Works On Improving ANSAT Performance

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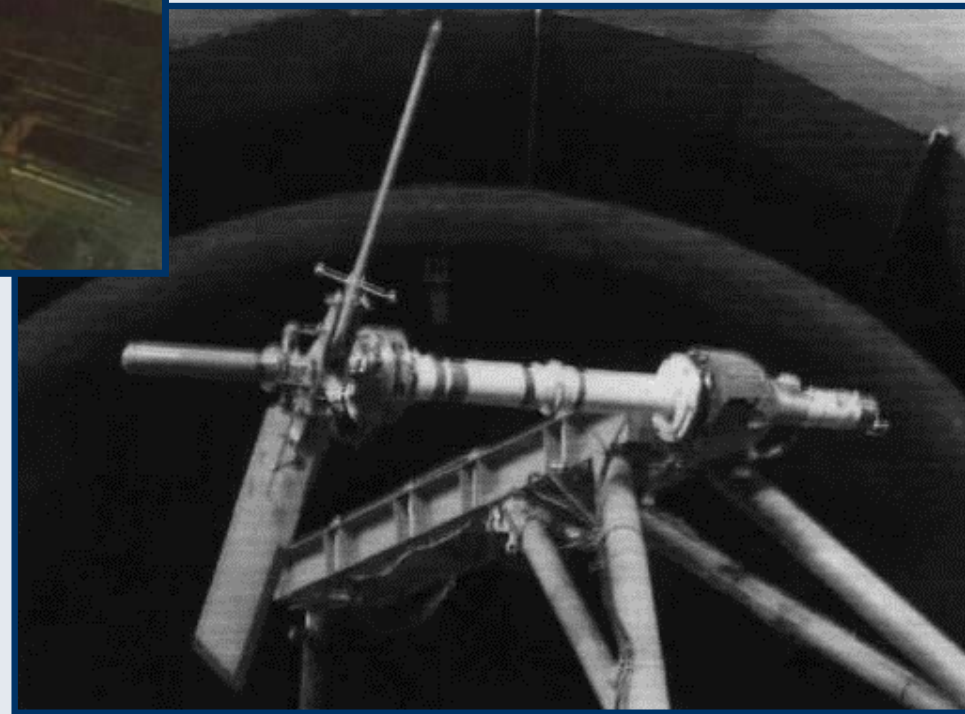Kazan Helicopters, Russia

Speaker: A. Garipov

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ANSAT prototype flight tests

Main and tail rotors in wind tunnel

Full-scale

Real performance
=
Estimated performance

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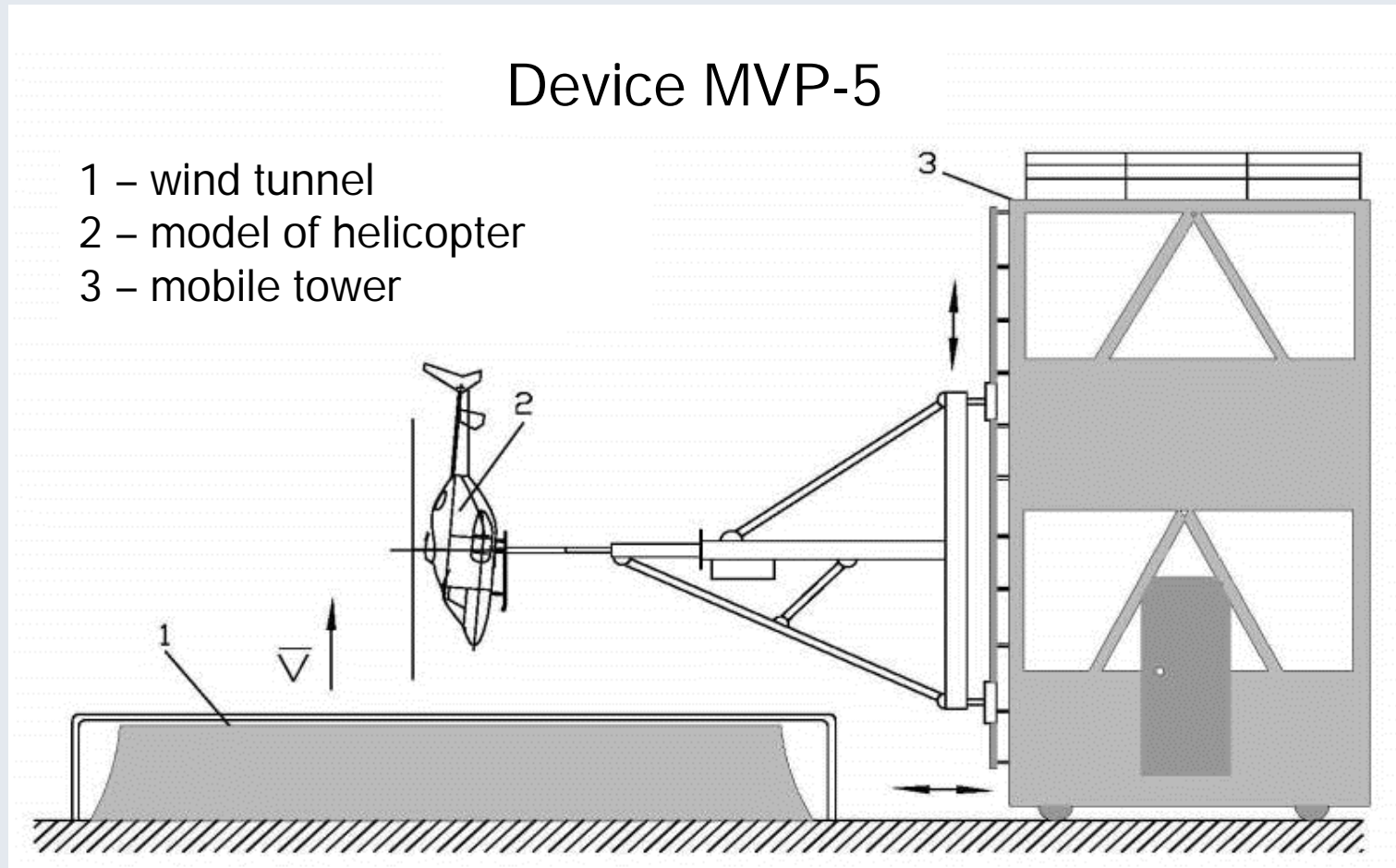КАЗАНСКИЙ ВЕРТОЛЕТНЫЙ ЗАВОД

