

VAYU

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Aerospace & Defence Review



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Rafale solo display



On 4 May 2026, the new French Rafale Solo Display (RSD) pilot was officially revealed to the media on Nancy airbase (Base Aérienne 133 Nancy–Ochey “Henry Jeandet”, ICAO:LFSO). Due to runway maintenance at the nearby Rafale airbase St-Dizier (ICAO:LFSI), the Escadron de Transformation Rafale 3/4 “Aquitaine” was temporarily deployed to BA Nancy. During the RDS presentation at Nancy airbase, the new 2026 paint scheme of the Rafale was presented as well.

The operational continuity of the Rafale Solo Display (RSD) is ensured through a personnel transition within the French Air Force (L’Armée de l’Air et de l’Espace, AAE). For the 2026–2027 cycle, the responsibility of primary Rafale Solo Display pilot (RSD) is taken over by Captain (Capitaine) Alexandre “Rocky” Roeckel, he is the 9th

RSD pilot. This tenure follows an extensive career path that commenced in 2008 with entry into the French Air Force through the Elève Officier Personnel Navigant (EOPN) programme; the EOPN path is designed for Officers Under Contract. It focuses heavily on immediate operational training for those who want to fly as quickly as possible.

Having achieved fighter pilot certification in 2011, initial instructional duties were performed at the Ecole de Pilotage de l'Armée de l'Air (EPAA) at Cognac airbase (ICAO: LFBG). Experience was further consolidated at Saint-Dizier airbase (ICAO: LFSI) within the Escadron de Chasse (EC) 01.004 "Gascogne," followed by a specialised role at the Rafale Transition Squadron (ETR) 03.004 "Aquitaine." With 3200 flying hours and sixty-one war missions completed, the required tactical proficiency for the demonstration role is very well achieved by Captain Rocky.

The coaching and tactical oversight for this period are provided by Captain Jean-Brice "Mimouss" Millet. Following the completion of approximately 200 technical demonstrations as the primary RSD pilot during the 2024-2025 seasons, a transition to the role of Technical



Display Coach was undertaken. The professional background of CNE Millet includes service at Istres air base (ICAO: LFMI) and French Strategic Air Command (Commandement des Forces Aériennes Stratégiques, COFAS) at Taverny airbase (ICAO: LFPJ). A tandem partnership is maintained between the pilot and the coach, wherein the display sequence is developed from a blank sheet.





The mission parameters of the RSD extend beyond technical flight; the team is utilised as a strategic “Ambassadeur” for French military and industrial excellence. Representation of the AAE and the French aeronautical industry is prioritised to strengthen the Lien Armée–Nation. Furthermore, these public engagements are leveraged to inspire interest among the civilian population and facilitate recruitment efforts. The aircraft utilised for these tasks, the Dassault Rafale, is operated within rigorous technical boundaries. A maximum take-off weight of 24 metric tons is supported by two M88 engines providing a combined thrust of fifteen metric tons. During the high-performance maneuvers required for display, the airframe is subjected to G-loads ranging from -3.2 G to $+11$ G.

Standardisation of the display is achieved through three specific profiles adapted to environmental conditions. A “High Show” is executed

when the cloud ceiling is at least 1,067 meters, while a “Low Show” is conducted at a minimum of 457 meters. Should conditions deteriorate further, a “Spare Show” is performed at a threshold of 244 meters. As the Rafale demo is designed and performed by the current Rafale pilot, the coach can not take over the demo in case the current pilot is not available, even if the coach was the official demo pilot 2 years before; the coach can only take over the Spare Show when needed.

Operational readiness is maintained through a comprehensive training regimen that includes centrifuge sessions for high-G tolerance, advanced aerobatics (Voltage), and maritime survival training at Solenzara airbase (ICAO: LFKS). This preparation is finalised during the winter season through more than 30 training flights, where flight altitudes are progressively reduced from 1,524 meters down to 152 meters above ground level, ensuring that the highest standards of safety and precision are upheld for the upcoming display seasons.

The preparation of a Rafale technical demonstration is an exhaustive process that transforms an operational fighter pilot into a specialised display aviator. This progression is defined by the creation of the “Ruban” (the Ribbon) and the physical conditioning required to execute it. The Ribbon refers to the continuous sequence of maneuvers performed during the 10-minute flight display. Unlike a standard operational mission, the Ribbon is designed to showcase the aircraft’s flight envelope, agility and power in a compressed space.

