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SAF / OT&E EVALUATION REPORT NFA FLIGHT TEST 2008

The "SAF / OT&E Flight Test Effectiveness Report NFA Evaluation 2008/2009" was reviewed and approved for distribution: November 09

Released by: Head OT&E



Lt col GS C. Oppliger

Approved by: Commander Swiss Air Force



Three star General M. Gygax

EXECUTIVE SUMMARY

The purpose of the evaluation was to assess the effectiveness of the Gripen, the Rafale and the Eurofighter in their Air-to-Air, Recce and Strike(Strike) roles; according the evolution of Air-to-Air and Surface to Air threats, to provide recommendations for aircraft able to fulfil missions assigned to the Swiss Air Force during the upcoming 40 years.

The Evaluation has been divided in 2 parts. The first is based on the results of the flight tests in 2008 the second on the additional information provided by the constructors describing the delivery configuration in 2015. This document provide the results of the evaluation of the flight tests in 2008.

The operational effectiveness of each NFA has been assessed for accomplishment of all Mission Essential Tasks required by Air Policing, Defensive Counter Air, Escort (OCA / AI / DA), Recce and Strike missions. An evaluation of the suitability, a comparison between NFA and F/A-18 OFP-19C effectiveness, an assessment of the pilot impression on each NFA has been also performed.

Each NFA has been assessed on the result of about 10 missions including one or two NFA. The flight tests have been performed from the Airbase of Emmen during the period of 28th July to the 05th December 2008.

Among the three NFA candidates, the Rafale was the aircraft which demonstrated the best effectiveness and suitability in the accomplishment of all types of Air-to-Air missions, Recce and Strike missions. In addition, the Rafale made the best impression to the pilots.

The strong points of the Rafale were the quality of its sensors such as the PESA Radar, the Frontal Optronics and the EW suite SPECTRA. The good data fusion of all its sensors allowed to provide to the pilot a very good Situational Awareness. A new concept to display all mission data has been implemented. The Recce Pod demonstrated also outstanding performances. The actual weak point of the Rafale was the lack of Helmet Mounted Sight System. The Rafale has been rated Satisfactory in the accomplishment of all types of Air-to-Air, Recce and Strike missions with some enhancing characteristics in several domains. The Rafale obtained the 1st rank in the evaluation of the effectiveness.

The Eurofighter was able to fulfil all Mission Essential Tasks required by Air-to Air missions. Hence, in the Air-to-Air domain, there were several deficiencies that prevented a good execution of some mission essential tasks. The a/c performances (super cruise at Mach 1.4) were among the strong points of the Eurofighter. The sensors data fusion and the EW suite performances can be mentioned among the weak points. The Eurofighter was rated satisfactory for Air Policing missions and satisfactory with comments in the accomplishment of DCA and Escort missions. The Eurofighter could be engaged in Recce and Strike missions, nevertheless there were also several limiting factors affecting the overall mission success. Range and systems reliability were the main limiting factors of the Eurofighter. The RecceLite Pod provided only basic solutions for Recce Tasks. For Strike missions, the Eurofighter was not able to engage multiple targets in one pass (multiple DMPI). Despite the mentioned limitations, the capabilities of the Eurofighter to fulfill Recce and Strike missions were rated as unsatisfactory. The Eurofighter obtained the 2nd rank in the evaluation of the effectiveness.

Although the Gripen could be engaged in all type of Air-to-Air, Recce or Strike missions, there were several limiting factors affecting the overall mission success. Given by its design, the endurance, aircraft performances and aircraft weapon load were among the main limiting factors of the Gripen.

For Recce missions, the RecceLite Pod was also used by the Gripen. Multiple targets were not able to be engaged during Strike missions. There was no sensor data fusion between the Radar and EW suite. Among the strong points, the Gripen had three large screens to display Situational Awareness and mission data. The EW suite can be mentioned among the strong points of the Gripen.

The Gripen has been rated unsatisfactory in the accomplishment for Air-to-Air and Strike missions. In the Recce domain the Gripen was assessed satisfactory with comments. The Gripen obtained the 3rd rank in the evaluation of the effectiveness.

Based on flight test results, the Rafale is the candidate which fulfil all Swiss Air Force requirements and ended with the best score recommended as new fighter for the Swiss Air Force. The Eurofighter is the best alternative to the Rafale.

SECTION II - AIR POLICING

The effective NWA score received by each NFA candidate for Air Policing mission is presented in figure 2-11.

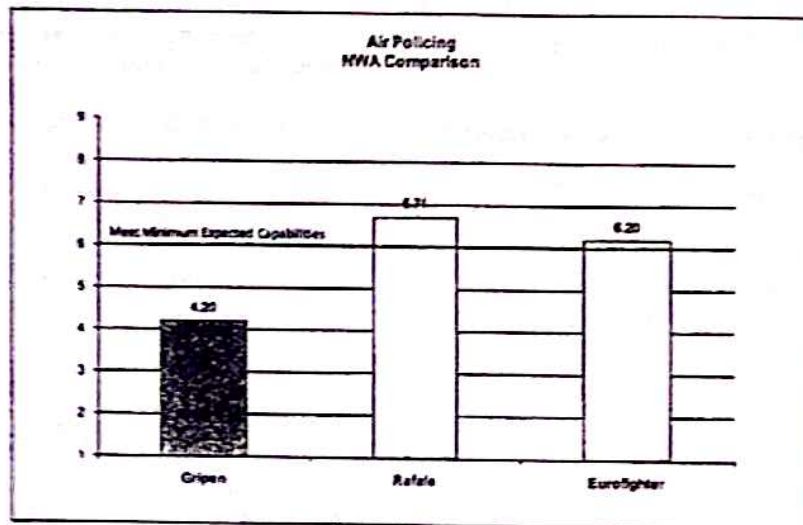


Fig. 2-11. Effective NWA score of each NFA candidate for AP missions

In the Air Policing domain, the Rafale has been assessed with the best effectiveness. The Rafale and the Eurofighter have met the "Minimum Expected Capabilities" in the Air Policing domain.

5.3. COMPARISON SWISS F/A-18C/D VS NFA

Each NFA Mission Essential Subtask has been compared with the capability of the F/A-18C/D OPF-19C(S) to accomplish the same subtask. The F/A-18C/D has been taken as the reference to rate the NFA. The NFA was rated according a scale [No Capability - Worse - Identical - Better - Much Better] than F/A-18.

The figure 2-12 shows the average score obtained at Mission Essential Tasks level for each NFA compared to the F/A-18. It must be taken in consideration a MET score is the average of up to 10 subtasks. For example, the MET Detection includes as subtasks the capability to detect a target by all sensors (Radar, IRS&T, CIT, RWS etc.).