Directions of research

- Tests in wind tunnel
  - Define the drag coefficient of several variants of the helicopter airframe
  - Determination the model aerodynamic characteristics, including characteristics of static stability
  - Fix the model flow pattern
  - Estimate the influence of the main rotor on aerodynamic characteristics of helicopter airframe
- Flight tests
  - Check results of tests in wind tunnel
  - Detection of real flight performance
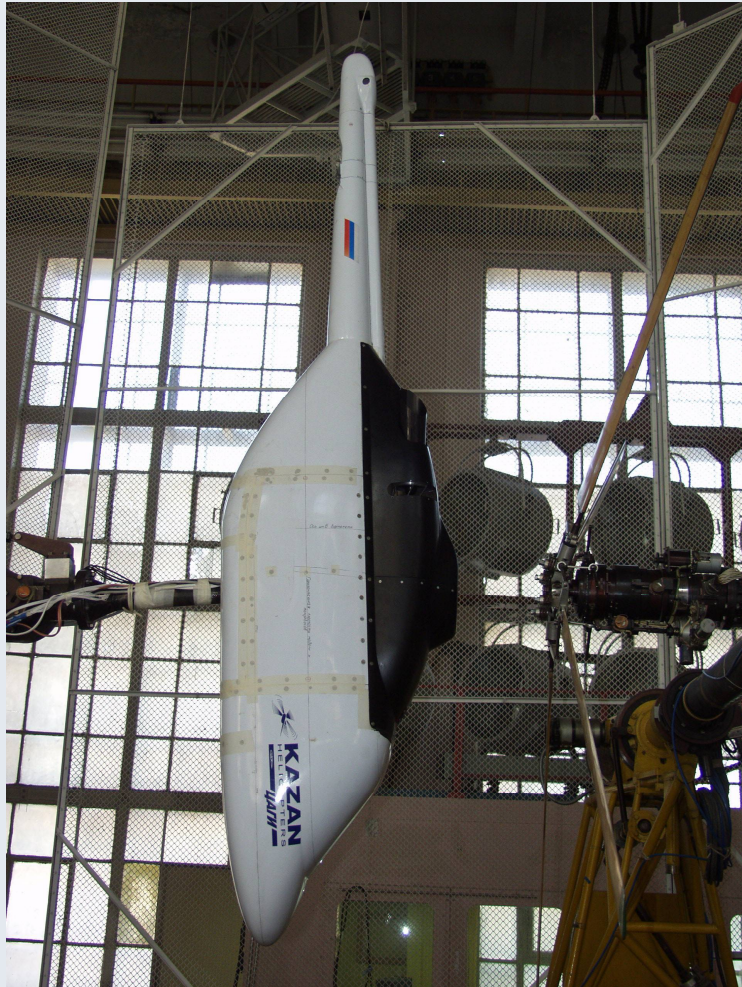 - Search of new tasks for research in wind tunnel