Each new pilot, including CNE Alexandre “Rocky” Roeckel, begins their tenure by designing the Ribbon from a “blank sheet.” While they may draw inspiration from predecessors, the sequence is strictly personal. The pilot selects the maneuvers, such as high-alpha passes, square loops, and 360-degree rolls, and determines their order based on energy management and visual impact. Before



each take-off, the RDS pilot can be seen walking on the ground, while moving with his hands, mimicking the whole demo flight. Although the pilot creates the sequence, it is refined in close collaboration with the Technical Display Coach, CNE Jean-Brice “Mimouss” Millet. The coach provides critical technical advice on safety margins and visual symmetry from the ground.

The operational effectiveness of the Rafale Solo Display (RSD) is maintained by a rigorous selection process within L'Armée de l'Air et de l'Espace (AAE). Recruitment is initiated through a comprehensive survey distributed to all Rafale pilots, ensuring that the role is filled exclusively by volunteers. Initial screening is conducted by the AAE human resources department, focusing on specific career milestones. Candidates are required to hold “Chef de Patrouille” (Flight Lead) status and must have logged a minimum of five hundred flight hours on the Rafale. Furthermore, an aptitude for public relations and communication is considered essential, as the personnel must commit to a four-year service term, comprising two years as the primary demonstrator followed by two years as the technical coach for the new demopilot.

Final selection is determined through a multi-stage interview process involving the current coach, the active demonstrator pilot, and the commander of the Escadron de Transformation Rafale 3/4 “Aquitaine”. Crucially, the final decision-making authority rests with the current demonstrator. This is necessitated by the intensive nature of the pilot-coach partnership; during the demonstration



season, these individuals interact more frequently than with their respective spouses. The physiological and psychological demands of the role are extreme, often described as a peak physical challenge. It is noted that:

“Performing a 10-minute demonstration in the air is the equivalent of doing a marathon while sprinting.” To withstand the repeated exposure to high G-forces, which range from -3.2 G to $+11\text{ G}$, the body must be meticulously prepared. A dedicated sports coach oversees physical strength training during the autumn and winter months. This preparation ensures the pilot can manage the thrust of the two M88 engines, which provide a total of fifteen metric tons of power.





The new livery for the 2026–2027 seasons, flown by captain Alexandre “Rocky” Roeckel, was designed by Régis “Rage” Rocca. Rocca is a prominent “Painter of the Air and Space” (Peintre de l’Air et de l’Espace) who has been responsible for the visual identity of the Rafale Solo Display (RSD) since 2009. The 2026 Scheme features a blue–white–red tricolor theme, described as a revisit of the team’s visual signature. It was officially unveiled on April 28, 2026, during the Flight Safety Committee meeting. His signature is on the left side of the Rafale tail. Rocca’s approach for 2026 was to preserve the “DNA” of the RSD while providing a “new breath” for the debut of the new pilot. The physical painting of the aircraft is often a collaborative effort; past projects have involved specialist painters such as Sébastien “Harry” Bault and support from the mechanics at Saint–Dizier airbase (LFSI).

The signature “À Root et Lolo” is a dedication to two people who were deeply connected to the French Air Force and the Rafale community, but who have passed away:

“Root”: Refers to Jean–Claude “Root” Veroot, a highly respected figure in the French Air Force community. He was a long time member of the “Ambassadeurs de l’Armée de l’Air et de l’Espace” (Ambassadors of the Air and Space Force) and was known for his work in communication and support for the display teams. “Lolo”: Refers to Laurent “Lolo” Arvieu, a technician/mechanic who was a beloved member of the Rafale Solo Display family and the wider French military aviation circle.

For the 2026 season, since the theme is “Unicity” (Unity), this list of names is more prominent than in some



previous years. It symbolises that the “pixelated” tricolor isn’t just a pattern—it’s a mosaic made up of all these individual people.

