide it with the best possible added values.



Jean-Pierre Sanfourche



Jean-Pierre Sanfourche  
Editor-in-Chief,  
CEAS Quarterly Bulletin

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## SPEECH DELIVERED BY PRESIDENT ALLAN COOK AT THE ASD PRESS CONFERENCE, BRUSSELS, JULY 2<sup>ND</sup> 2009



Allan Cook  
is President of the  
ASD and CEO  
of Cobham.

“ Good morning Ladies and Gentlemen and a very warm welcome to the annual ASD press conference, during which I will touch upon important developments that are currently affecting the European aerospace and defence industries which will include our collective view of the current global economic and political situation. I will also address key policy issues and I will present data compiled by ASD on the performance of the European aeronautics, space and defence sectors in 2008, in terms of orders, employment, and turnover.

### KEY DEVELOPMENTS AND POLICY ISSUES

Of course our industries in Europe are certainly not immune to the extraordinary economic and political developments that are currently unfolding around the world – the full consequences of which are not yet clear and may not be for some time to come. Our commercial customers have less to spend on our products and services and our governments are under increasing pressure to spend more on social programmes and even less on defence – despite the fact that global terror risks have still not been retired.

For Europe’s civil sector the negative effects of the deterioration in the economy are already evident. The global economic slowdown has resulted in a sharp drop in air traffic figures – by the end of this year freight traffic is expected to decrease by 17%, and passenger traffic by 8%. This steep decline in air transport demand is severely denting airline revenue, which are also affected by the recent rise in oil prices (oil has recently climbed back to around \$70 a barrel, up \$30 since the start of the year).



According to the latest IATA estimates, the fall in airline revenue could amount to \$80 billion in 2009, which would represent an unprecedented 15% drop compared to 2008. The combined losses of airlines could reach \$9 billion in 2009. In parallel the severe tightening of credit conditions has made it increasingly difficult for airlines to finance the purchase of new aircraft. According to most analysts, out of a total of \$68bn required to fund this year’s delivery of 950 to 1000 Airbus and Boeing aircraft there will be a shortfall of between \$10 and \$20bn due to the sharp contraction in bank finance.

The environment in which our defence sector operates has also become increasingly complex and challenging. Recent events in North Korea and Iran clearly show that global disorder doesn’t belong to the past and that threats to our nations’ security are still present. This discrepancy between worrying geopolitical developments on the one hand and European governments’ reluctance to invest in defence on the other hand, has become a cause of major concern for us. What is now at stake is our industry’s ability to provide Europe with an effective defence capability, as well as with the means to play an important, stabilizing role on the global stage.

In the USA, the current administration already believes that their NATO partners inability – or in some cases their lack of desire – to maintain their investment is a serious threat to the stability of the alliance. There is in fact a very strong case for additional spending on defence. After all, spending less on defence does not make any of the threats we face go away. Many of these threats will require the use of capable well equipped technologically enabled military forces if we are to overcome them. Europe needs military forces that can be more easily deployed than they are at present. Most of Europe’s military capabilities are far too fixed and static. To make this transition to greater flexibility and a genuine multi role capability will require investment in new capabilities and equipment.

Against such a bleak and uncertain scenario, one might expect our industry to be in a state of severe depression. This is certainly not the environment that I encountered at the Paris Air Show, a couple of weeks ago. Undoubtedly there was lower attendance but the quality of the attendance and the technology on display gave the show an impressive atmosphere. A number of order announcements were made, with Airbus for instance securing firm orders or letters of intent for more than 100 aircraft – a figure many would have seen as totally unrealistic before the show started, but of course well below the levels of Farnborough last year and Le Bourget in 2007.

We are not out of the woods yet, and the situation is particularly worrying in certain segments. Business aviation orders remain severely depressed, but what is certain is that the mood in Le Bourget was far from gloomy, and this is a great reflection of the confidence with which Europe's aerospace industry looks at its future. Air transport remains a fast growing – but cyclical - sector, which has been doubling in size every fifteen years. The cancellation rate at Airbus stands at only 3% compared with 6% in 2001 and the manufacturing rate for single aisle aircraft is still 50% higher today than in 2002. Our projections suggest that this trend will continue.

