

UTC Aerospace Systems

Improving the safety of hoisting operations on
rotorcraft through design, training, and maintenance

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Nick Demogines

HISTORY OF THE RESCUE HOIST

Origin of hoist application

"If you're in trouble anywhere in the world, an airplane can fly over and drop you flowers; a helicopter can land and save your life."

- Igor Sikorsky

With a hoist you don't even have to land.

August 11, 1944 – An electric powered rescue hoist was installed on an HNS-1 helicopter at Floyd Bennett Field, and dedicated for testing.

Six weeks later, a hydraulic hoist, which overcame basic disadvantages of the electric hoist, was installed and successfully tested, leading to its adoption for service use.

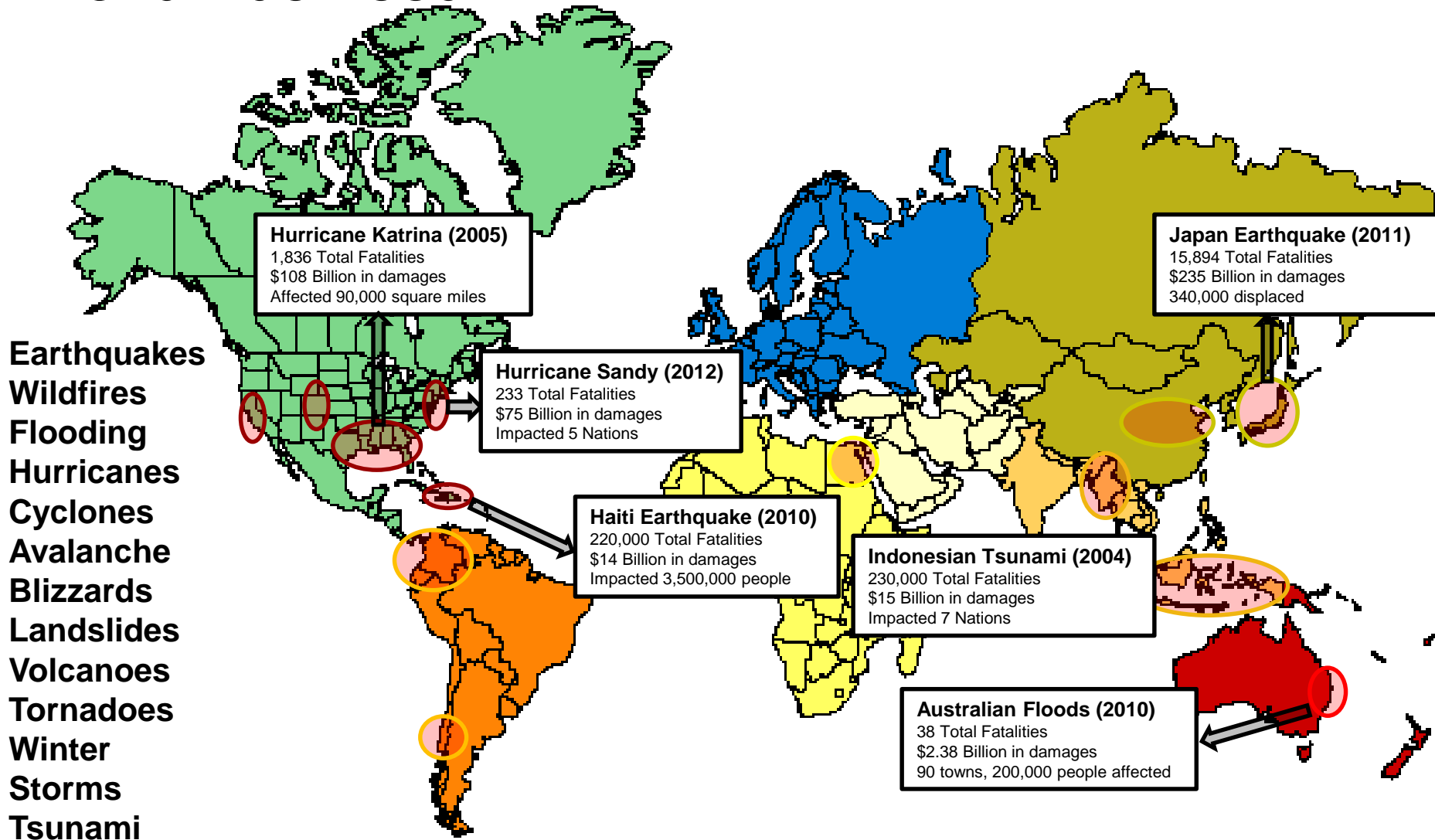


Source: wikimedia (A U.S. Coast Guard Sikorsky HNS-1 Hoverfly)