It can be also mentioned that the Gripen has better detection and identification than the F/A-18 due to the RWS capability. The Rafale and the Eurofighter demonstrated in general better performances than F/A-18, the Gripen performed worse.

SECTION II - AIR POLICING

6. GENERAL COMMENTS

In the suitability assessment, only Rafale and Eurofighter were able to accomplish Air Policing missions with satisfaction, despite the Eurofighter showed some moderately objectionable deficiencies. Gripen has been assessed as unsatisfactory for this type of mission. The main weak points of the Gripen were Endurance and Performances.

The best effectiveness score was given to Rafale followed by Eurofighter and lastly by Gripen.

When the NFA candidates were compared with the Swiss F/A-18C/D OFP 19C(S) the ranking was confirmed. Rafale ended first, followed by Eurofighter, Swiss Hornet and Gripen.

When the NFA candidates were ranked according pilot impressions, again, Rafale ended first, followed by Eurofighter and lastly by Gripen.

7. OVERALL CONCLUSION

Among the three NFA candidates, Rafale was the aircraft with the best effectiveness and suitability for the accomplishment of a typical Air Policing mission. It also demonstrated better capabilities than the F/A-18C/D equipped with OFP-19C(S) and in addition in the accomplishment of Air Policing tasks it made the best impression on the pilots.

For air policing missions, the Gripen was the only candidate which did not achieve the threshold of "meets minimum expected capabilities".

SECTION III - DEFENSIVE COUNTER AIR

The effective NWA score received by each NFA for Defensive Counter Air mission is given in the figure 3-11.

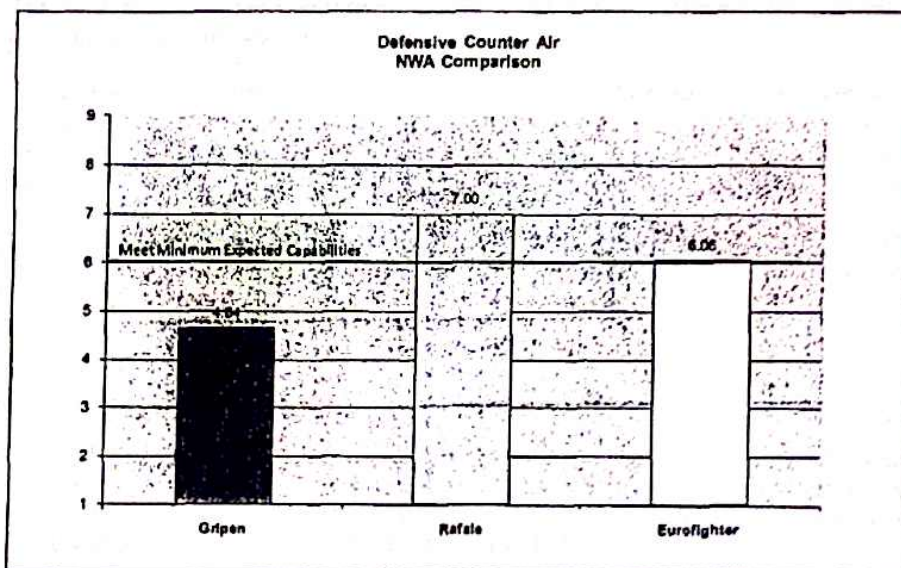


Fig. 3-11. Effective NWA note of each NFA for DCA missions

In the Defensive Counter Air domain, the Rafale has been assessed with the best overall effectiveness which is represented by the NWA score. The Rafale and the Eurofighter have met the "Minimum Expected Capabilities".

5.3. COMPARISON SWISS F/A-18C/D VS NFA

Each NFA Mission Essential Subtask has been compared with the capability of the F/A-18C/D OFP-19C(S) to accomplish the same subtask. The F/A-18C/D has been taken as the reference to rate the NFA. The NFA was rated with a score 1 to 9 according a scale [No Capability - Worse - Identical - Better - Much Better] than F/A-18.

The figure 3-12 shows the average score obtained at Mission Essential Tasks level for each NFA compared to the F/A-18. It must be taken in consideration a MET score is the average of up to 10 subtasks. For example, the MET Detection includes as subtasks the capability to detect a target by all sensors (Radar, IRS&T, CIT, RWS etc.). It can also be seen, that the F/A-18 has better capabilities in the VWR Engagement. This is due to the maturity of the HMD and AIM-9X integration into the F/A-18 over the NFA candidates.

Overall, the Rafale has the biggest delta capabilities compared to the F/A-18C/D. The Rafale can be considered much better than the F/A-18C/D in the DCA domain. The Eurofighter can be considered better than the F/A-18C/D in the DCA domain. The Gripen's current capabilities for DCA missions are inferior to those of the Swiss F/A-18C/D, which entered service in the Swiss Air Force 11 Years ago (1997).

SECTION III - DEFENSIVE COUNTER AIR

6. GENERAL COMMENTS

In the suitability assessment, only the Rafale and the Eurofighter were able to accomplish Defensive Counter Air mission with satisfaction. However, the Eurofighter needs some improvements especially in the EW, Detection and Identification domains.

The Gripen has been assessed unsatisfactory for DCA missions. The main weak points of the Gripen were Endurance and Aircraft Performances. These two weak points cannot be improved without a change in the structure of the aircraft. These weak points will most probably never improve during the entire life of the Gripen C/D aircraft but rather be addressed within the concept of the new Gripen NG.

The best effectiveness was given by the Rafale followed by the Eurofighter and outclassed the Gripen. The Rafale was also leading in comparison with the F/A-18C/D OFP 19C(S) and in the pilot impression for the accomplishment of Defensive Counter Air Missions.

7. OVERALL CONCLUSION

Among the three NFA candidates, the Rafale was the aircraft with the best effectiveness and suitability for the accomplishment of typical Defensive Counter Air missions. It demonstrated also better capabilities than the current Swiss F/A-18C/D equipped with OFP-19C(S) and gave to the pilots the best impression for the accomplishment of Defensive Counter Air tasks.

The Gripen was the only candidate which did not achieve the threshold of "meets minimum expected capabilities" for DCA missions.

SECTION IV - OCA / AI / DA

The effective NWA score received by each NFA for OCA / AI / DA (Escort) missions is given in the figure 4-8.