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Tests in wind tunnel

Model of ANSAT in wind tunnel

Device MVP-5

1 – wind tunnel
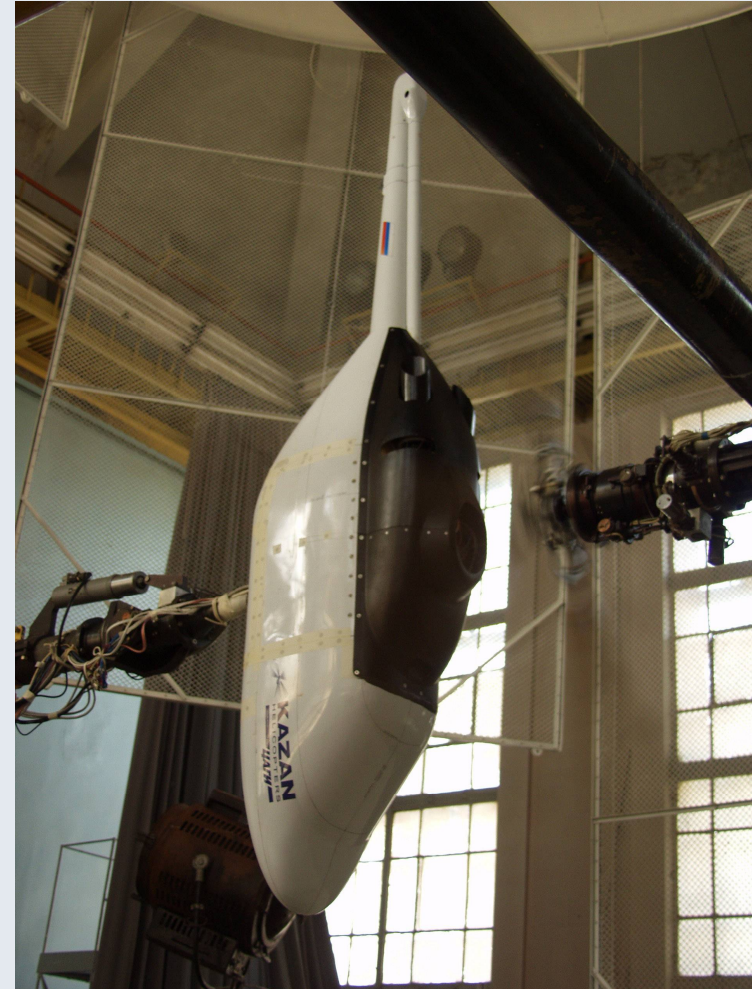2 – model of helicopter
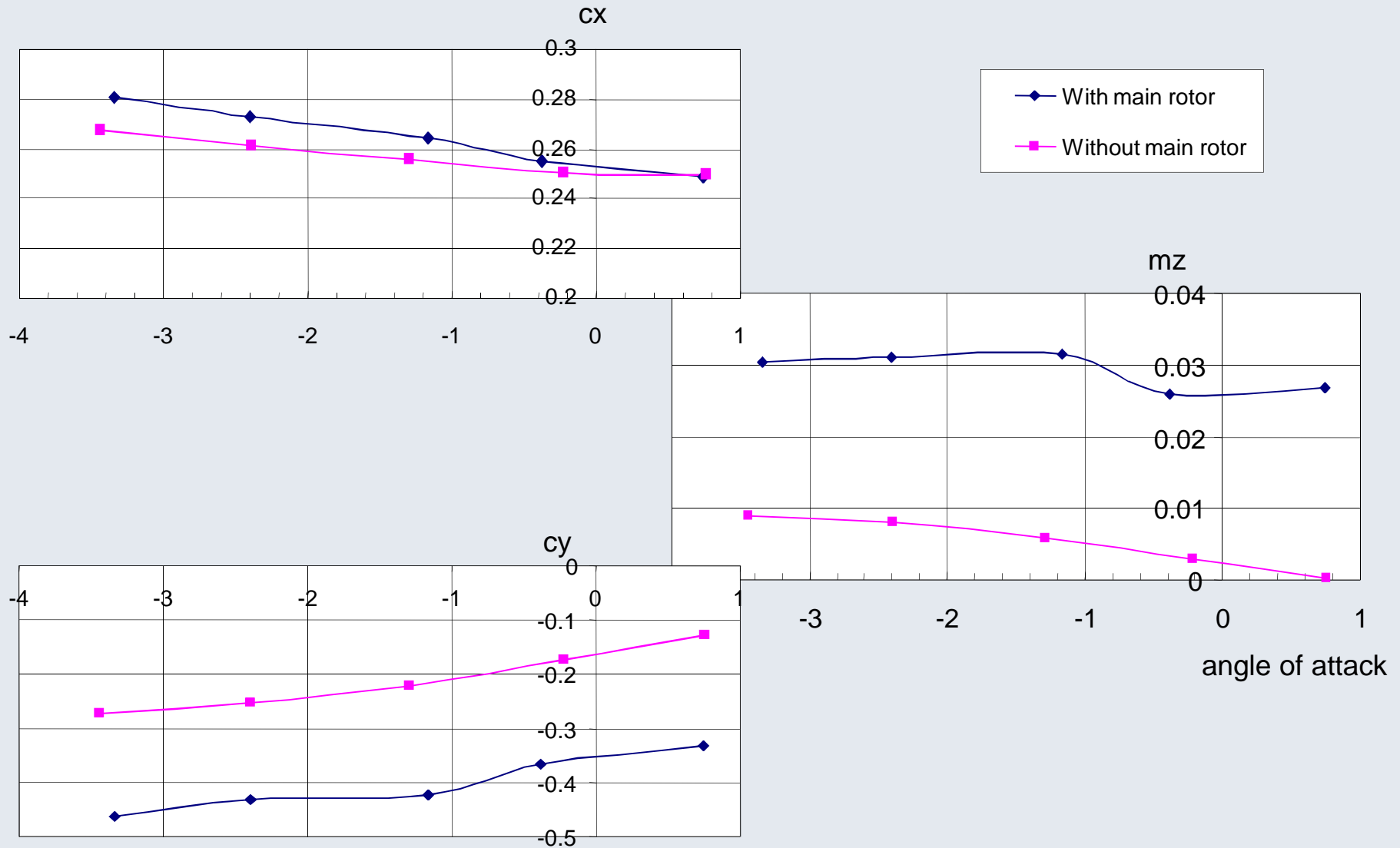3 – mobile tower