Hoist demonstration off Coast Guard Air Station Brooklyn, New York, 1944

CASE FOR RESCUE HOISTS

Worldwide need



CASE FOR RESCUE HOISTS

Hurricane Katrina

“The Coast Guard saved more than 33,500 lives. In all, Coast Guard personnel saved more lives during Hurricane Katrina than they did nationally in the last eight years combined.” - NyxoLyno Cangemi, Coast Guard Petty Officer 2nd Class



Source: wikimedia (photo by Photographer's Mate 3rd Class Jay C. Pugh)



Source: wikimedia (photo by Photographer's Mate 3rd Class Jay C. Pugh)

RESCUE VS. HEC OPERATIONS

Hoists are being used for more than just rescue

Rescue hoists represent the traditional approach for rescue and evacuation applications around the world:

- Search and Rescue (SAR)

- Evacuation

- Disaster recovery

- Challenging terrain: Sea, Mountain, Combat



Source: Air Rescue Systems

Demand for the use of the hoist in Human External Cargo (HEC) application is increasing:

- Transportation to Offshore Turbine Wind Farms

- Harbor Pilot Transfer

- Electric Power Line Maintenance



Source: Air Rescue Systems

KEYS TO IMPROVING SAFETY

Three components to safe hoisting operations

Hoist design

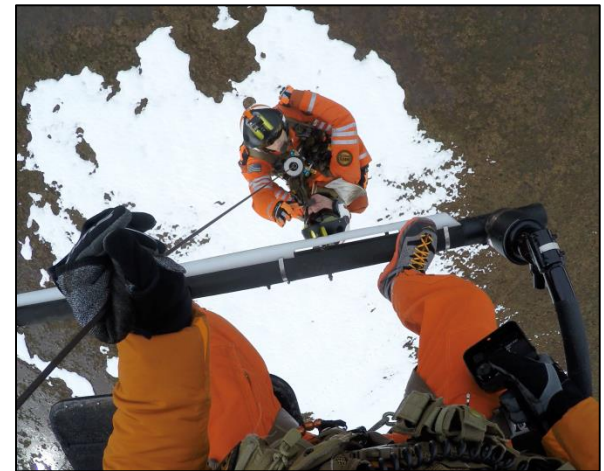
- Industry focus on hoist standard (G26 Hoist Committee)
- Lessons learned from past hoist operations (life cycle analysis)
- Hoist usage monitoring

Crew training

- Basic operational training
- Mission-specific training (scenario-based)
- Situational awareness

Maintenance

- Maintenance training (on a regular basis)
- Application of component maintenance manuals and service bulletins
- On-condition maintenance



Source: Air Rescue Systems

HOIST DESIGN IMPROVEMENTS

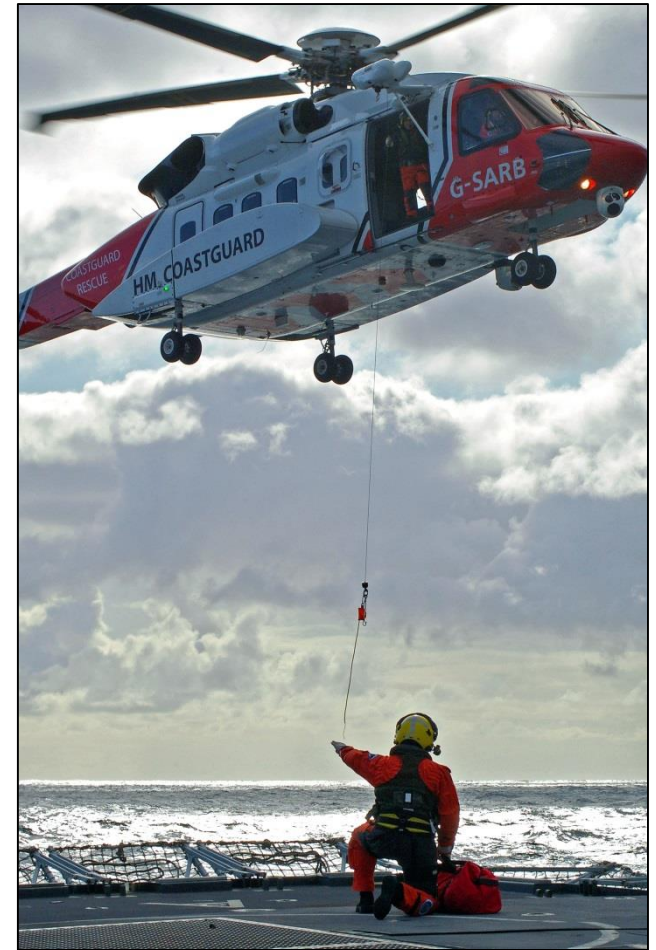
Continue focus on design improvements for safety

Previous safety improvements in hoist design

- Mis-wrap indicator
- End of travel limit switches
- Over-temperature protection