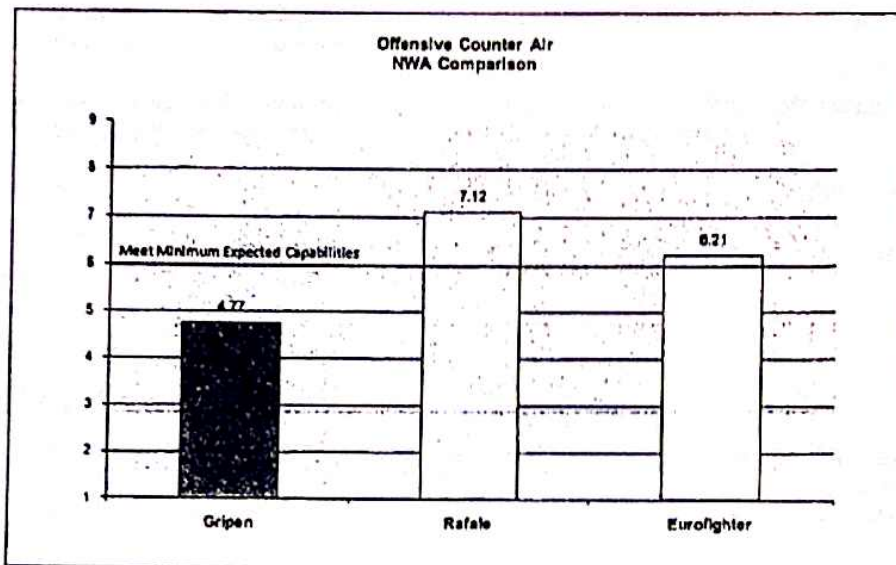


Fig. 4-8. Effective NWA note of each NFA for OCA / AI / DA missions

In the OCA / AI / DA domain, the Rafale has been assessed with the best overall effectiveness which is represented by the NWA score. Both Rafale and Eurofighter passed the threshold of "Meet expected Capabilities".

5.3. COMPARISON SWISS F/A-18C/D VS NFA

Each NFA Mission Essential Subtask has been compared with the capability of the F/A-18C/D OFP-19C(S) to accomplish the same subtask. The F/A-18C/D has been taken as the reference to rate the NFA. The NFA was rated according a scale [No Capability - Worse - Identical - Better - Much Better] than F/A-18.

The figure 4-9 shows the average score obtained at Mission Essential Tasks level for each NFA compared to the F/A-18. It must be taken in consideration a MET score is the average of up to 10 subtasks. For example, the MET Detection includes as subtasks the capability to detect a target by all sensors (Radar, IRS&T, CIT, RWS etc.). It can be seen that the F/A-18 has better capabilities in the VWR Engagement. This is due to the maturity of HMD AIM-9X integration into the F/A-18 over the NFA candidates.

Overall, the Rafale has the biggest delta capabilities compared to the F/A-18C/D. The Rafale can be considered much better than the F/A-18C/D in the OCA domain. The Eurofighter can be considered better than the F/A-18C/D in the OCA domain. The Gripen's current capabilities for OCA missions are inferior to those of the Swiss F/A-18C/D, which entered service in the Swiss Air Force 11 Years ago (1997).

SECTION IV - OCA / AI / DA

6. GENERAL COMMENTS

In the suitability assessment, only the Rafale and the Eurofighter were able to accomplish OCA / AI / DA missions with satisfaction. However, the Eurofighter would need some improvements especially in the EW and Sensors domain.

The Gripen has been assessed unsatisfactory for this type of mission. The main weak points of the Gripen were its insufficient Range/Combat Radius and its aircraft performance.

The best effectiveness was given by the Rafale followed by the Eurofighter. Both outclassed the Gripen.

The Rafale is also leading in comparison with the F/A-18C/D OFP 19C(S) and the pilot impression for the accomplishment of OCA / AI / DA Missions.

7. OVERALL CONCLUSION

Among the three NFA candidates, the Rafale was the aircraft with the best effectiveness and suitability for the accomplishment of a typical OCA / AI / DA (Escort) mission. The Rafale demonstrated also better capabilities than the current Swiss F/A-18C/D equipped with OFP-19C(S) and gave the pilots the best impression for the accomplishment of OCA / AI / DA tasks.

The Gripen was the only candidate that did not achieve the threshold of "meets minimum expected capabilities" for DCA missions.

SECTION V - RECONNAISSANCE / IMINT

The effective NWA score received by each NFA candidate for Recce mission is presented in figure 5-11.

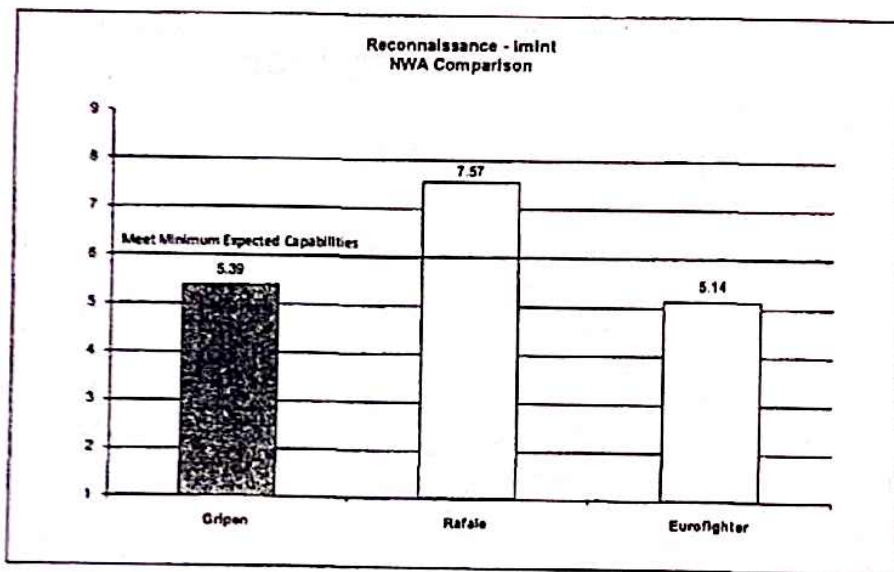


Fig. 5-11. Effective NWA score of each NFA candidate for Recce missions

In the Recce domain, the Rafale has been assessed with the best effectiveness. The Gripen and the Eurofighter do not achieve the minimum expected capabilities.

5.3. F/A-18C/D - NFA CAPABILITY COMPARISON

The Swiss Air Force does not have the Recce capability on their F/A-18C/D. For that reason we could not compare directly the performances of the three candidates. We decided to skip this chapter for the Recce assessment.

SECTION VI - STRIKE

The effective NWA score received by each NFA candidate for Strike missions is presented in figure 6-11.