## SEEKING TO IMPROVE THE NATURE AND EXTENT OF EUROPE'S AEROSPACE AND DEFENCE INDUSTRIES COOPERATION WITH THEIR GLOBAL PARTNERS

What I also find reassuring, in these times of economic hardship, is that Europe's aerospace and defence industries have steered clear of the twin temptations of unilateralism and protectionism, and have actually gone in the opposite direction by seeking to improve the nature and extent of their cooperation with their global partners – in particular those from the U.S.

On June 16<sup>th</sup>, at the Paris Air Show, ASD Secretary General François Gayet and I, together with Åke Svensson, CEO of Saab, and Pier Francesco Guarguaglini, CEO of Finmeccanica, met with some of our American colleagues, namely Robert Stevens, CEO of Lockheed Martin Corporation, Scott Donnelly, COO of Textron, and Clay Jones, CEO of Rockwell Collins. This high-level CEO dialogue, organised under the aegis of ASD and AIA, the American Aerospace Industries Association, gave us an opportunity to exchange views and learn from each other's experience in dealing with the current economic situation.

We had a fruitful discussion, and found common ground on several key issues. In a joint statement, we called for governments across the Atlantic to avoid the adoption of protectionist policies that would ultimately stifle our industry's competitiveness. We also emphasized that, to preserve a safe and efficient air transportation system, U.S. and EU lawmakers should ensure that current bilateral maintenance agreements continue to be recognized. In particular, we asked for legislation recently proposed in the U.S. House of Representatives to be amended, since the new inspection requirements it imposes contradict the U.S.-EU Bilateral Aviation Safety Agreement (BASA) and could impede its implementation. This is a technical issue, but its implications are very important for our industries across the Atlantic, and it is particu-

larly positive that we approached it in a cooperative way.

### • *Towards the International Forum on Business Ethics Conduct*

Our dialogue with our American colleagues does not stop there. In recent months, areas such as export control, business practice (the combined code of conduct), air traffic management and the environment have all been addressed collectively. I would like to say a few words in particular on EU-US cooperation in the area of ethics, which is crucial for the reputation and social responsibility of our industries. Two years ago the ASD Council, which includes the CEO's of Europe's top 15 aerospace and defence companies, approved the "Common Industry Standards" for European Aerospace and Defence on Ethics and Anti-Corruption. Since then ASD and AIA have worked together on a process which will lead to the creation of the International Forum on Business Ethics Conduct (IFBEC). The IFBEC Working Group, consisting of representatives of the European and US industries, has now drawn up an implementation road map, as well as a list of global Business Ethics Principles.



## CONTINUED PROGRESS ON THE ENVIRONMENTAL FRONT: THE CLEAN SKY PROGRAMME

Our industry is not losing sight of its responsibilities towards society at large. And what society expects from us today, more than ever, is continued progress on the environmental front. To travel by air is still one of the greatest freedoms of the 21<sup>st</sup> century. Our industry with its long history of technical innovation and determination has to be the solution, not the cause of the issue and we do need to do more to develop an industry that is sustainable environmentally and economically.

Through constant technological innovation we have made encouraging progress. For example, fuel consumption levels (and corresponding CO<sub>2</sub> emissions) from a jet aircraft have decreased by over 70% over the last 50 years. However, much more now needs to be done, since the growing popularity and affordability of civil aviation has resulted in an increase in overall CO<sub>2</sub> emissions which is outpacing previous technological improvements.

Our target, as established by ACARE (Advisory Council for Aeronautics Research in Europe), is to reduce CO<sub>2</sub> emissions and noise by 50% of 2000 levels for new aircraft entering into service by 2020. To achieve this ambitious target we are investing €800 million in the "Clean Sky" programme, a seven-year project which aims to fur-



ther reduce the impact of flying on the environment. Clean Sky focuses on 6 sectors: smart fixed-wing aircraft; green regional aircraft; green helicopters; sustainable and green engines; system for green operations; and eco-designs. Among the areas that are being investigated are new propulsion modes such as open-rotor engines that are expected to offer 15% improvements in fuel consumption over today's turbofan engines. 'Clean Sky' will develop and validate breakthrough technologies that will allow Europe to design and build the green aircraft of the future.

