Design Considerations for Cold Weather Operations

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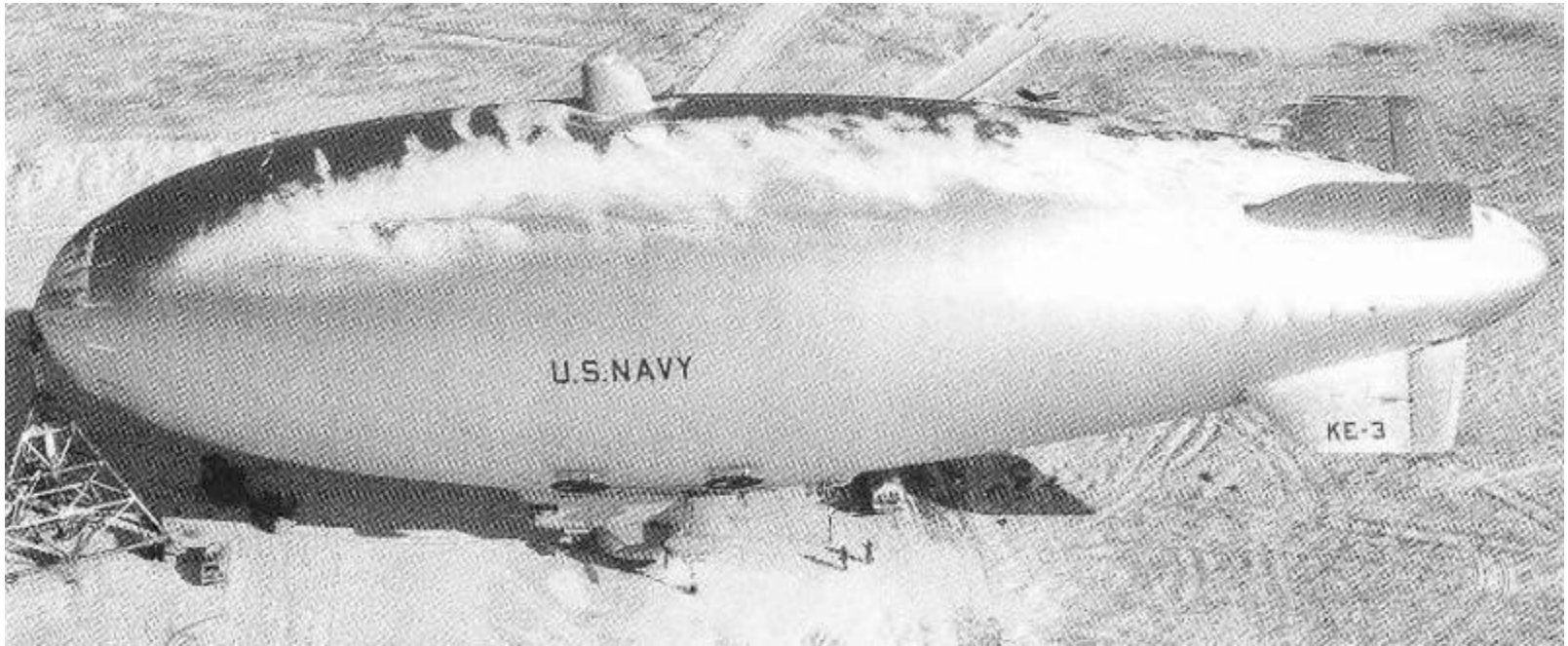
Airships to the Arctic VI

ISOPOLAR

BASI

Obvious Cold Weather Considerations

- Snow and ice clearance/removal at operations site.
- Pre-heat equipment for starting procedures.
- Gondola heating.
- Cockpit windows de-icing/de-misting.
- De-icing/icing prevention for essential systems, e.g. Valves.
- Heating/anti-freeze for fluid systems, and water ballast.
- Prevention of ice build-up in flight.
- Maintenance with heavy clothing and gloves.