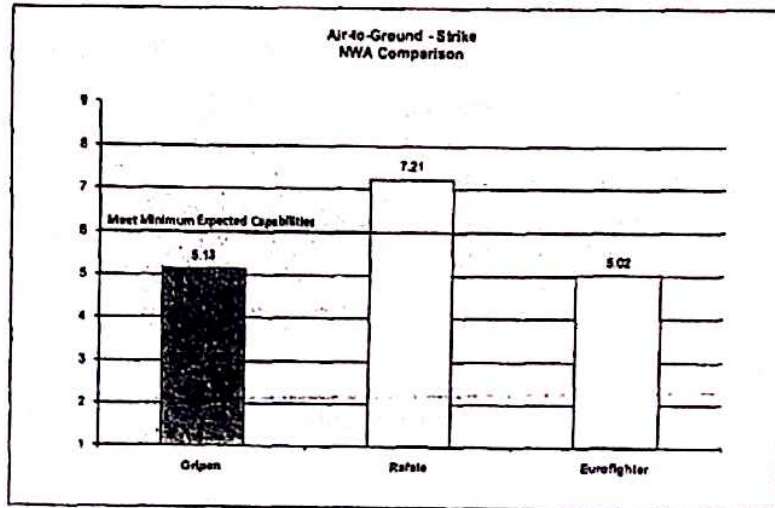


Fig. 6-11. Effective NWA score of each NFA candidate for Strike missions

In the Strike domain, the Rafale has been assessed with the best effectiveness.

5.3. F/A-18C/D - NFA CAPABILITY COMPARISON

The Swiss Air Force does not have the Strike capability on their F/A-18C/D. For that reason we could not compare directly the performances of the 3 candidate. We decided to skip this chapter for Strike missions assessment.

SAF / OT&E EVALUATION REPORT NFA DELIVERY CONFIGURATION 2013

The "SAF/OT&E Evaluation of Proposal 2 for the NFA delivered Configuration" was reviewed and approved for distribution: November 09

Released by: Head OT&E



Lt col GS C. Oppliger

Approved by: Commander Swiss Air Force



EXECUTIVE SUMMARY

The purpose of the phase II of evaluation was to estimate the impact of NFA improvements scheduled with the delivered configuration in 2015 on the NFA effectiveness score measured during flight tests 2008, to provide recommendations for aircraft types able to fulfill missions assigned to the Swiss Air Force during the next 40 years.

The phase II evaluation has been based on documents provided by constructors and a visit done at each constructor including a flight demonstration or a simulator demonstration of components in developmental stage and in tests. The impact of every improvement brought in each NFA systems on effectiveness to accomplish tasks in Air Policing, Defense Counter Air, Escort (OCA/AI/DA), Recce and Strike domains has been assessed and rated. The effectiveness score obtained by improvements has been corrected by a credibility factor which was a function of the block upgrade readiness level. A comparison between Air-to-Air missiles proposed by each NFA and an operational study on Air Policing Persistence have been described in the present report. The phase II evaluation has been conducted from March to August 09.

SAAB has scheduled 98 upgrade items on the Gripen for the delivered configuration. The proposed delivered version is the Gripen MS21. The Gripen MS21 is based on the cell and engine of the Gripen Demonstrator equipped with new avionics and sensors (AESA Radar, IRS&T).

Dassault has scheduled for the Rafale a total of 18 upgrade items, already contracted by the French "Armée de l'air". The delivered version corresponds to the standard F3+, which includes mainly sensors improvements (AESA RBE2 Radar, Improved technology for the sector optronics, etc.). If the Rafale is sold to the UAE, 11 new upgrade items not taken in the evaluation, will be part of the delivered configuration.

EADS has scheduled for the Eurofighter 25 upgrades items which improve mainly the Air-to-Ground domain. The Eurofighter will be delivered to the SAF with the tranche 3 P1E Enhancement.

The supplementary effectiveness provided by the upgrades scheduled for the delivered configuration have not changed the NFA ranking obtained by the flight tests 2008 (1st rank Rafale, 2nd Rank Eurofighter and 3rd rank Gripen). The delta effectiveness score between each candidate was too big to allow the Eurofighter or the Gripen upgrades to fill the effectiveness gap over their direct competitor. The Rafale is the only NFA candidate which fulfils in all type of missions the "Meet Minimum Expected Capabilities". The Eurofighter is able to perform all type of missions but fulfils the "Meet Minimum Expected Capabilities" only in the Air-to-Air domain.

With its scheduled upgrades, the Gripen MS21 obtained the highest delta effectiveness score. However, the Gripen MS21 is still not able to compete with the two other candidates. It never reaches the "Meet Minimum Expected Capabilities" in all type of missions.

Based on flight test results and upgrades scheduled for the delivered configuration, the Rafale is the aircraft that can accomplish with the best effectiveness all Air-to-Air, Recce and Air-to-Ground missions. The Rafale has the potential to be operationally effective and suitable for the next 40 years.

The Rafale is recommended to be the New Fighter Aircraft for the Swiss Air Force.

The best alternative to the Rafale is the Eurofighter.

SECTION II - AIR POLICING

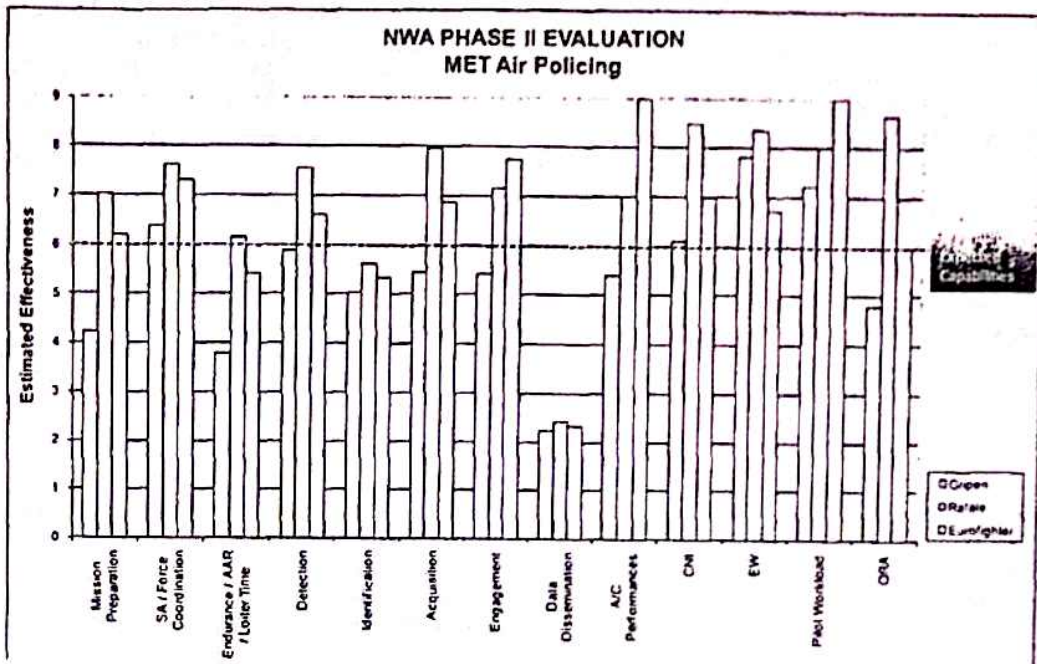


Fig. 2-4. Estimated score effectiveness obtained by each NFA candidate in the accomplishment of Air-Policing Tasks

3.3. NFA COMPARISON IN AIR POLICING

A comparison of effectiveness between each NFA candidates for the Air Policing domain is given in figure 2.5. The figure shows also the impact on estimated effectiveness done by upgrades proposed for the delivered configuration.

