החלפת מנועים במטוס קורנס (F-4)
יום עיון מנועי סילון
טכניון / פקולטה לאיורונאוטיקה
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י"ר אגודת המהנדסי מיקנוהז תפעולה
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Reengineering of F-4 A/C
Superphantom / Phantom 2000

Programs targets:

• Part of modernization program of F-4 A/C weapon system.

• Opportunity to use common engine with LAVI A/C.

• Improvements of performance, agility and survivability.

• Capability to perform low level high speed, long range strike.
Comparison between PW1120 and J-79-17 engines
## Comparison between PW1120 and J-79-17 engines

<table>
<thead>
<tr>
<th>Feature</th>
<th>PW1120</th>
<th>G.E J-79-17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Turbofan</td>
<td>Turbo-Jet</td>
</tr>
<tr>
<td>Length</td>
<td>4110 mm</td>
<td>5300 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>1292 kg</td>
<td>1750 kg</td>
</tr>
<tr>
<td>Compressor by-pass</td>
<td>3 fan and 10 axial stages</td>
<td>17 axial stages</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>1:30</td>
<td>1:13.5</td>
</tr>
<tr>
<td>“Leaky” T.F.-0.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thrust</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Military</td>
<td>6137 kgf</td>
<td>5290 kgf</td>
</tr>
<tr>
<td>Max after burner</td>
<td>9337 kgf</td>
<td>7940 kgf</td>
</tr>
<tr>
<td>Thrust to weight ratio</td>
<td>7.22:1</td>
<td>4.6:1</td>
</tr>
<tr>
<td>S.F.C (Specific Fuel Consumption)</td>
<td>0.76 kg/kgf</td>
<td>0.87 kg/kgf</td>
</tr>
<tr>
<td>Max Military</td>
<td>1.9 kg/kgf</td>
<td>2.0 kg/kgf</td>
</tr>
<tr>
<td>Max after burner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engines Control</td>
<td>“FADEC”</td>
<td>HYDRO-MECHANICAL</td>
</tr>
</tbody>
</table>
CHANGES / MODIFICATIONS

- Inlet compatibility to the new air-flow.
- New inlet duct extension and change of secondary air-flow (cooling) around the engine.
- Structure and new engine mounts.
- Modified A/C Bay-doors.
- New airframe mounted gearbox with integral generator and pumps.
- Modifications of hydraulic and electrical system of A/C.
- Bleed management and air-conditioning system.
- Cockpit instrumentation of engine parameters.
- “Automatic” throttle – interface between pilot throttle and FADEC.
- Flight instrumentation.
Main development milestones

- Design and manufacture of the modifications.
- Installation of PW1120 engine on the starboard side nacelle of the A/C.
- Ground tests.
- Flight test with both J-79-17 and PW1120 installed.
- Two PW1120 installed.
F-4 with PW1120 performance improvements

- Speed: mach ≥ 1 without afterburner.
- Increase of low level speed with 18 bombs from 1046 km/n (605 kt) to 1120 km/n (650 kt)
- Combat thrust to weight ratio ≥ 1.04 (17% better).
- Sustained turn rate: 15% better.
- Climb rate: 36% better.
- Range increase: 12%-21%.
Summary

• F-4 engine conversion from G.E. J-79-17 to PW1120 was very successful and met the expectations of IAF.

• The program was terminated with the cancellation of LAVI A/C development.

• The prototype A/C is in the IAF museum near Beer-Sheva and is part of our aviation history.