The new Su-35S Flanker is the most comprehensive redesign of the T-10 Flanker series of fighters since the introduction of this family of aircraft during the 1980s. Described by a senior US analyst as “far deeper design changes than seen with the F-15E”, the Su-35S incorporates almost completely new systems, propulsion and some fundamental aerodynamic and structural design changes. With the Russian Air Force ordering 48 aircraft in 2009, and a major export marketing campaign, the Su-35S is expected to open new markets for Russia’s aerospace industry, as well as supplant Su-30MK series fighters in the fleets of existing operators.

The Su-35S is the first Russian production fighter with engines designed for sustained supersonic cruise operation, until now the exclusive domain of the F-22A Raptor. This will provide the Su-35S with important advantages in manoeuvrability and combat persistence, compared to all adversaries other than the F-22A Raptor. There can be no doubt that the Su-35S is the most lethal and survivable new fighter in the market, prior to the new T-50 PAK-FA which is to supplant it.

EXPLORING THE SU-35S

The Su-35S is the ultimate evolution of a ‘deep modernization’ of the existing Russian fleet of Su-27M flankers introduced during the 1990s, later relabeled as the Su-35 in an attempt to garner export sales. The reuse of the Su-35 label for the Su-35S has, as a result, produced much confusion, as non-expert observers often have great difficulty recognizing the fundamental differences between these types.

The ‘classic’ Su-27M/Su-35 Flanker E was a direct evolution of the basic Su-27S/SK Flanker B, intended to be a genuine multirole fighter, to overcome the limitations of the dumb-bomb-only Flanker B. The Flanker F introduced a glass cockpit based on CRT technology, a planar array Tikhomirov NIIP N011 radar with air-surface capability, foreplane/canards from the navalised Su-27K/Su-33 Flanker D, and wiring and software for various air to surface weapons, making this variant the most potent of its period. The widely advertised Su-37 Flanker F was a modified Flanker E, which
The ability of the Su-35S to sustain supersonic cruise without afterburners will produce unprecedented lethality and survivability gains for the Su-35S. Entering air combat engagements, the Su-35S will be able to emulate the F-22A, coming in high and fast and thus being able to dictate terms at the merge. The additional speed and altitude will increase the kinematic range of BVR missiles by 30 – 40 per cent over range for subsonic launches at the tropopause, which is a major advantage the F-22A has enjoyed exclusively, until now.

Because the Su-35S will be running on dry thrust, its heat signature will be smaller than more conventional opponents who must use afterburner to sustain supersonic speeds. Opponents will be hampered by the need to shoot ‘uphill’ against a high/ fast Flanker, and it will be able to play the same kinematic games as the F-22A in rapidly gaining separation, to spoil an opponent’s missile shots or pre-emptively deny kinematically initial firing opportunities.

The Su-35S carries 11,500 kg (25.4 klbs) of internal fuel, more than any other Flanker, in addition to more internal fuel. The Su-35S will use its control surfaces to provide the speedbrake function, not just FLAPs. The empty weight of the airframe has not been disclosed. The extensive use of composites and structural design of the basic Flanker airframe, unlike the F-22A and later F/A-18 variants.

The F-22A has enjoyed exclusively, until now. Because the Su-35S will be running on dry thrust, its heat signature will be smaller than more conventional opponents who must use afterburner to sustain supersonic speeds. Opponents will be hampered by the need to shoot ‘uphill’ against a high/ fast Flanker, and it will be able to play the same kinematic games as the F-22A in rapidly gaining separation, to spoil an opponent’s missile shots or pre-emptively deny kinematically initial firing opportunities.
While the Su-35S visually resembles earlier Flanker variants, the redesign is deep and comprehensive. The new glass cockpit is modelled on the F-35 arrangement but employs mature low risk AMLCD technology.

Air combat configurations with up to 12 x RVV-SD (AA-12 Adder/Amraamski) BVR missiles, 4 to 8 x BVR R-27 variants (AA-10 Alamo), up to 6 x WVR RW-11 (AA-11 Archer), and up to 5 x long range Anti-AWACS AAMs, the latter likely variants of the 200 nautical mile range Novator R-172 series. For strike operations the payloads are equally formidable. A single centerline supersonic Kh-47 Sunburn can be carried. Up to three 4,000 lb class supersonic 3M54AE Sizzler or Kh-61 Yakhont/Brahmos can be carried. Up to five Kh-59M or Kh-35 series ASM, or up to six supersonic Kh-31 missiles can be carried, the latter available in anti-radiation or anti-ship variants. Small bomb payloads include up to three 3,000 lb class KTRV/GNMP KB-1500 bombs, or six 1,000 lb class KAB-500 bombs. The latter are available with conventional, bunker busting, or thermobaric warheads, with electro-optical correlator, satnav or laser guidance, the latter including a GBU-24 style gimbaled seeker. Dumb bombs, rockets, and laser guided S-25L FFARs can be carried. Targeting pods include the UOMZ Sapsan E and licence built French Thales Damocles. Used as a strike fighter, the Su-35S provides similar range/payload to late model F-15E derivatives but with a much broader and more flexible mix of smart weapons.

The avionics package on the Su-35S well exceeds with a much broader and more flexible mix of smart weapons.

The avionics suite is fully digital but details of its integration have yet to appear in Russian language publications. The Su-35S is currently in the early phase of its life cycle and has yet to make export sales. Target customers include all existing Flanker users but also other nations shopping for fighters and not too closely tied politically to the US or EU, or both. This aircraft is what the Americans like to label a “game changer”, as it fuses elements of fifth generation technology such as supersonic cruise engines and high power-aperture phased array radar, with a mature airframe design. By carefully balancing advanced technology and a mature basic design, the Russians have produced a fighter that will decisively defeat all US teen series fighters, and the F-35 family of fighters. Independent air combat simulations and parametric analysis indicate that this design will achieve around a 10:1 exchange rate against the F-35, and even higher against the F/A-18 family of fighters.

The reason the Su-35S is so lethal is that in BVR combat it combines supercruise, a large payload of missiles with diverse seekers, and one of the longest ranging radars ever installed in a fighter, supported by passive infrared and radiofrequency sensors, yet this aircraft has possibly the highest agility of any contemporary production fighter not to close combat. The sustained speed, persistence and high acceleration performance produced by the 1175 engine will allow the Su-35S to attack slower and less agile opponents, yet remain outside their missile engagement envelopes, thus making this aircraft very difficult to kill. The high thrust at high speeds and altitudes will allow the Su-35S to defeat most conventional BVR missiles by endgame manoeuvre and use of countermeasures.

The Su-35S is clearly the benchmark in conventional fighter threat capability for the coming decade. Its more lethal offspring, the T-50 PAK-FA, becomes the benchmark post 2020.