The Gripen MS21 obtained the highest delta effectiveness with 46 upgraded items tied to Air Policing domain on 98 taken for the evaluation.

With a score of 6.98 for the Rafale and 6.48 for the Eurofighter, both aircraft are above the threshold score of 6, which is defined as "meets the minimum expected capabilities".

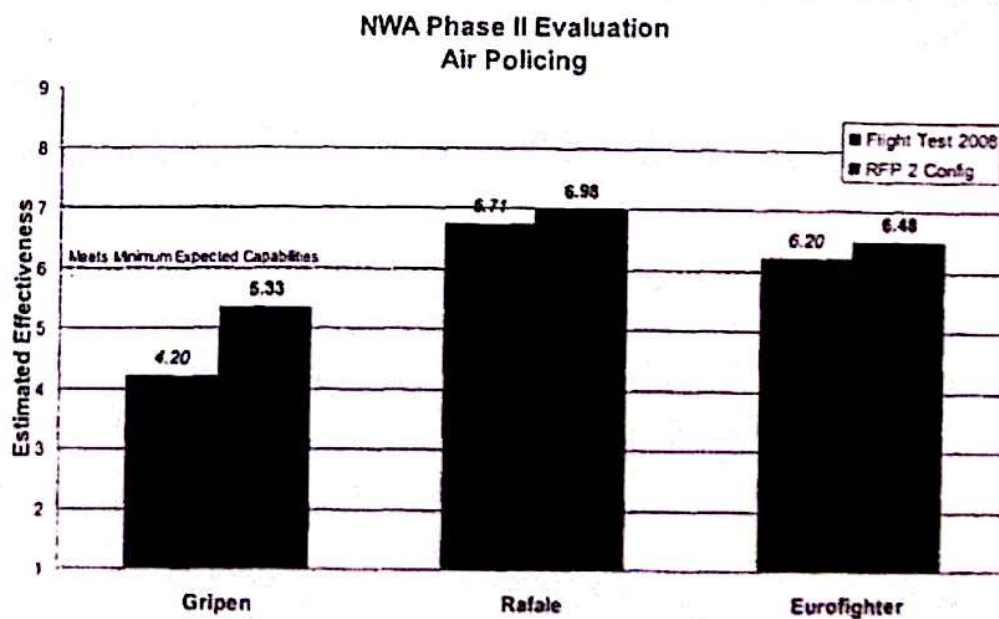


Fig. 2-5. Effective NWA score of each NFA candidate for Air Policing missions

SECTION II - AIR POLICING

The best overall Air Policing persistence effectiveness was given by the Rafale for updated alternative A with a rating value of 7.0 and by the Gripen for the alternative B with a rating value of 7.1. The Gripen offers a better fleet persistence (only) rating value over the other candidate with a 7.0 for the updated alternative A and a 9.0 for the alternative B. However, for persistence calculation for the alternative B, SAAB considered a pooling of spare parts² with other Gripen users which reduces in fact the turnaround time and impacts favorably the fleet persistence.

For the specific alternative A (22 aircraft), the Rafale has been considered as the preferred candidate in the air policing mission in regard to fleet persistence due to its overall time on station, lack of operational restriction (gun, fuel difference between single seat and two seat aircraft) and dash performances; the Gripen in the MS 21 configuration should be considered as the second best candidate; the Eurofighter should be considered as the least preferable candidate due to the modest persistence of the fleet for the alternative A.

5. CONCLUSIONS

Based on Flight Test 2008 and upgrades proposed for delivery configuration in 2015, all three NFA candidates are able to perform Air Policing Missions. With a score higher than six, only the Rafale and the Eurofighter have pass the threshold of "Meets Minimum Expected Capabilities"³.

The capabilities of the Rafale and the Eurofighter to accomplish Air Policing tasks were rated mainly with a good effectiveness. Nevertheless the Eurofighter still has four important METs rated with medium to low effectiveness.

The upgrades proposed with the new Gripen MS21 have consequent impacts on all Mission Essential Tasks required for Air Policing operations. However, Gripen MS21 performances, endurance and QRA improvements which are part of the important Air Policing tasks, still have an estimated Effectiveness rated medium to low. The likelihood of the Gripen MS21 of being unable to carry out with success AP missions is considered to be somewhat possible.

6. RECOMMENDATIONS

The Rafale is still recommended as the preferred candidate for the accomplishment of Air Policing missions. The best alternative is the Eurofighter.

6.1. SPECIFIC

If the Gripen MS21 has been chosen, OT&E Flight Tests in the Air Policing domain should be conducted in Switzerland to assess the real effectiveness of the high importance Mission Essential Tasks.

² Was not the case for the other candidates (part number integrity)

³ Threshold given by POL NFA before Flight Tests 2008

SECTION III - DEFENSIVE COUNTER AIR

3.3. NFA COMPARISON IN DEFENSIVE COUNTER AIR

A comparison of the overall effectiveness between each NFA candidates for the Defensive Counter Air domain is given in figure 3-5. The figure shows also the impact on estimated effectiveness provided by upgrades proposed for the delivered configuration.

The Gripen MS21 obtained the highest delta effectiveness in the Defensive Counter Air domain with 59 upgrade items concerning DCA domain.