Clean Sky is one of the European Union's largest ever research programmes, with a total budget of €1.6 billion - the €800 million funding provided by Europe's aerospace industry being matched by a similar amount coming from the European Commission. Unfortunately, and as most of you know, Clean Sky has been struggling to get off the ground. The programme has been mired in administrative difficulties, with industry partners finding it hard to deal with severe constraints imposed by internal Commission regulations. Last April these difficulties had reached the point where industry feared that the programme would fail to produce the needed results on time. We then made it clear to the Commission that it had to take rapid action if Clean Sky were to be given a chance to deliver on its ambitious objectives.

Today I am glad to say that this message has been heard by the European Commission. We have now received reassurance that Commission services are exploring solutions to meet industry's requests, and we noted with satisfaction that an ad-hoc group had been set up within the Commission to facilitate and speed up decision-making on Clean Sky-related issues. These measures were confirmed during a meeting between industry and Commissioner Potočnik, held on June 18th at the Paris Air Show.

Other positive developments over the last few months have been the appointment of Eric Dautriaat as Executive Director of Clean Sky, in April, and the launch of Clean Sky's first call for proposals for R&D projects on June 16<sup>th</sup>.

We welcome this positive evolution, and in particular the European Commission's willingness to act swiftly in order to recover the situation and make Clean Sky a success. We as industry are ready to help the Commission in any way we can to build an effective partnership on this very important project, which will decide if Europe can build the new efficient aircraft that the market will need, and - beyond that - if our continent can become the world's leader in green aviation.

## THE EU DEFENCE PACKAGE

In the last months, the European defence sector has been affected by the adoption of the 'Defence package' of two Directives, covering defence procurement and intra-community transfer of defence goods to enhance competition in

Europe's defence markets. Our industry welcomed the adoption, in December last year, of the intra-EU transfers Directive. This text will contribute a great deal to the emergence of a genuine European defence equipment market, and to a further consolidation of the European defence industry. It will establish the basis for simplified national processes for the licensing of transfers of defence goods, services and information. Once transposed into national law, it should greatly facilitate cross-border movements of sensitive goods and technologies to governments and certified companies, therefore allowing the defence supply chain to operate more easily across national borders.

We have been less positive about the Defence and Security Procurement Directive, adopted in January this year, considering that it does not meet all its intended objectives. We are concerned that, while encouraging cross-border competition and trade, as well as transparency in defence and security markets, the text could be damaging to R&D investment and hence to the defence and technology base in Europe. Indeed, the Directive applies the logic of EU internal market rules which rigidly divide R&D and production phases, therefore reducing the incentives for defence capability investment by both the public and private sectors. Under these rules, one may wonder whether companies will invest in R&D if they cannot be confident of winning the resultant production.

Despite these reservations, we consider that, taken as a whole, the EU Defence Package is definitely a step in the right direction, which will lead to the emergence of a new environment, more conducive to the development and rationalisation of Europe's defence industry. It is now our task to work closely with public authorities to ensure that the benefits offered by this text are fully realised.

## SPACE: THE STRATEGIC IMPORTANCE OF THE GMES PROGRAMME

Concerning space we warmly welcome the draft Commission regulation, presented in May 2009, on the bridge financing of GMES operational services for the period 2011-2013. GMES, for Global Monitoring for the Environment and Security, is a programme aimed at building and implementing a European capacity for Earth observation. The Commission's text provides for the granting of €150 million out of the EU budget for the operational phase of the GMES programme. We call on the EU Council and the new European Parliament to adopt this draft regulation and to recognise the strategic importance of GMES for Europe.

## MESSAGE TO EU DECISION-MAKERS

Before moving on to the presentation of the industry data compiled by ASD for the year 2008, I would like to address a simple message to EU decision-makers, one month after the

election of a new European Parliament and before the appointment of a new Commission.

Our industries are strategic assets for Europe. They are world leaders in advanced engineering, and a vital part of Europe's prosperous economy. They are also one of the most R&D intensive sectors in Europe, as they dedicate more than 11% of their turnover to research and development. Fully 20% of their employees work in R&D - only in the pharmaceuticals sector is the proportion higher. Finally, they make a €30 bn positive contribution to the EU trade balance.

In a recent article, Simon Tilford, Chief Economist at the Centre for European Reform (a UK think-tank), called our sector "a rare high-tech success for Europe", emphasizing that "it is precisely the kind of activity that Europe needs more of". To quote Mr Tilford, "there is plenty that EU and national authorities should be doing to ensure the future success of the industry" - in particular "increase their support for the development and commercialisation of new technologies" and "work with the industry to ensure that new technologies are developed and deployed in Europe". "Other countries, not least the US, provide more support for technology development", he says.