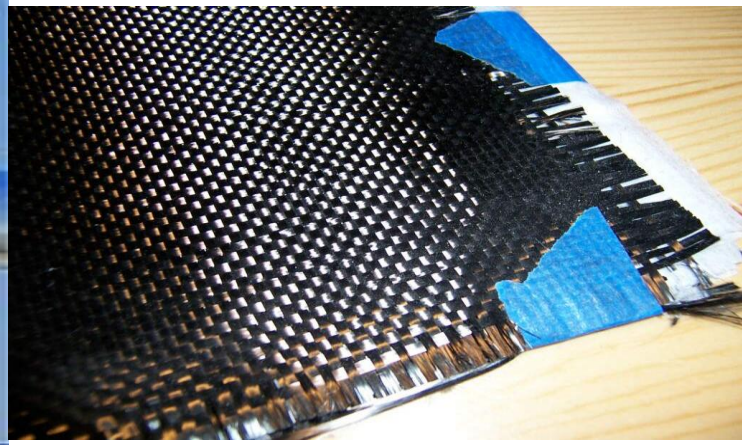


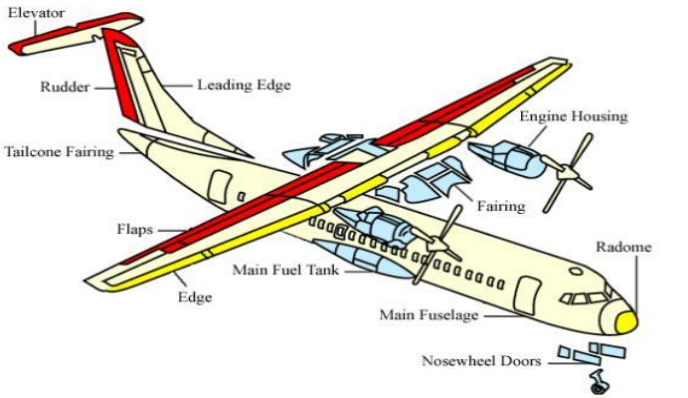
Less Obvious Cold Weather Design Considerations

- Materials and assemblies. (can they survive?)
- Propulsion systems, piston, turbine, electric. (will they start?)
- Ground handling operations, human factors. (will they work?)
- Intelligent weather reporting, (will it be reliable?)
- Infrastructure and environmental issues. (where are the hangars?)

New materials will be needed

Carbon fibre and composite assemblies





Carbon/Nomex* Sandwich
Carbon Monolithic Structure
Kevlar*/Nomex Sandwich
Reinforced Glass Fibre

Metal aeroplanes can suffer from corrosion and metal fatigue. Their flying speeds and range can be increased by using composite materials where this makes sense. This aircraft has used composite materials where different properties are required. These might include strength, rigidity, and lightness. They can work reliably for at least 25 years.

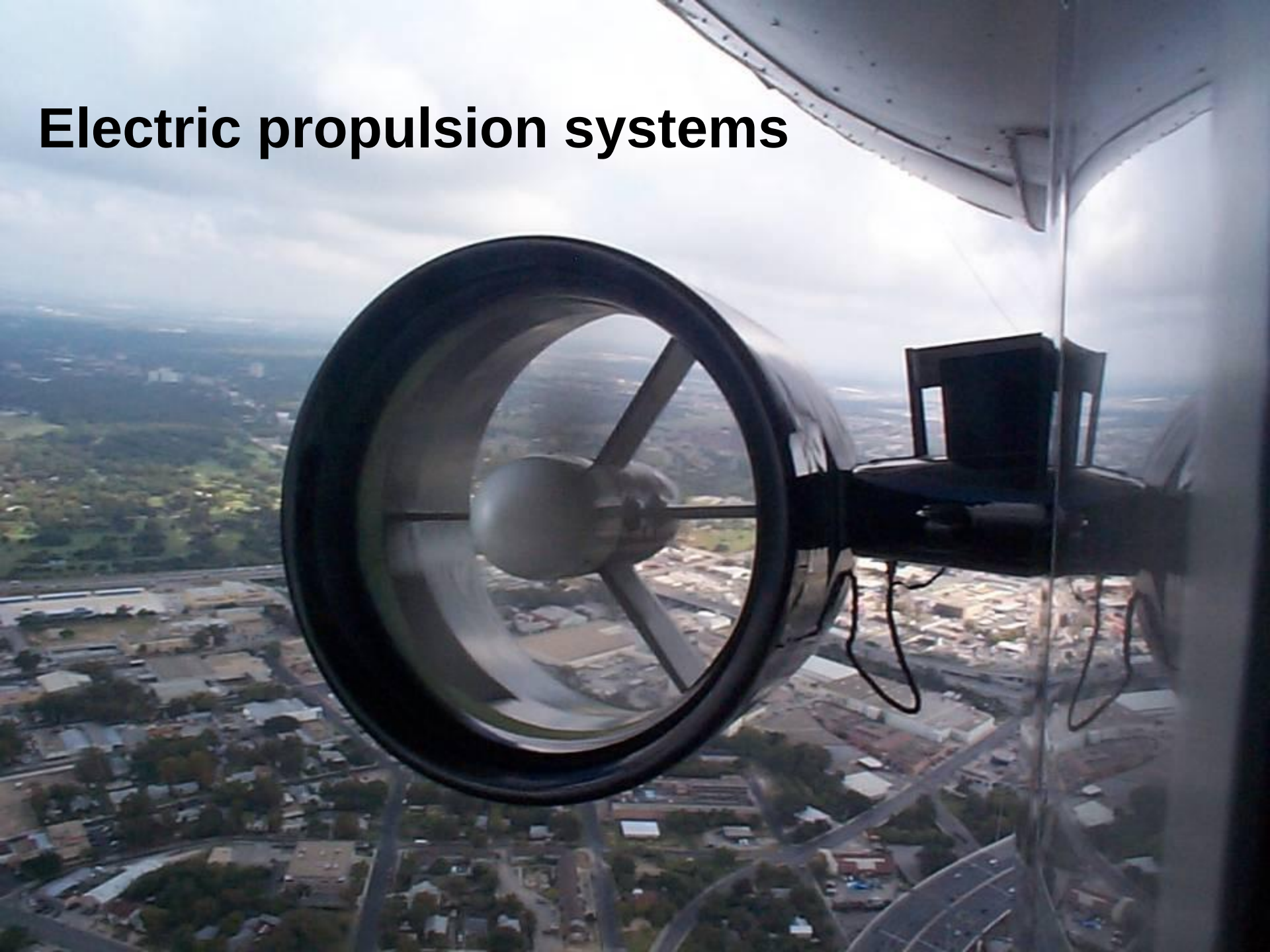
*Nomex: Brand name (aromatic polyamide fibre)
*Kevlar: Brand name (polyarylamide fibre)