This list represents the technicians, mechanics, and support staff of the ETR 3/4 “Aquitaine” who actually maintain the aircraft and brought this specific 2026 livery to life. In the French Air Force, it is a point of pride that the “Ambassadors” (the display teams) are not just about the pilot; they are a collective. Régis Rocca includes these names to ensure that every mechanic who turned a wrench or spray painted a pixel is recognised. The crew names are on the right side of the Rafale tail. ➡

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Photos by: Joris van Boven and Armee de l’Air (blue sky photos by Pascal Bock and Nicolas Travaux)

The airspace dilemma and civil–military synergy



The European airspace dilemma

European airspace is a spider web of increasingly growing air traffic that cannot be expanded, yet the demands placed upon it are reaching a critical breaking point. Commercial air traffic is projected to rise significantly as global travel continues its post-pandemic recovery, while the geopolitical climate in Europe simultaneously requires a much higher tempo of military exercises to ensure credible deterrence and collective defence. The result is a “Zero-Sum Game” played at 30,000 feet, where every cubic mile of sky dedicated to a military mission is a mile taken from the most direct and fuel efficient route of a commercial airliner. This friction is most intense over the Benelux and Germany, which serve as the primary junction for the continent’s busiest hubs, including London, Schiphol, Frankfurt and Brussels. For the military, the challenge is not just transit because important operations, particularly Air-to-Air Refueling (AAR), require massive boxes of reserved airspace. A tanker mission involving an Airbus A330 MRTT

and a formation of German Tornados or Eurofighters cannot be squeezed into a standard civilian airway. These missions require large, protected blocks of air to ensure safety and operational effectiveness. As commercial flows grow and military readiness becomes non-negotiable, the



traditional method of simply segregating the sky is no longer sustainable, and the industry is facing a logistical stalemate. Solving this requires a complete overhaul of how we view the sky, moving away from rigid borders and toward a dynamic, shared environment where rapid military mobility and civil efficiency can coexist.

Civil–military synergy at EUROCONTROL

At the heart of the logistical puzzle governing the European skies is EUROCONTROL, the European civil–military organisation tasked with supporting the continent’s aviation network across 42 Member States. Leading the efforts in civil–military cooperation in the organisation is Major General Karsten Stoye, Head of the Civil–Military Cooperation (CMC) Division and Military Advisor to the Director General, who possesses over 3,000 flying hours primarily on the Tornado. The strategic philosophy at EUROCONTROL has shifted significantly under the current geopolitical climate, moving away from simply finding an empty corner of the sky toward advocating for a “Dual–Use” infrastructure. This vision assumes that the European Air Traffic Management (ATM) network must be inherently flexible to serve the economic interests of commercial carriers while simultaneously fulfilling the security mandates of national air forces. Major General Stoye explains that they are bringing civilian aviation and military aviation together under the principle of Flexible Use of Airspace (FUA). Under FUA, airspace is seen as a continuum that is allocated based on real time requirements, meaning that when a tanker track like LENA is not being used by the Multinational MRTT Unit (MMU), that box is immediately returned to



the civilian controllers at Maastricht UAC to let airliners fly more direct, fuel–efficient routes. This collaborative decision–making process is the only way to prevent total gridlock in the Benelux and German sectors, where traffic density is among the highest in the world.

The “Dual–Use” concept extends beyond sharing blocks of air to the very technology that keeps aircraft separated and safe, meaning future Communication, Navigation, and Surveillance (CNS) installations must be robust enough for military encryption and anti–jamming requirements while remaining accessible for civilian safety. A critical focus for EUROCONTROL today is “Rapid Air Mobility” because the military cannot wait for standard 72–hour civilian flight–planning windows during a crisis. Stoye’s division supports experts across its Member States to ensure that the military backbone of Europe can move assets across borders at a moment’s notice by linking the EATC’s mission planning systems directly with EUROCONTROL’s network manager to predict where



friction will occur hours before a tanker ever leaves the tarmac. Furthermore, because each nation maintains its own sovereign rights over its airspace, the CMC division works to create standardised and harmonised procedures for Air-to-Air Refueling (AAR) and large scale formations, ensuring that a Dutch tanker can refuel a German fighter over Belgian airspace with the same level of safety and efficiency as a domestic mission. Looking toward the future through the lens of the Single European Sky (SES), Stoye's team is actively involved in ensuring that the next generation of combat aircraft and Unmanned Aerial Systems (UAS) are interoperable by design so they can communicate with civilian air traffic control systems from day one.

mobility hubs in the world. The genius of the EATC lies in its pooling and sharing concept, where member nations do not give up ownership of their aircraft but instead transfer authority over these assets to the EATC for operational employment. General Mollard explains that they are essentially a service provider for their member nations across three primary pillars comprising strategic and tactical transport, aeromedical evacuation, and air-to-air refueling (AAR). By centralising the planning and execution of these missions, the EATC eliminates redundancy. One of the most innovative aspects of this command is the use of the ATARES (Air Transport, Air-to-Air Refueling System) and other Exchange of Services, which is a non-monetary accounting system that allows