Vertical wind tunnel T-105 TsAGI

Model of ANSAT in wind tunnel

without main rotor
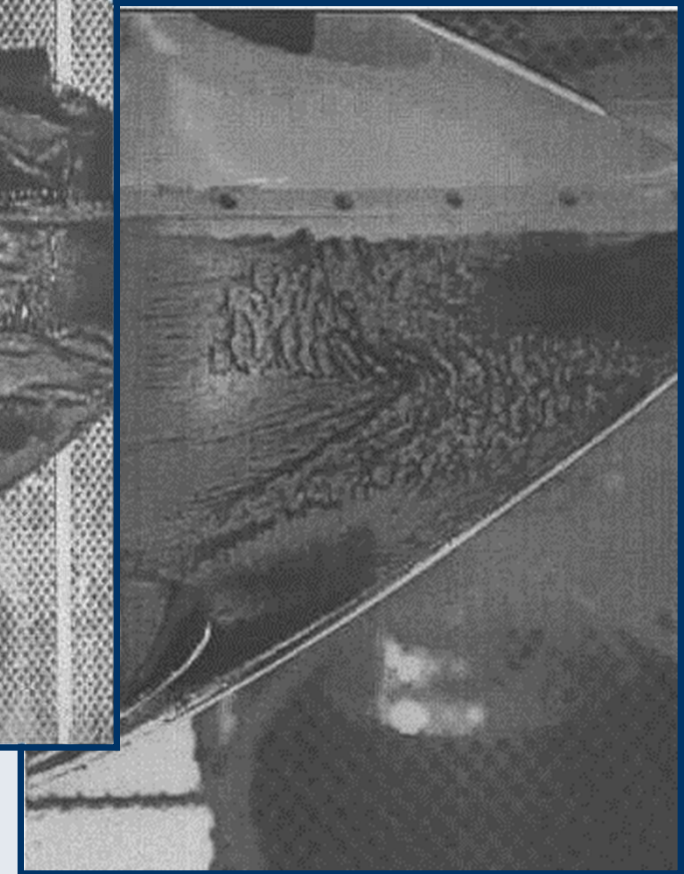