Today we need EU institutions and European governments to increase investment in our industry, and in particular to raise their level of support for research and development activities. Investing in our growth-enhancing sectors will propel the whole European economy forward and will help us continue providing highly-skilled employment, technological innovation and environmental performance.

## FACTS AND FIGURES 2008

I would now like to give you an overview of the performance of the European aerospace and defence sectors in 2008, based on data compiled by ASD.

### ***In 2008, Europe's aeronautical sector has grown at a pace of 7%***

In 2008 Europe's aeronautical sector (including both civil and military activities) recorded turnover of €98.5 bn, up from almost €96 bn in 2007. Had it not been for the weakening of the UK pound against the euro in 2008, these figures would have been significantly higher, as we had to reduce the value in euros of the UK contribution to the European industry. Without this the sector would have grown at a pace of 7% in 2008.

These good results mainly stem from the strong growth recorded in the first half of last year. The last months of 2008 were marked by a significant slowdown, as the effects of the global economic downturn started having an impact on our industry - especially in the civil manufacturing sector. Employment in the sector contracted by 1.2% last year - it

was down to about 443,500 from close to 449,000 in 2007. This shows that our companies started adapting to the new economic environment last year, by launching restructuring processes to improve their efficiency, and by resorting to temporary contracts as tools for improving flexibility (these contracts are not included in our employment figures).

An illustration of the robust health of Europe's civil aeronautical sector last year can be found in Airbus's performance: in 2008 the Toulouse-based manufacturer delivered 483 aircraft, setting another company record. Airbus recorded 900 gross orders (the third highest ever for the company) and ended the year with a backlog at an all-time high of more than 3,700 aircraft. Our companies also beat delivery records last year in the regional aircraft segment, where ATR delivered 55 aircraft (up from 44 in 2007), as well as in the helicopter segment, where deliveries for both Eurocopter and Finmeccanica (through Agusta Westland) were up by 20%. However the deterioration of market conditions started having an impact on some of our activities in 2008, in particular in general and business aviation which was the sector most severely hit by the economic downturn. In that segment European manufacturers only recorded 419 deliveries last year, down from 528 the year before.

In military aeronautics, 2008 was marked by the maiden flight of the first Eurofighter Tranche 2 aircraft, in January. In the last quarter, the first aircraft of this type were delivered to the German, Italian, Spanish and UK air forces. In total 22 Eurofighters were delivered last year. In France Dassault delivered 14 Rafale jets to the French Air Force last year, while in Sweden Saab continued to work to win new export contracts for its Gripen aircraft. A contract was signed with Thailand in February for a comprehensive defence package that included Gripen.

### ***The A400M***

2008 was a year of contrast for the A400M, the most ambitious military procurement programme ever undertaken in Europe. The first complete version of the new military transport aircraft was rolled out from its final assembly line in June last year. However, as we all know, in September, Airbus Military announced an undefined delay of the first flight of the A400M. There are high level political discussions taking place between Airbus and their customer governments and we are confident that we will reach a satisfactory outcome, leading to the successful completion of a programme that will provide Europe's armed forces with the new standard in military airlift.

### ***2008 was a good year for the European space sector***

Overall 2008 was a good year for the European space sector. Consolidated turnover grew by almost 10%, from €5.36 bn to €5.88 bn, and employment climbed above 30,000, follo-

wing a 1.7% growth. The industry benefited from a new cycle in geostationary telecommunications satellites, as well as from the relative stability of spending in government space programmes, both civil and military.

On the commercial side, satellite markets exhibited robust growth, driven by the cyclical evolution of satellite lifetime and the needs for replacement of orbital capacity. Geostationary telecommunications satellites were the most dynamic segment of this market in 2008, and this trend should be confirmed in the coming years. In the medium-term future, another source of growth for the commercial satellite market will be provided by the roll-out of the Galileo system, expected in early 2010 after the selection of the winning bid currently being assessed by the European Commission. The commercial launcher business (Arianespace) naturally benefited from the dynamism of the geostationary telecoms market, since Ariane primarily serves the needs of that market.

