# Supplementary Information - Online Resource 1

## Multidisciplinary Screening of a 178 kN Class Geared Turbofan with Explicit Mission Auditing and Independent Uncertainty Checks

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### Package contents

The archive supplies frozen inputs, portable scripts, complete uncertainty draws, thermal histories, rotor matrices/results, numerical checks and figure exports. README.md maps the files and documents their scope. Main manuscript, cover letter and internal reviewer notes are separate submission records.

### Reproduction

Use Python 3.12 in a separate environment. Extract the ZIP, then run:

```
python -m pip install -r requirements.txt

python verify_manifest.py

python run_reproduction.py
```

The workflow uses the frozen k = 0.194 cooling law and seed 20261017. It does not rerun design selection or retune the cooling coefficient. Historical notebook fragments are supplied for provenance; they are not standalone entry points.

### Interpretation

The 5000 mission samples are independent draws on the frozen matched trajectory. There are 210 temperature exceedances above 1250 K: 4.20%, with a 95% Wilson interval of 3.678-4.792%, and zero numerical failures. These are conditional screening results under assumed thermal input laws.

Compressor operability remains unevaluated; surge margins are undefined. Rotor/AMB results use a separate speed sweep. Detailed cooling-system pressure losses and film-cooling aerodynamic penalties are unresolved. The package establishes neither experimental validation nor qualified engine performance.

# Supplementary Fig. S1

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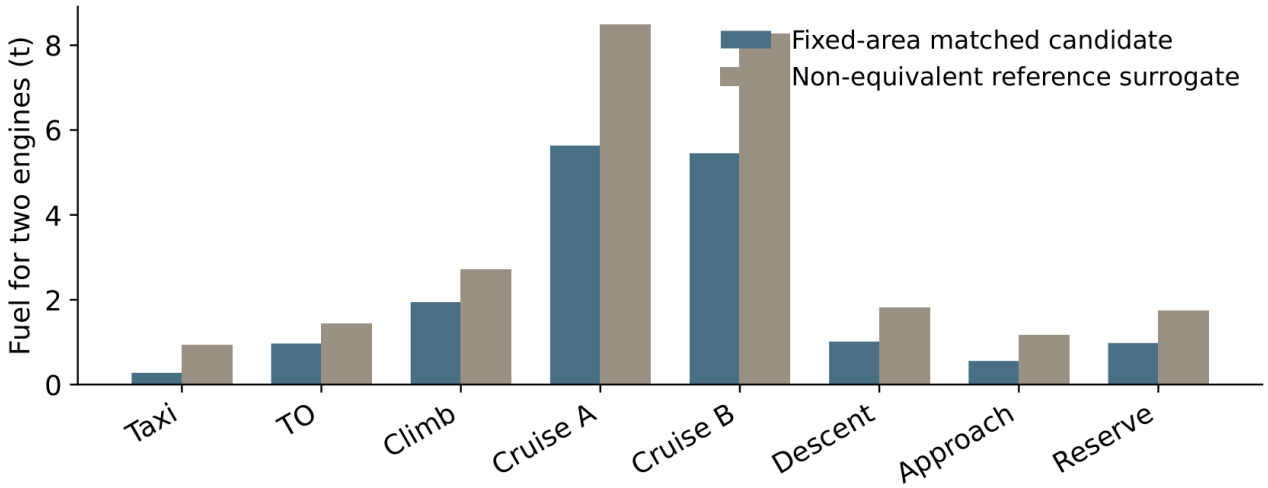



**Fig. S1 Model-internal two-engine phase fuel comparison using non-equivalent surrogate models under a common imposed thrust-demand profile**

The six-hour totals are 16.824 t for the candidate and 26.547 t for the archived reference. The arithmetic difference is 36.63%. These are outputs of the paired computational representations.

Common demand does not establish aircraft equivalence. Candidate fixed-area component matching and reference throttle-surrogate part-power behavior use different model fidelity, component assumptions and installation treatment. Neither supplies validated aircraft-level fuel predictions. The comparison cannot be attributed to engine architecture alone.

Data: frozen_inputs/reference_mission_fuel.csv and verification/frozen_mission_replay.json; matching outputs are retained under v3_revision/recompute/admission/