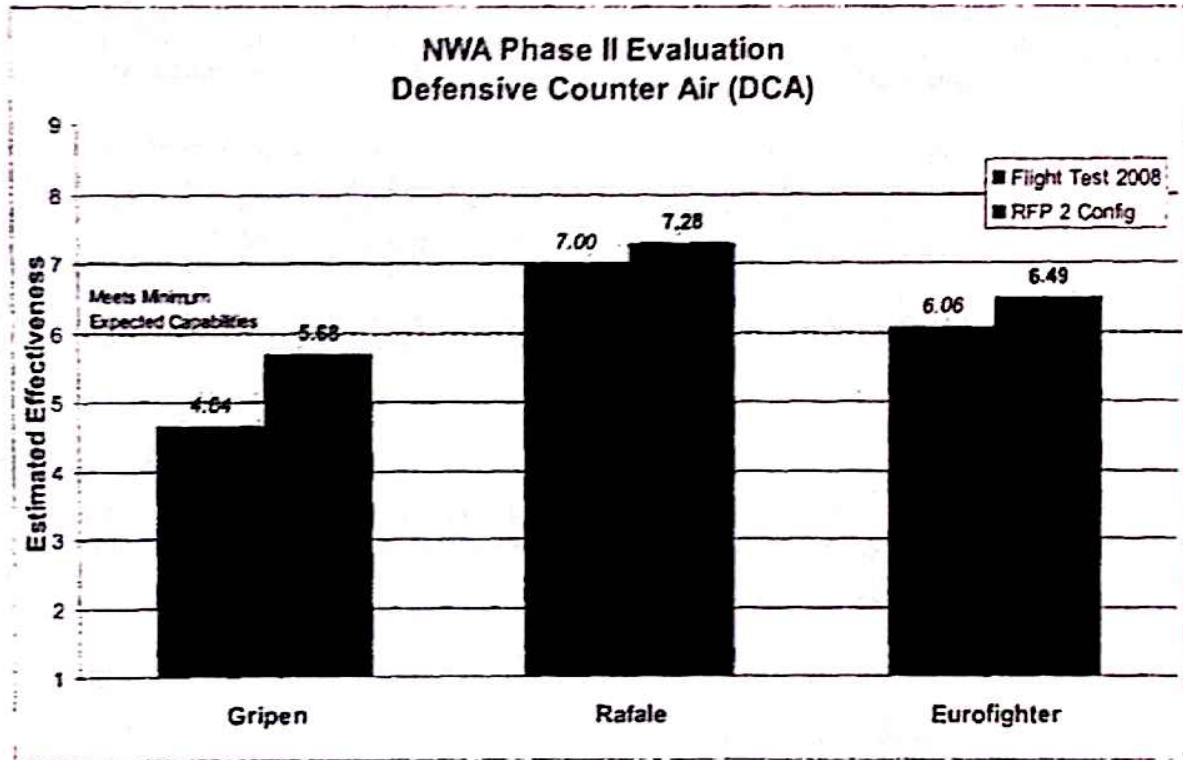


Fig. 3-5. NWA score (Effectiveness) of each NFA candidate for DCA missions

With a score of 7.28 for the Rafale and 6.49 for the Eurofighter, both aircraft have reached the threshold of "Meet Minimum Expected Capabilities".

SECTION III - DEFENSIVE COUNTER AIR

5. CONCLUSIONS

Based on Flight Test 2008 and upgrades proposed for delivery configuration in 2015, only the Rafale and the Eurofighter have several Mission Essential Tasks required by DCA missions above the limit of effectiveness acceptability. For the Gripen MS21 none of the DCA METs have reached the limit of effectiveness acceptability.

The Rafale can be engaged in all Defensive Counter Air scenarios. The capabilities of the Rafale to fulfill Defensive Counter Air missions have been rated with an overall good effectiveness.

The P1E upgrade of the Eurofighter does not provide big improvements for the Defensive Counter Air missions tasks. The Eurofighter can accomplish all DCA scenarios. However, the high importance tasks for the user rated with a medium to low effectiveness may prevent the good execution of DCA missions.

Despite the upgrades scheduled with the delivery configuration of the Gripen MS21, all Mission Essential Tasks to perform DCA mission are still below the limit of effectiveness acceptability. The Gripen MS21 can be engaged in all type of DCA scenarios. However, the likelihood of being unable to carry out with success DCA missions is significant. In general, the overall effectiveness of the Gripen MS21 is still insufficient get the air superiority against future threats (2015+).

The Rafale and the Eurofighter were the only two NFA candidate to cross the threshold of "Meets Minimum Expected Capabilities" for DCA Missions.

6. RECOMMENDATIONS

The Rafale is the only candidate with the best overall effectiveness to fulfill DCA missions. The Rafale is still recommended as the preferred candidate for the accomplishment of DCA missions. The best alternative is the Eurofighter.

6.1. SPECIFIC

Before 2025 (at the latest), a stock (small number) of Meteors shall be part of the Swiss inventory. See para. 4.4.3.

3.3. NFA COMPARISON FOR OCA/AI/DA(ESCORT) MISSIONS

A comparison of effectiveness between each NFA candidates for the OCA/AI/DA (Escort) domain is given in figure 4-5. The figure shows also the impact on estimated effectiveness provided by upgrades proposed for the delivered configuration.

The Gripen MS21 obtained the highest delta effectiveness in the OCA/AI/DA domain with 59 upgrade items.