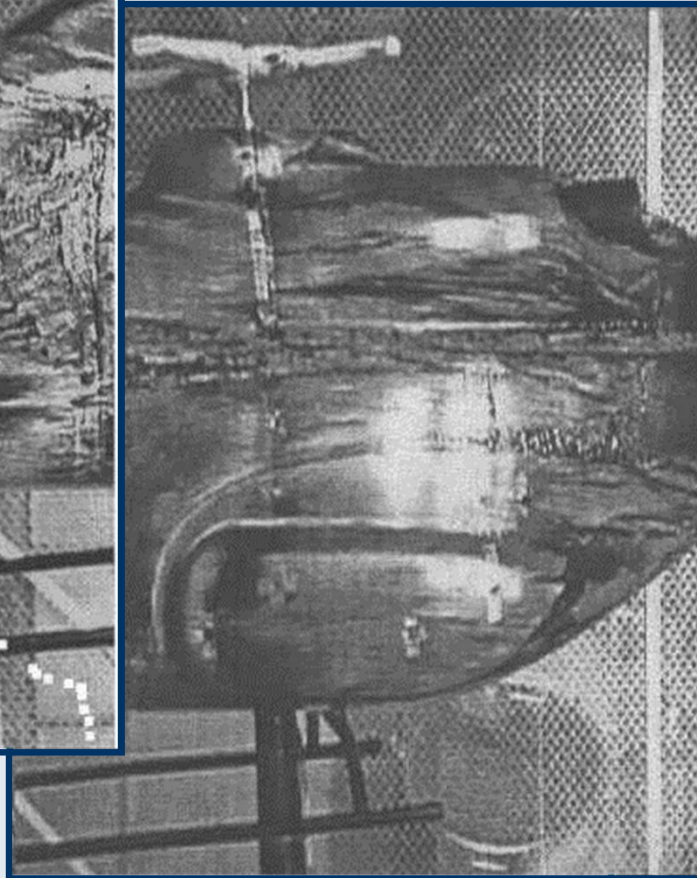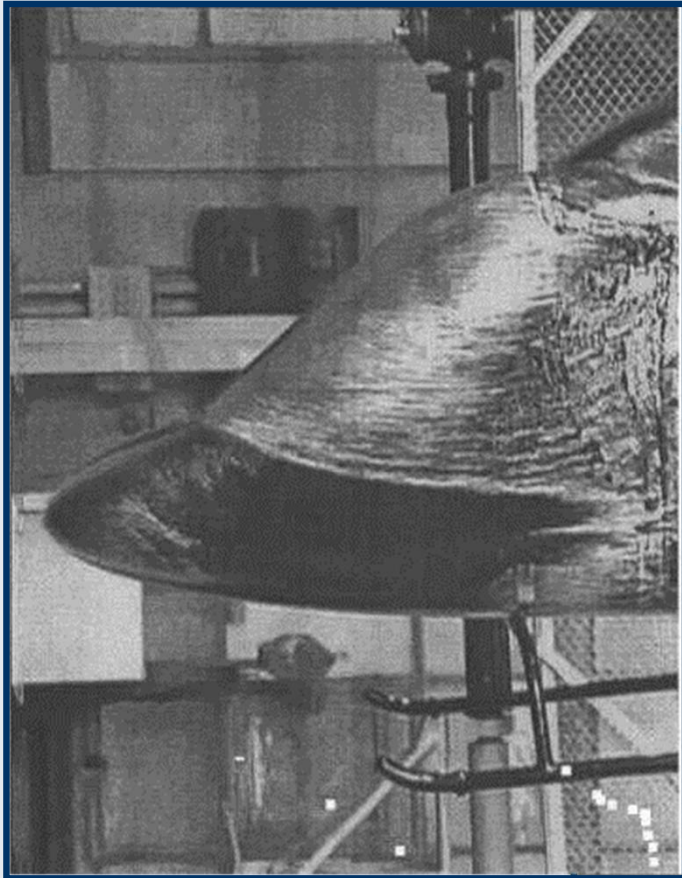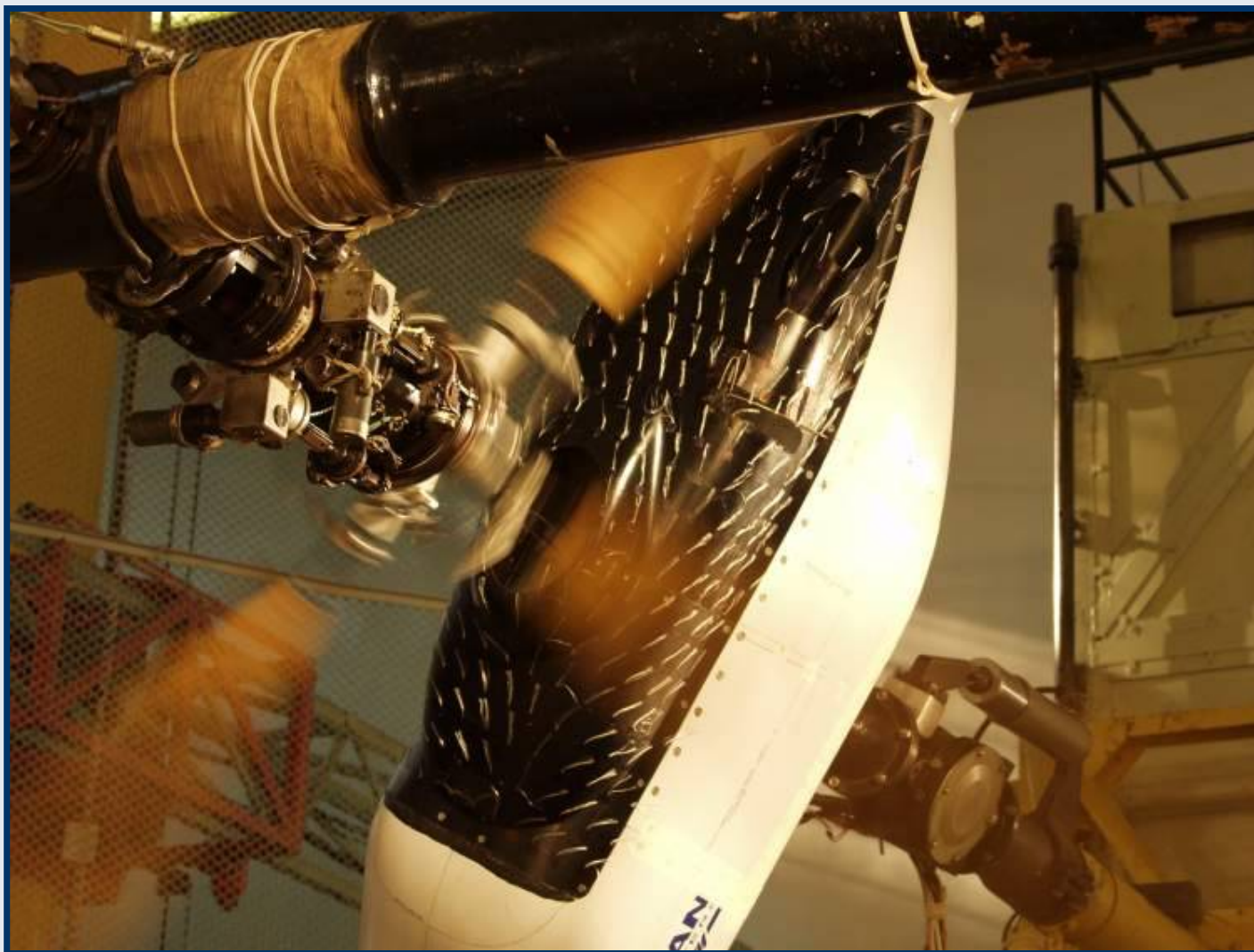