EATC's Multinational Authority

While EUROCONTROL keeps the overview on air traffic, the European Air Transport Command (EATC) provides the planning of flights. Headquartered at Eindhoven Air Base, the EATC represents a unique model of European military integration, functioning as a coalition of the willing established in 2010 by four founding nations including the Netherlands, Belgium, France and Germany, and later expanded to include Luxembourg, Spain and Italy. At the helm of this command is Major General Franck Mollard, who assumed leadership in September 2023 and oversees a structure that manages over 180 aircraft, making the EATC one of the largest air

member nations to exchange services, such as trading one flying hour on an A330 MRTT for a specific amount of cargo space on a C-130 Hercules or an A400M, building deep trust without the need for complex financial transactions.

Sovereignty remains a cornerstone of the EATC as member nations retain the right to invoke a “red card” at any time if a mission conflicts with national policy or specific legal constraints, though this safeguard is rarely used due to the high degree of alignment among the seven members. The role of the EATC has become even more vital with the arrival of the Multinational MRTT Unit (MMU) because the EATC is responsible for the operational planning of its missions, identifying the refueling requirements

across member nations and seamlessly tasking an MMU aircraft to fulfill that need across borders. Managing such a diverse fleet of roughly 20 different aircraft types requires immense technical expertise, and the EATC harmonises flight safety standards and maintenance procedures across the member nations to ensure a multinational force can operate together smoothly.

Moving from JOJO to the LENA Track

For years, the JOJO track in the Hannover Upper Information Region (UIR) served as the primary operational hub for Air-to-Air Refueling (AAR) in Western German airspace close to the Dutch border, supporting tactical wings like the Tornados and Eurofighters from Nörvenich and Büchel alongside USAFE assets stationed at Spangdahlem. However, as commercial aviation underwent a period of rapid expansion, the JOJO track became a significant logistical bottleneck because its geographic footprint directly influenced the most critical civilian arrival and departure corridors in Europe, creating severe interference with aircraft departing from Frankfurt via the OBOKA waypoint and those arriving at Schiphol via the NAPRO arrival route. An AAR mission requires a protected block of airspace typically 10 to 20 nautical miles wide and approximately 50 nautical miles long, which becomes a no-go zone for civilian controllers when active. This forced commercial airliners to level off at lower altitudes or take lengthy vectors to circumnavigate the track during civilian peak hours, resulting in increased fuel consumption and a zero-sum situation where military training came at the direct expense of civilian efficiency.

To resolve this breaking point, EUROCONTROL and the military commands engineered the establishment of the LENA AAR track within the Amsterdam Flight Information Region (FIR), marking a fundamental redesign of how military boxes interact with the busiest commercial flight paths in Europe. To manage the complex flow of traffic around the active LENA track, Maastricht Upper Area Control (UAC) implemented a sophisticated set of Flow Management Zones known as FBZs, designated as EHTRA12Z1 and EHTRA12Z2, which act as dynamic tools to maintain a protective buffer around the refueling mission while providing predictable constraints for commercial operators. One of the most significant technical advantages of the LENA track is the vertical separation it affords because commercial traffic is generally able to clear the primary AAR protection area (EHTRA12Z1) by planning to fly at Flight Level (FL) 340 or higher, allowing



high-altitude commercial overflights to maintain their most efficient cruise levels and direct routings while a complex military mission is underway several thousand feet below. For aircraft operating at lower altitudes between FL245 and FL335, the LENA track introduces strict but predictable planning requirements where southbound traffic is rerouted via specific anchor points such as GISEB or LARAS, and eastbound flights are channeled through waypoints like TUSUK or BADGO, eliminating tactical uncertainty for airline operations centers. The impact on departures from major airports is where the LENA track truly shines because flights departing Frankfurt via the OBOKA waypoint are shifted to the Z29 TORNU route during LENA activations, ensuring that departing aircraft cross the TORNU waypoint above FL285 to place them safely above the lower levels of the refueling area while maintaining high departure frequencies.