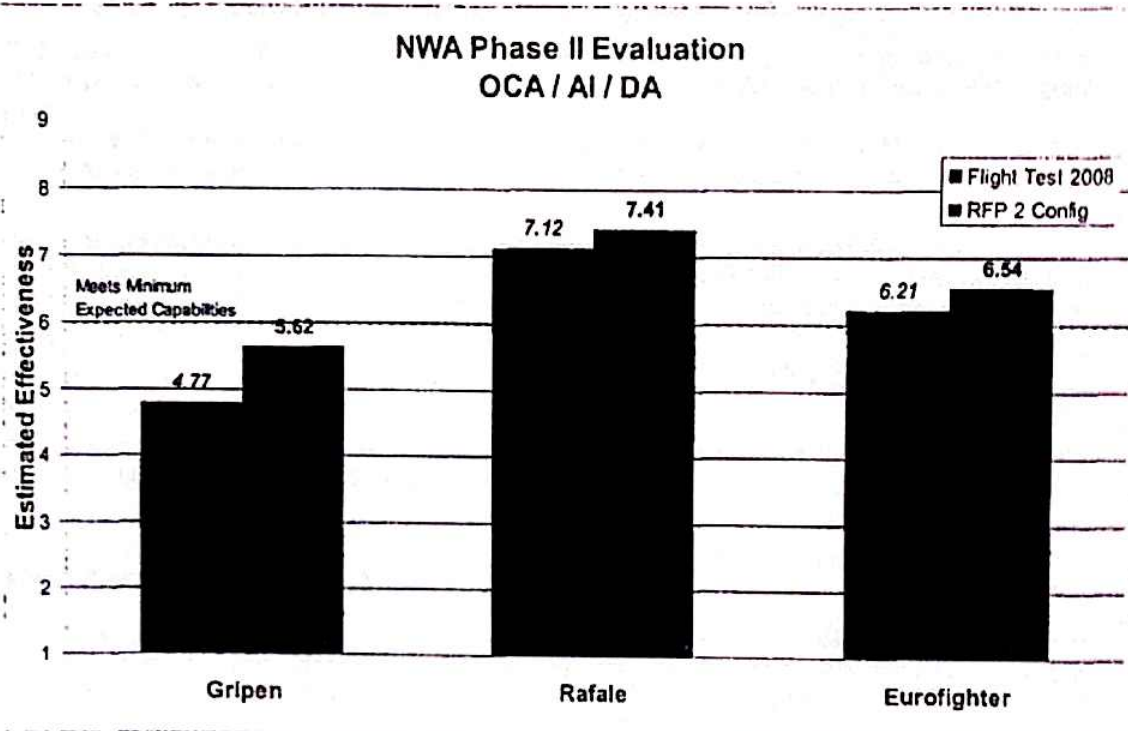


Fig 4-5 NWA score (Effectiveness) of each NFA candidate for OCA/AI/DA (Escort) missions

With a score of 7.41 for the Rafale and 6.54 for the Eurofighter, both aircraft have reached the threshold of "Meet Minimum Expected Capabilities".

4. CONCLUSIONS

Based on Flight Test 2008 and upgrades proposed for delivery configuration in 2015, only the Rafale have all Mission Essential Tasks required by OCA/AI/DA (Escort) missions above the limit of effectiveness acceptability.

The Rafale can be engaged with a good effectiveness in all type of OCA/DA/AI (Escort) missions.

The P1E upgrade of the Eurofighter provides pertinent improvements for the accomplishment of OCA/AI/DA (Escort) tasks. The Eurofighter effectiveness in the accomplishment of OCA/AI/DA is good to medium.

The Eurofighter can be engaged as Escort in all OCA/AI/DA type of scenarios. However, the high number of tasks rated with a medium effectiveness (7) may prevent the good execution of such missions.

The Gripen MS21 has been improved in most tasks required to perform OCA/AI/DA (Escort) missions. For the delivered configuration, the effectiveness has been improved from a Low effectiveness to a Medium effectiveness with nevertheless some tasks such as combat radius, survivability and detection remaining in the sector with a low estimated effectiveness.

The estimated effectiveness of the Gripen MS21 is still insufficient to perform OCA/AI/DA (ESCORT) missions with a good probability of success.

The Rafale and the Eurofighter were the only two NFA candidate to cross the threshold of "Meets Minimum Expected Capabilities" OCA/AI/DA (Escort) missions.

5. RECOMMENDATIONS

The Rafale is the only candidate with the best overall effectiveness to fulfil Escort missions in OCA/AI/DA scenarios. The Rafale is still recommended as the preferred candidate for the accomplishment of OCA/AI/DA missions. The best alternative is the Eurofighter.

3.3. NFA COMPARISON IN RECONNAISSANCE

A comparison of effectiveness between each NFA candidates for the Reconnaissance domain is given in figure 5-5. The figure shows also the impact on estimated effectiveness done by upgrades proposed for the delivered configuration.

The Gripen MS21 obtained the highest delta effectiveness in the Reconnaissance domain with 57 upgrade items.

With a score of 7.63 the Rafale is the only one achieving the "Minimum Expected Capability" score. The estimated capability of the Gripen MS21 with a score of 5.79 is close to the Swiss Air Force expected capabilities. The Eurofighter with a score of 5.43 does not meet the "minimum expected capabilities".

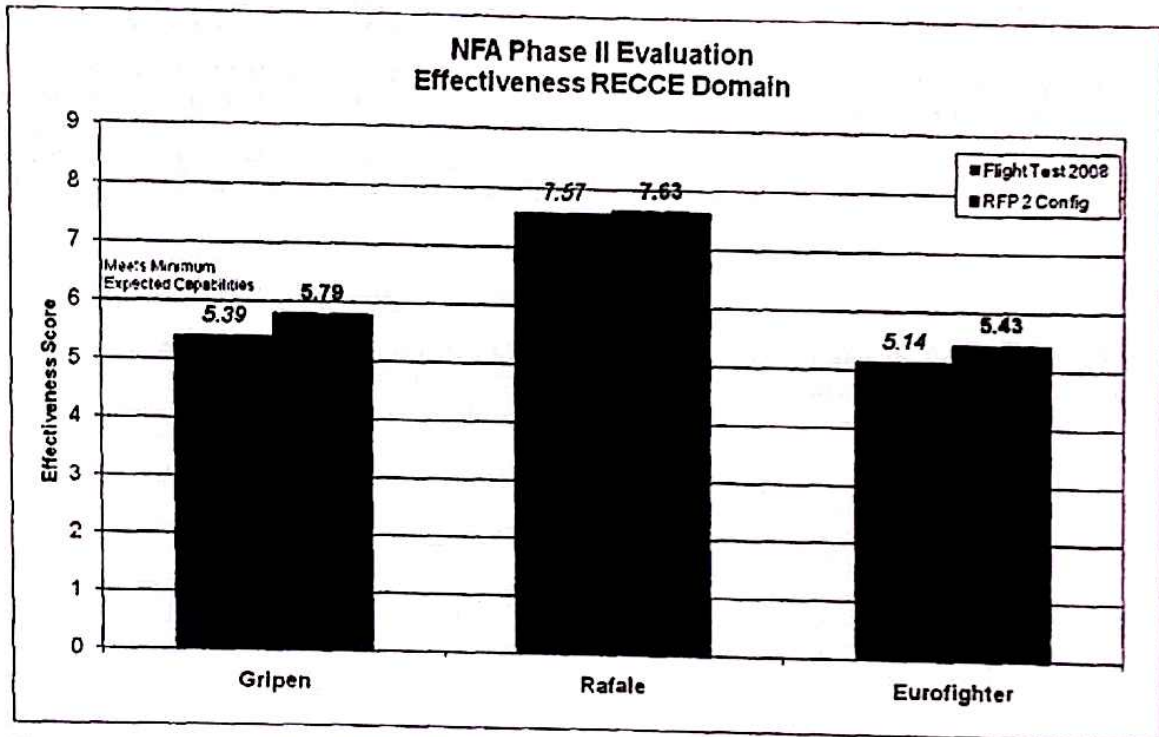


Fig. 5-5. Effective NWA score of each NFA candidate for Reconnaissance missions

4. CONCLUSIONS

Based on Flight Test 2008 and upgrades proposed for delivery configuration in 2015, the Rafale is the only one fulfilling the Swiss Air Force expected capability for Reconnaissance missions. With exception of the Multirole task which has been qualified with a medium effectiveness, all other tasks required to perform Recce missions have been qualified with a good to very good effectiveness. Among the three candidates, the Rafale is the only one which has passed the threshold of "Meets minimum expected capabilities".