with main rotor

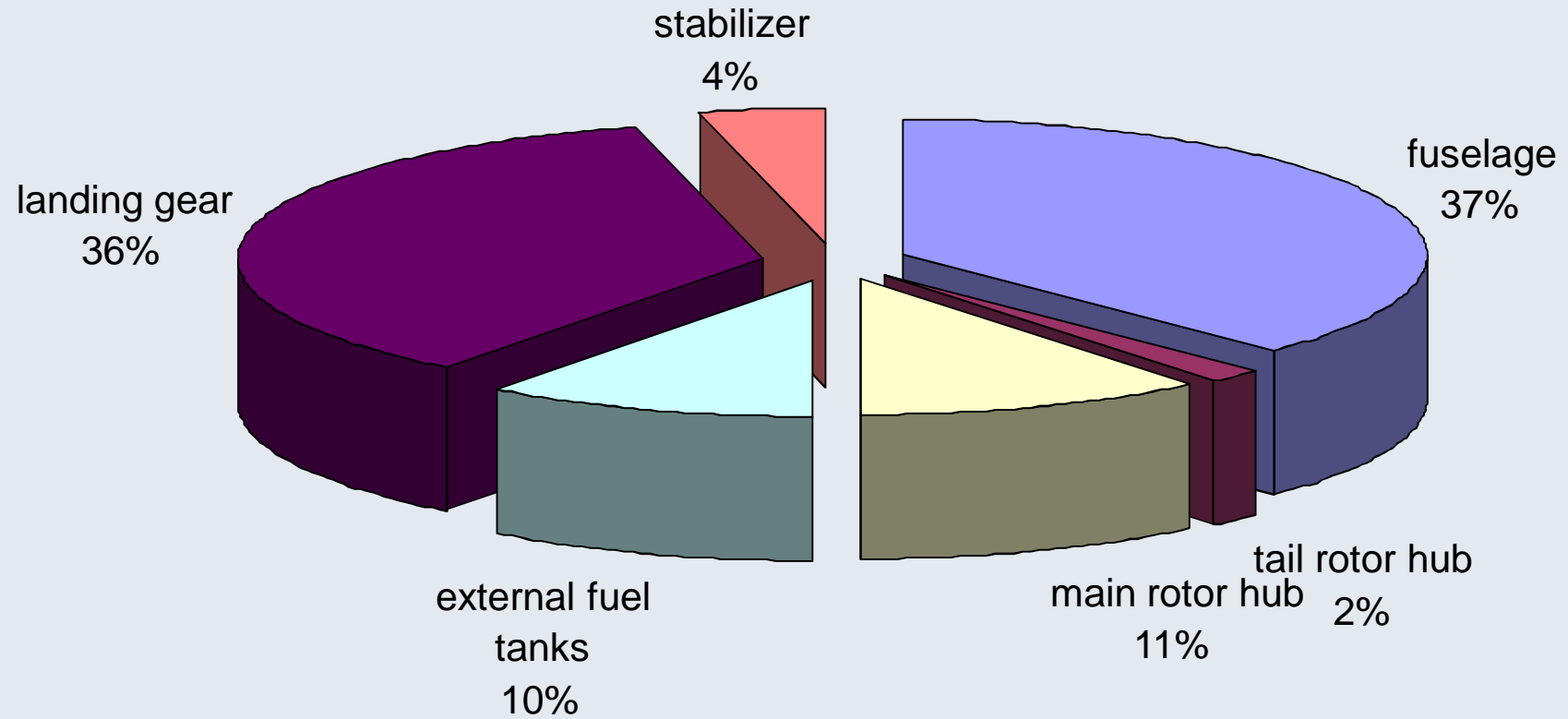# Aerodynamic performance with main rotor
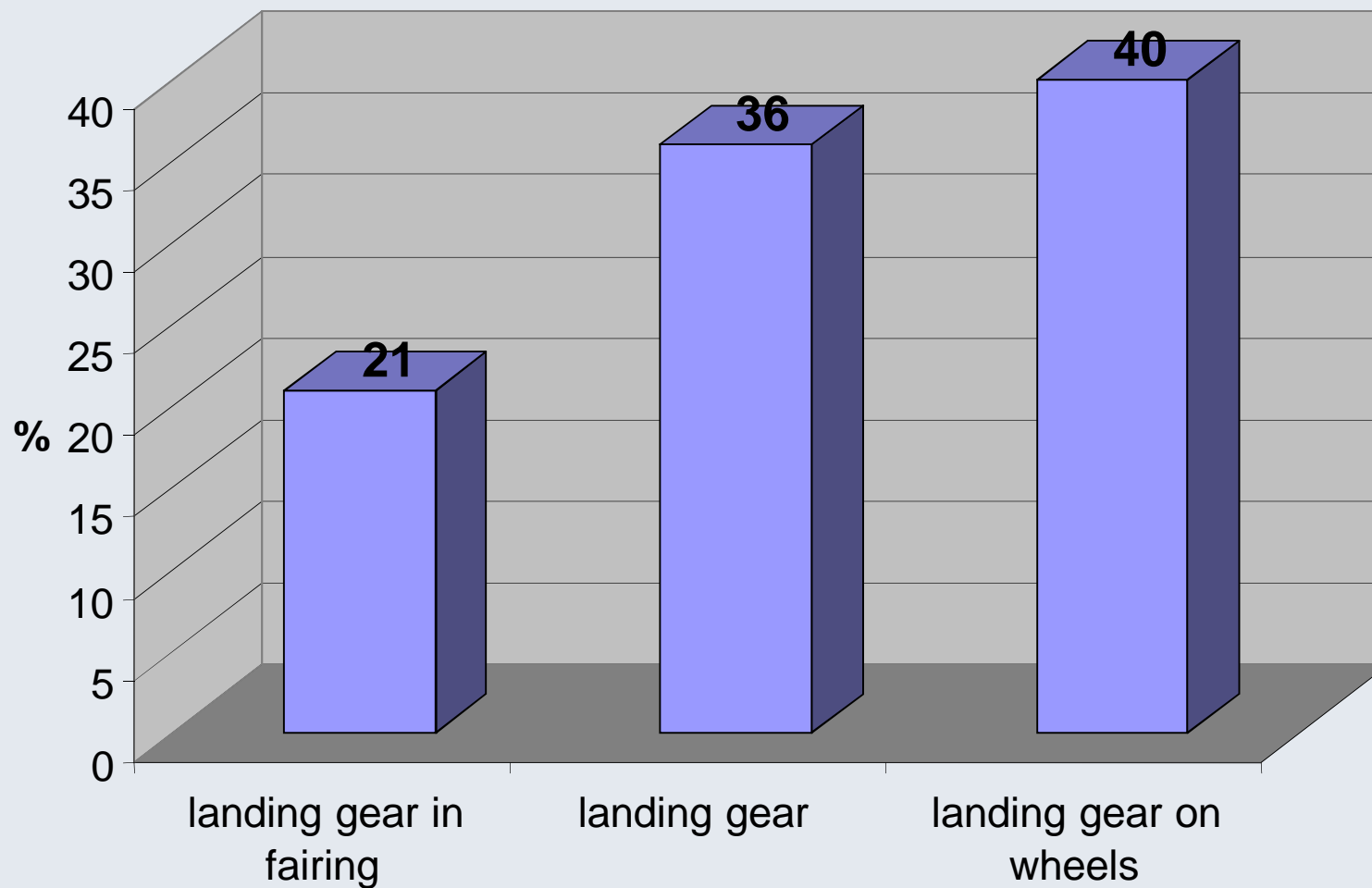
Model flow pattern

