

# HIKARI

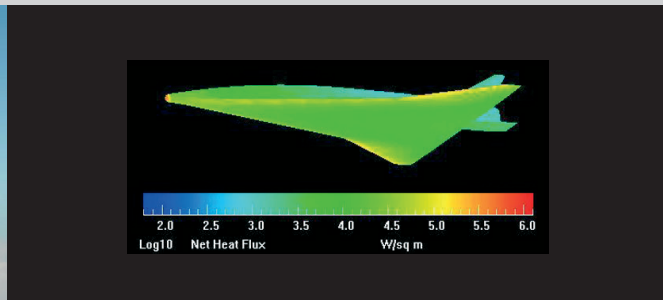
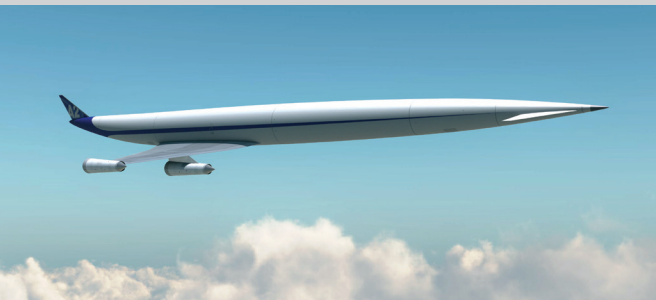
## High speed Key technologies for future Air transport Research & Innovation Cooperation scheme

Coordinator: FR-Airbus Group

Project Participants: FR-ESA, FR-MBDA, FR-Airbus Defence and Space, FR-ONERA, DE-DLR, IT-CIRA, FR-Airbus Group, UK-OE, NL-NLR, FR-CNRS, BE-EASN-TIS, JP-JAXA, JP-Utokyo

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### Are hypersonic planes the aircrafts of the future?



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HIKARI

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

#### Is it possible?

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.

#### Do we have the power?

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

**The Result:** 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?

**The Topic:** 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.

**The Result:** Two propulsion options were specifically considered: the Pre-Cooled Turbojet (PCTU) and the reusable rocket engine. The fuel system to feed the engines, and espe-

cially 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.