It should be highlighted that the evolution of the euro/dollar exchange rate continued posing serious threats to Europe's competitiveness on the global commercial market, for both satellites and launcher services.

#### ***About land and naval defence sector***

For the land and naval defence sector, the figures I am about to present are based on estimates. Final data will be included in the ASD Facts and Figures 2008, to be published in October.

Still, the available data indicates that Europe's defence sector had a satisfactory year in 2008, with an estimated turnover increase of 6.5% from 2007. This growth was driven by a moderate increase in defence expenditure in some European countries, even though defence spending levels - in particular for equipment programmes - remain low in Europe. It was also bolstered by strong growth in military markets outside Europe, in particular Brazil, India, South Korea, Singapore, the United Arab Emirates and Saudi Arabia. Of course the U.S. remains, by far, the world's largest defence spender and has increasingly become a key market for many European firms, including my own company Cobham.

Concerning land systems, German firms Rheinmetall and Krauss-Maffei Wegmann achieved strong performances last year, while in the UK BAE Systems' munitions business secured a 15-year partnering agreement from the UK Ministry of Defence (MoD) covering the supply of approximately 80% of general munitions consumed by UK Armed Forces. Among the most dynamic segments of the land market last year were the through-life support business on the one hand, and the production of vehicle upgrades - in particular with the integration of digital systems - on the other hand.

In the area of defence naval systems, European companies had to cope with a severely depressed market for new vessels, as orders worldwide plummeted by 25 % compared to 2007. Good results were still achieved by the Italian-French FREMM Frigates programme, with the order by the Italian Navy of 4 more units to Fincantieri. The UK Future Aircraft Carrier programme also made further progress last year, with the signing in June of the manufacturing contract between the UK government and the BAE Systems-VT Group joint venture. Finally, European companies were still able to win important orders in a shrinking export market from countries such as Brazil, India and Morocco.

### **OVERALL FIGURES FOR THE EUROPEAN AEROSPACE AND DEFENCE INDUSTRIES**

Working on the basis of estimates for defence land and naval activities, overall figures for the European aerospace and defence industries are the following:

- a turnover increase of 2.5%;
- a 0.3% increase in employment;
- and a marginal (0.06%) decrease in the volume of R&D investment.

These figures show that our industries held their own in 2008, despite the deterioration of economic conditions which started to be acutely felt during the second half of the year. Overall our companies proved able to adapt to this new, more challenging environment, by launching restructuring processes, but also by accelerating their expansion outside Europe, in particular in the US and Asia - mainly through acquisitions and investments in production facilities.

Of course we are concerned that falling global growth rates, coupled with shortages of consumer finance, will have a more severe impact in 2009. We remain particularly vigilant over the situation of our SMEs, which provide the backbone of Europe's aerospace and defence industry. Preserving our supply chain in this difficult period is crucial to ensure that our industry will be fully operational when the economy (and global demand) start growing again.

ASD represents 2000 companies, in Europe with annual revenue of \$175bn employing 650,000 people. There is no doubt that our success today is underpinned by yesterday's investment in R&D, in new programmes and in education and skills provision.

I continue to regard myself very fortunate to work in an industry that is dynamic, exciting, demanding and full of interesting people. Thank you ladies and gentlemen."



## TsAGI: TODAY AND TOMORROW

By Sergei L. Chernyshev



Sergei L. Chernyshev is Director General of the Central Aerohydrodynamic Institute.

Currently TsAGI is the major Russian Aeronautical Research Center with the unique experimental basis that meets all the requirements of modern sciences. Within the world, there is no analogue to the legendary wind tunnel complex (c. figure p.8), to the facilities to perform the versatile strength tests, to the acoustic chambers complex, to the hydrodynamic tests facilities and the flight simulators. Theorists, experimentalists and designers work at the institute. Furthermore, it is to be mentioned that there is hardly another knowledge area where the experiment plays such an exclusively important role. It is because the overwhelming number of problems cannot be solved analytically on account of great number of influencing factors. The observations and the experiment enable only generating the adequate mathematical models and elaborating the engineering computation approaches based on them. It is in TsAGI where the great attention is paid to the experimental basis that has made it possible to perform all the tests and to obtain the resulting inventions.