Cowling flow pattern

Components of drag coefficient

Drag coefficient of landing gear

Basic results

- External fuel tanks has been removed
- Tail part of airframe has been changed
- Cowling has been changed
- Part of landing gear has been removed in airframe
- Landing gear fairing has been make
- Vertical stabilizer has been increased

Flight Tests

Helicopter flow pattern

External fuel tanks removed

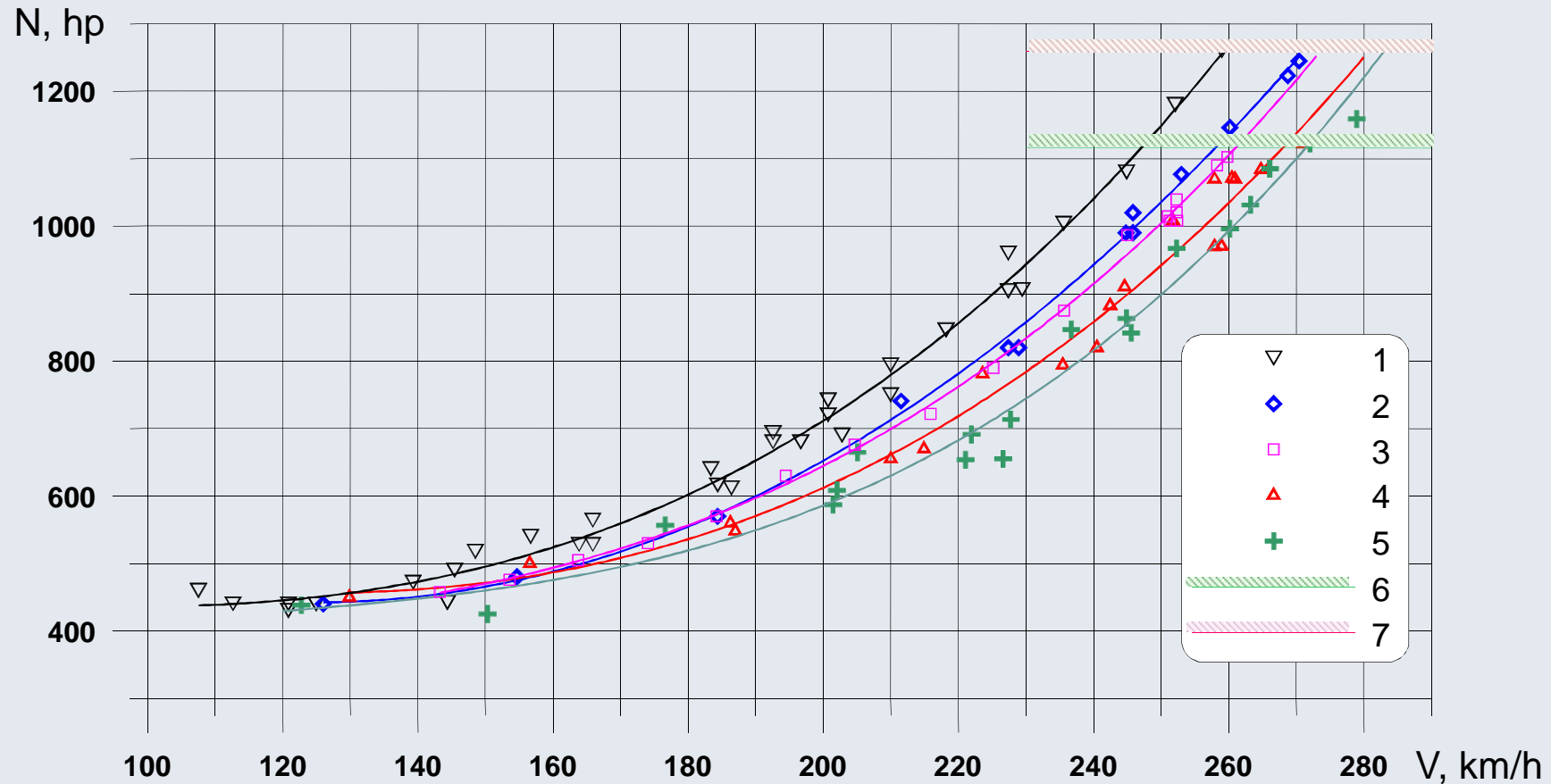# Tail part of airframe changed

Part of landing gear removed in airframe

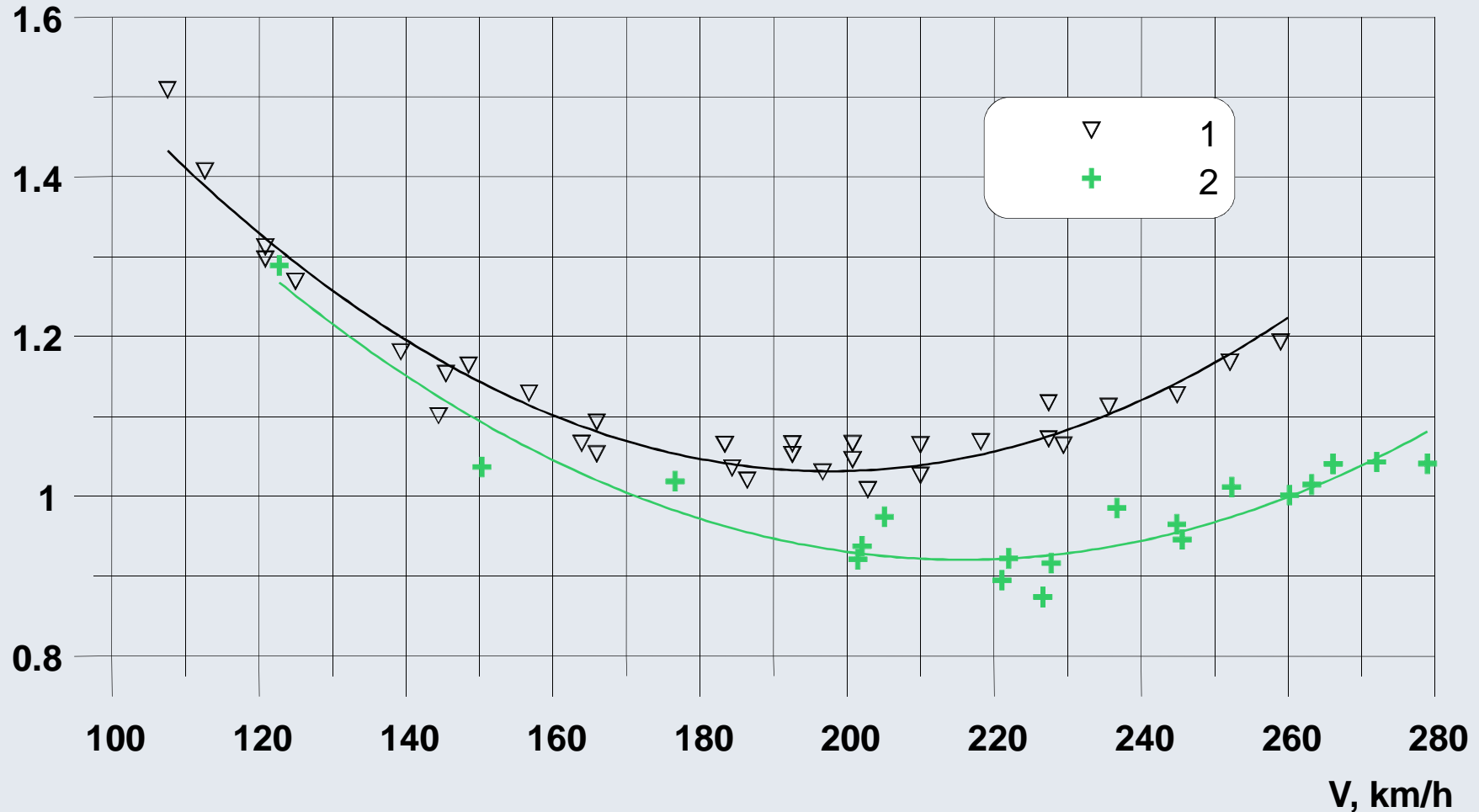# Springs in fairing, vertical stabilizer increased

Required power (Tests results)

1 – prototype of ANSAT
2 – external fuel tanks removed
3 – tail part of airframe changed
4 - part of landing gear removed in airframe

5 – springs in fairing, vertical stabilizer
    increased
6 – cruising power
7 – take-off power

Fuel consumption (Tests results)

Standard construction of ANSAT

Conclusion

- Research in wind tunnel model of ANSAT helicopter have given information for choice aerodynamic design of helicopter

- Data of tests in wind tunnel have used for mathematical model of helicopter

- Joint works TsAGI and Kazan Helicopters for choice aerodynamic design of ANSAT helicopter has given good results:
  - The maximum speed has increased for 25 km/h
  - The fuel consumption has decreased for 11 – 16 %
  - Characteristics of directional stability of the helicopter are provided