Future safety improvements in hoist design

- Additional monitoring (usage statistics) – understand operational usage
- Overtension protection
- Studies on cable strength and material
- Motor and motor controller improvements
- Modular configuration and development to improve overall availability



Source: wikimedia (A Sikorsky S-92 SAR helicopter operated by HM Coastguard)

TRAINING

Focus on safety through exceptional training

Improved training standards lead to improved safety

- Crew competency development

 - Hoist operation / body position / communication

- Scenario-based training

 - Go/No-go decisions

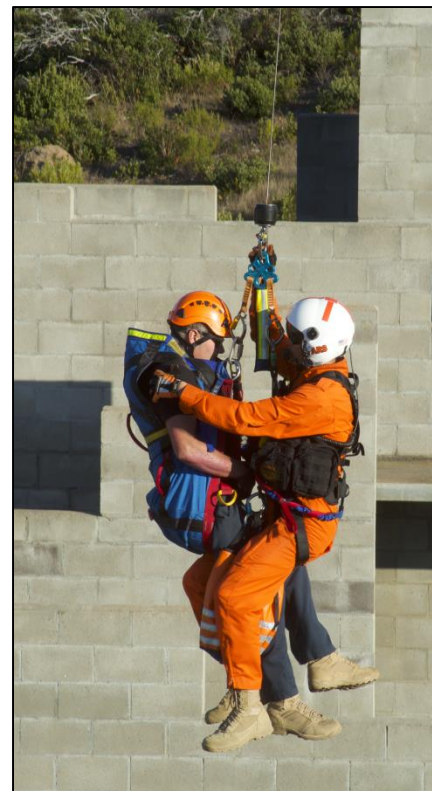
 - Team building

Real-time decisions based on risk management approach

- Stop spin

- Stop oscillation

- Reduce potential for entanglement and other incidents



Source: Air Rescue Systems

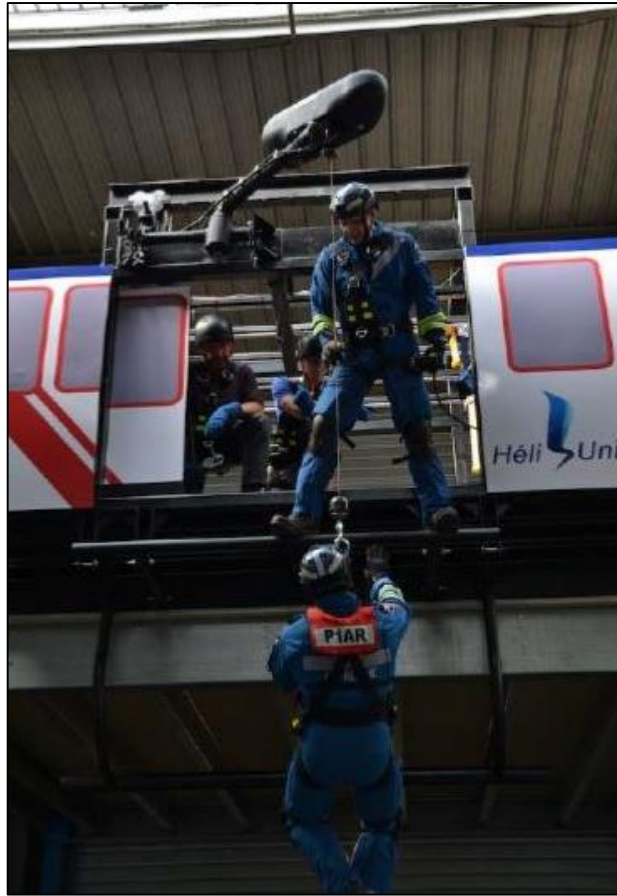


TRAINING

Various training for improving operational safety



Source: Bergwacht Bayern (Nick Demogines)



Source: Priority One Air Rescue



Source: Air Rescue Systems

MAINTENANCE

Improving maintenance enhances safety

As with any safety critical device, maintenance is a key piece of hoist operations

- Cable inspections

- Cable conditioning

- Drum pre-tensioning

- Regular inspections per component maintenance manuals

Updating maintenance manuals is imperative

- Regular and frequent reviews and updates improves operational safety

- Direct feedback from users is important

SUMMARY

Safety will always be the priority

Hoists are often operated in challenging conditions

Search and rescue environments can be dangerous

Wind / Rain / Snow / Swiftwater / Night operations

By focusing on these key components we can make hoisting safer:

Design – continuous improvements and innovations to raise safety of users and operators

Training – crew competency improvement through robust exercises and communication

Maintenance – improve existing instructions and standardize on frequency



Source: Air Rescue Systems



Source: Air Rescue Systems



Source: Air Rescue Systems