Naturally, we devote a lot of time to issues of advanced development and of military aeronautical engineering. Nowadays, the fourth generation aircrafts are to be changed by the fifth generation aircrafts. Moreover, the airplanes of the sixth generation can be foreseen. Each of the promising aircraft generations differs from the previous ones through a set of novel features, specified by military customers and by the market as a whole. E.g., the qualitatively novel characteristics of next-generation maneuverable aircraft are as follows: high level of camouflage properties, supersonic cruise flight and extremely high maneuverability. In order to implement these properties, TsAGI carries out the integrated research investigating the non-conventional aerodynamic configurations, including the large scaled models experimental investigation.

Recently the attention is growing and focusing at flight safety supporting; virtually it is getting the first priority where the human factor constitutes 70-80%. The innovative flight personnel training means are under development in TsAGI.

**TsAGI IS SUCCESSFULLY CO-OPERATING WITH MAJOR AEROSPACE COMPANIES AND RESEARCH INSTITUTES IN THE WORLD**

Owing to the fact that TsAGI has accumulated an enormous experience in area of science and experiment, the institute is successful in cooperating with more than 50 major aerospace companies abroad and research centers in America, Europe and Asia. Among the Institute's joined partners are: Boeing, Lockheed Martin, EADS, Airbus, Snecma, Dassault, Alenia, HAL, NASA, DLR, ONERA and so on.

For many years the annual workshops of TsAGI — ONERA, that are two leading aerospace research centers in France and in Russia, are held already. The cooperation facilitates the contacts between young Russian and French specialists and the major scientists as well contributing to the harmonization of joined scientific activities within the bilateral agreements.

In 2009 TsAGI and DLR signed a framework agreement on cooperation in fundamental and applied aeronautical sciences area. This cooperation is intended to enhance the long-term partnership of these research centers. The document reconfirmed the agreements obtained on cooperating in area of developing and implementing jointly the young scientists training programs, when organizing the scientific conferences and workshops.

### **PARTICIPATION IN EUROPEAN UNION FP PROJECTS**

The participation of TsAGI in EU FP (European Union Framework Programmes) projects is one of the perspective trends in international cooperation. Currently, TsAGI has more than 20 active projects within the FP6 and the FP7.

- E.g., TsAGI is involved in FLYSAFE project that is focused at creating the integrated aeronautical system to enhance the flight safety in all weather conditions and to improve accident protection system.
- Within HISAC (high speed aircraft) project, the key activities of the Russian team, TsAGI constitutes part of, are targeted at investigating the feasibility of achieving the low-level sonic boom for the supersonic business jet.
- Within DREAM (validation of Radical Engine Architecture systems) project, TsAGI designs and manufactures a number of bi-rotary propeller models and performs its acoustic and aerodynamic tests inside TsAGI's T-104 and T-107 Wind Tunnels.

Under the joint decision of Ministry of Industry and Trade, Ministry of Education and Science and EC, TsAGI is appointed to be a National Contact Point to provide the

coordinated cooperation with EU and European countries. TsAGI plays an important role in enhancing the mutually beneficial links with European countries in aeronautics.

**PARTICIPATION IN SPACE PROGRAMMES**

The knowledge of TsAGI scientists, accumulated when carrying out the Russian national programme on “Buran” aerospace vehicle development, made it possible for TsAGI to participate greatly in many of actual and perspective space programmes. From year to year, TsAGI will sufficiently increase its participation in and contribution into scientific supporting the major part of space projects, in particular in contents and in work scope.

**ATTRACTING YOUNG SPECIALISTS**

Thus, TsAGI has as the key aim to retain the present staff and to make attractive the aeronautical activities for the young specialists. The establishing of the large-scale national aviation center in Zhukovsky will facilitate it: it is high time to consolidate Russian aeronautical research organisations. Thus, my point of view is that it will be possible to manage the researches, to eliminate the duplication and to solve

public challenges much more efficiently. The educational objectives and economic aspects are also included. It should not be forgotten that aeronautical researches are extremely expensive. I would like to underline, that not only money are meant, but the human lives as well. The lack of knowledge in aviation causes the accidents. Therefore, the highly developed aeronautical science is the guarantee of success and progress in all aircraft vehicles evolution.

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Mig 29 T-101 mock-up in course of aerodynamic tests in the wind tunnel of TsAGI. (Credit TsAGI)