Propulsion systems, piston engines

Aging fleet

Jet turbine systems

Electric propulsion systems



Loading and un-loading

Bulky arctic dress

Weather conditions, icing and de-icing

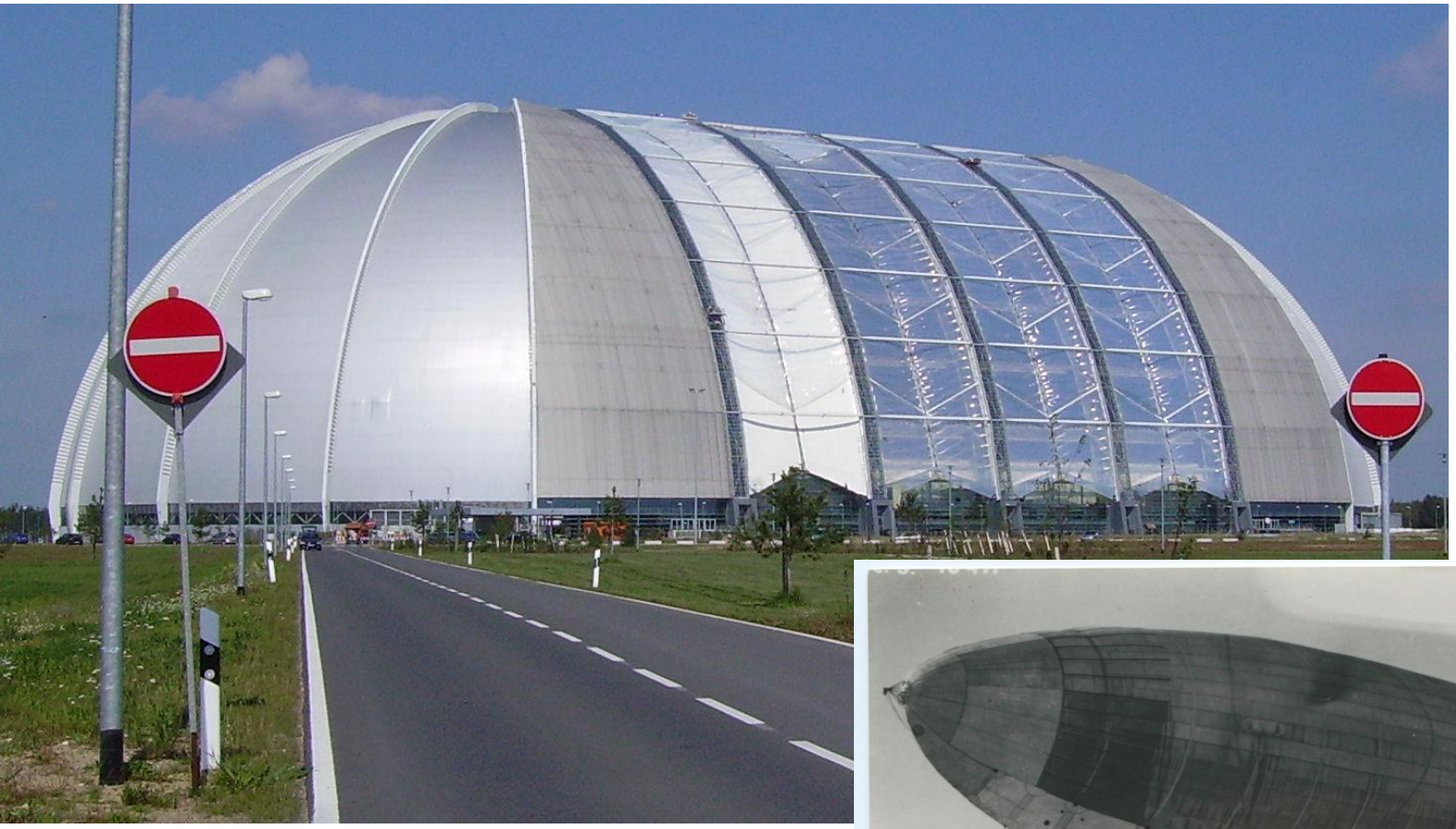
Notice how the wing's ice buildup is less on the leading edge's expandible rubber boot which had been employed prior to landing.

Typical arctic weather stations

Infrastructure and environmental issues

New masting systems need to be designed

New hangars need to be designed



In Conclusion

- Materials and assemblies will require extensive cold weather testing.
- Propulsion systems must operate with low or no reliance on external heat sources.
- Ground handling and human factors will require work to be done in heavy dress.
- Infrastructure will require the use of existing fragile environmental concerns.

Thank you!