MMU and the Executing Tanker Fleet

The physical manifestation of this complex airspace management effort is the Multinational Multi-Role Tanker Transport Fleet (MMF), a programme providing a sovereign, shared capability that is owned by NATO and managed by the NATO Support and Procurement Agency (NSPA), while being registered in the Netherlands and operated by the Multinational MRTT Unit (MMU). The MMF programme is the result of a partnership between eight European nations including the Netherlands, Germany, Belgium, Luxembourg, Norway, Czech Republic, Denmark and Sweden, who have pooled their resources to build a fleet currently expanding toward its target of ten aircraft, with an eleventh already on order. The distribution of flight hours within the unit is managed proportionally to each nation's investment, with Germany leading the group at 5,500 flight hours, followed by the Netherlands with 2,000 hours, Luxembourg with 1,200



hours, Belgium with 1,000 hours, and both Norway and the Czech Republic utilizing 100 hours each to gain vital strategic reach for their air forces.

Technically, the Airbus A330 MRTT is a highly sophisticated three-in-one platform capable of Air-to-Air Refueling (AAR), strategic passenger and cargo transport, and aeromedical evacuation (MedEvac). In its tanker configuration, the aircraft utilises a dual delivery system equipped with a high-speed Aerial Refueling Boom System (ARBS) for boom-only receivers like the F-16 or F-35, as well as under-wing Cobham 905E hose-and-drogue pods for aircraft like the Eurofighter and Tornado. Beyond its role as a flying gas station, the A330 MRTT provides a massive strategic lift capability by carrying up to 267 passengers in a standard layout or transporting up to 45 tons of equipment on its lower deck for cargo roles. The MedEvac capability is the most specialised aspect of the fleet, allowing the aircraft to be rapidly reconfigured into a state-of-the-art flying hospital that includes up to six intensive care units (ICUs) and 16 stretchers for the transport of wounded personnel, with one aircraft always kept in a dedicated medical configuration or available for immediate conversion. To manage this fleet effectively, the MMU utilises a split-basing strategy where five aircraft are permanently stationed at Eindhoven Air Base in the Netherlands as the unit's headquarters, and the remaining four aircraft operate out of a Forward Operating Base (FOB) at Cologne-Bonn in Germany to minimise transit time to refueling sectors like the LENA track.

Strategic bottlenecks at IT and diplomacy

Even with a state-of-the-art fleet and a unified multinational command, the path to seamless air mobility is often blocked by terrestrial constraints. Major General Franck Mollard identifies diplomatic clearances as a primary bottleneck that still hampers military agility in Europe because each nation maintains its own sovereign approval process that requires significant lead times,

acting as a friction point during a crisis when Rapid Air Mobility is the priority. To address these hurdles, EATC and EUROCONTROL are working on formalising their partnership through a new Letter of Intent to establish dedicated sub-working groups tasked with updating and standardising the essential documentation for Air-to-Air Refueling (AAR) patterns and trail formation procedures at a European level, ensuring a mission can transition

through multiple national airspaces without a breakdown in communication or safety.

Technological interconnectivity is the second major hurdle because military mission planners and civilian air traffic controllers must share the same data to manage the invisible grid in real time. This is where systems like LARA (Local and Sub-regional Airspace Management Support System) and CIMA CT (Civil-Military Aviation Coordination Tool) become indispensable IT platforms, allowing Maastricht UAC to see military requirements as they develop so controllers can plan for AAR mission hours before takeoff. General Stoye emphasises that Dual-Use must apply to infrastructure, meaning the next generation of communication and surveillance systems must be interconnected by design so that data from military sensors can feed into the civilian network to provide a complete picture of the sky. By solving these diplomatic and IT friction points, Europe can transform its airspace from a patchwork of national sectors into a unified operational environment where the military can move with the speed of relevance while the civilian economy flows without interruption.

The evolution of European airspace management from the restrictive JOJO era to the dynamic LENA framework demonstrates that civil efficiency and military readiness are two sides of the same coin, each requiring the other to ensure a stable and prosperous continent. The success of the Multinational MRTT Unit proves that pooling resources is the only viable path forward for European defense, but these high-end assets are only as effective as the airspace they occupy. The ongoing work to dissolve diplomatic bottlenecks and integrate IT systems like LARA and CIMA CT is essential to ensuring that this fleet can be deployed at the speed of relevance, bridging the gap between the cockpit and the controller's console to ensure Europe's skies remain both a thriving economic artery and a shielded sanctuary for collective defence. ➡

Text and Photos: Joris van Boven and Alex van Noije