Is it possible?

Lunch in Tokyo, breakfast in Paris… same day…in that order!

The HIKARI project has brought together all the hypersonic initiatives in Europe and Japan to drive the convergence of their concepts and roadmaps.

Thanks to the expertise of its 16 partners from industry, research centers and academia, HIKARI has shown how the Europe-Japan partnership could allow achieving such high ambitions as defining the design guidelines and technology roadmaps towards future high speed air transport.

This fruitful outcome allows considering a natural next step for this cooperation, in order to jointly design the most promising high speed aircraft meeting the HIKARI guidelines, and to prepare the joint flight demonstrations recommended by the HIKARI roadmap.

Hence, when overlooking passenger transport at the horizon of 2040 - 2050, a high speed transport design capable of sufficient performance levels to capture a reasonable market share (>15% of the premium traffic) and to sustain stable operations seems to be feasible.

Traffic Flow and ERF - Source:AIRBUS

Design by: EASN-TIS

Our team members

Coordinated by:

AIRBUS GROUP

esa · MBDA MISSILE SYSTEMS · AIRBUS DEFENCE & SPACE

ONERA THE FRENCH AEROSPACE LAB · DLR · CIRA Centro Italiano Ricerche Aerospaziali

AIRBUS · OXFORD ECONOMICS · NLR

cnrs · easn Technology Innovation Services · JAXA

THE UNIVERSITY OF TOKYO · IHI · JADC

Travel at the speed of HIKARI or watch HIKARI video on **euronews**:

http://www.hikari-project.eu

https://youtu.be/AP1YluCr9CA

HIKARI

HIgh speed Key technologies for future Air transport
Research & Innovation Cooperation scheme

High Speed Transport

Are hypersonic planes the aircrafts of the future?

Findings in the frame of the HIKARI project

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no. 313987, the METI and other concerned Japanese authorities.

The Topics

Performance · Control · Aerodynamics · Propulsion · Societal Acceptance · Safety · Materials · Environmental Impact

& The Results

Travelling at the Speed of HIKARI*

*Japanese for light

Is it worth the effort?

In order to prove the adequacy between High Speed Transport (HST) and societal and market needs, HIKARI performed a market analysis to define the frame for the possible profitable development of a future high-speed aircraft.

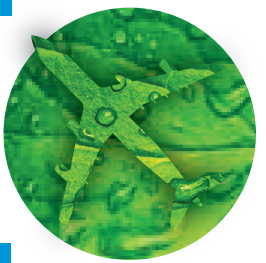
The market analysis and high level technical trades have shown that the most promising vehicle to address high speed passenger transport would be a ~14000km range ~Mach 5 aircraft, with high performance levels to ensure affordable ticket prices.
The share of premium traffic could exceed 15% and allow sustainable operations of a worldwide fleet of more than 200 aircrafts by 2040+.

To accompany the market growth and master the risk associated with such a development, an incremental approach is recommended, starting first with a smaller size vehicle (<100 passengers) and progressively moving towards larger aircraft.

Can it be green?

The aim of this research axis was to analyse the impact of high speed emissions on the atmosphere and on the long term effects on the climate, while taking into account production and distribution issues as a function of the type of fuel.

Technology wise, the hydrogen fuel, though providing excellent range and cooling capacity, might not be the only alternative to consider, for other fuels (bio liquid hydrocarbons) might provide better overall climate/performance characteristics. Hence, the use of hydrogen is not an obvious greener solution than hydrocarbon fuels, and the latter are still good candidates for the high altitude / high speed application. An investigation of alternative designs using other fuels (e.g. LNG) is thus recommended.



Do we have the power?

This HIKARI topic focused on assessing different options and developing a complete thermal and energy management system.

Regarding the energy and thermal optimization, the technology progresses accomplished within HIKARI, both on the modelling side and on the demonstration side provide credible building blocks to the future aircraft concept. Furthermore, these technologies offer real synergies with other industries, and promising short term applications.

Aircraft or Rocket?

HIKARI focused on propulsion systems that require very specialized knowledge owned by only a few entities in the world. Concepts involving one single engine as well as combinations of different engine types have been studied, along with the respective tanks required for each option. This topic also included an assessment of noise at take-off resulting from the options studied.

Two propulsion options were specifically considered: the Pre-Cooled Turbojet (PCTJ) and the reusable rocket engine. The fuel system to feed the engines, and especially the tank characteristics were also analyzed for two fuel types: liquid hydrogen and liquid methane. Additionally, the noise of an aircraft propelled by this multi-cycle engine has been simulated in the airport environment.
First results, prior to any noise reduction procedure or engine design optimization, indicate noise levels inferior to those of the Concorde. Specific emphasis should be given in the coming steps to prepare the noise regulation applicable to high-speed aircraft and to adjust the design and procedures to minimize the noise impact in the airport vicinity.

PCTJ Mach 4 Wind-tunnel Test