The Rafale can be engaged in all type of Reconnaissance missions with a good to very good effectiveness.

The improvements planned for the Gripen MS21 bring the capability of the system close to the expected capabilities. However, the risk involved in the redesign of the aircraft is rated high.

The Gripen MS21 can be engaged in all type of Recce missions. However the likelihood of being unable to carry out with success Recce missions is considered somewhat possible.

The Eurofighter did enhance its capability for the delivered configuration in 2015 especially in the multirole task. The overall effectiveness of the Eurofighter in the accomplishment of Recce missions is considered as Medium.

The Eurofighter can be engaged in all type of Recce missions. However the likelihood of being unable to carry out with success Recce missions is considered likely possible.

5. RECOMMENDATIONS

From a Reconnaissance point of view, the Rafale is the recommended aircraft. Its mature Recce sensors fulfill completely the Swiss Air Force expected capabilities. The Rafale can accomplish all type of Recce missions with good to very good effectiveness.

SECTION VI - STRIKE

3.3. NFA COMPARISON IN STRIKE MISSIONS

A comparison of effectiveness between each NFA candidates for the Strike domain is given in figure 6-5. The figure shows also the impact on estimated effectiveness done by upgrades proposed for the delivered configuration.

The Gripen MS21 and the Eurofighter have almost the same delta effectiveness in the Strike domain.

With a score of 7.63 the Rafale is the only one achieving the "minimum expected capability" score. The estimated capability of the Gripen MS21 with a score of 5.80 and the Eurofighter with a score of 5.75 are close to the Swiss Air Force expected capabilities.

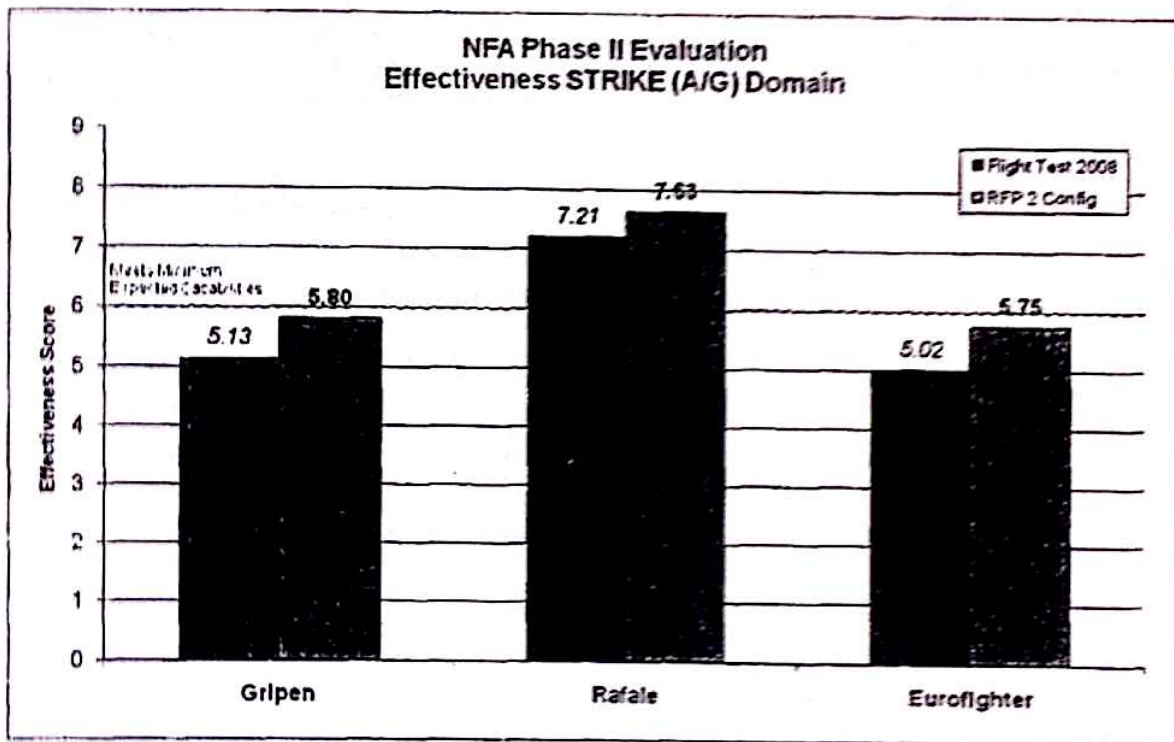


Fig. 6-5. Effective NWA score of each NFA candidate for Strike missions

4. CONCLUSIONS

Based on Flight Test 2008 and upgrades proposed for delivery configuration in 2015, the Rafale is the only one fulfilling the Swiss Air Force expected capability and can be engaged in all Strike missions with a good to very good overall effectiveness.

The improvements scheduled for the Gripen MS21 bring the capability of the system close to the Swiss expected capabilities. However, the risk involved in the redesign of the aircraft is rated high.

The overall expected effectiveness of the Gripen MS21 for Strike missions can be qualified as medium. It can be engaged in all type of Strike missions. However, the likelihood of being unable to carry out with success Strike missions is somewhat possible.

The Eurofighter enhanced overall its capability for the Strike missions. Its effectiveness to accomplish Strike missions is rated from low to good. The overall effectiveness of the Eurofighter can be qualified Medium and can be engaged in all type of Strike missions. However the likelihood of being unable to carry out Strike missions is considered as somewhat possible.

5. RECOMMENDATIONS

From the Strike point of view, the Rafale is the recommended aircraft. Its mature systems fulfill completely the Swiss Air Force expected capabilities.

Evaluationskriterien (1/2)

1. operationelle Wirksamkeit (60 %)

- Luft-Luft (50 %)
- Aufklärung und Luft-Boden (je 20 %)
- Wachstumspotential (10 %)

2. operationelle Eignung (15 %)

- Wartungs-Prozesse (30 %)
- Miliztauglichkeit (25 %)
- Kompatibilität mit CH Infrastruktur (25 %)
- Lärm- und Abgas-Emissionen (20 %)

3. Beteiligung / Kooperation (25 %)

- Beteiligung CH Industrie (70 %)
- militärische Kooperation (30 %)

Evaluationskriterien (2/2)

Kosten

- Beschaffung, inkl. Logistikpaket
- Anpassung Infrastruktur
- Betrieb und Instandhaltung erste zehn Jahre (3x)

pro memoria:

- Risiken
- Zeitplan
- Verhältnis Wirksamkeit zu Kosten

nicht Kompetenz der Projektorganisation:

- politische Aspekte