

# **A I R W O R K** **& Heliseilerei GmbH**



A&H Equipment – EASA Part 21 G POA CH.21.G.0022



## Calculation of load lifting devices in accordance with the requirements of HESLO



## ***Production Organisation (A&H EQU)***

**EC Directive on Machinery Safety 2006/42/EC**

**EC Directive on Personal Protective Equipment 89/686/EEC**

### ***Who we are***

- load lifting devices
- special equipment according to annex II, rotorcrafts
- personal protective equipment (air rescue and ropework)

**EASA Part 21 G POA CH.21.G.0022**  
**CS 27/29.865 External Loads / PCDS**

- personnel-carrying device systems (HEC equipment)
  - simple PCDS
  - complex PCDS with STC according to EASA, form 1



# Legal requirements

**Regulation (EU) No. 965/2012 AIR-OPS**

**ED Decision 2014/018/R, Annex VIII, Part-SPO**

**AMC & GM to Annex VIII, Part-SPO**

**Subpart E – Specific Requirements**

**AMC1 SPO.SPEC.HESLO.100  
Standard Operating Procedures**



## AMC1 SPO.SPEC.HESLO.100

HESLO = Helicopter External Sling Load Operation

### (c) Equipment

(3) All additional equipment used, e.g. ropes, cables, mechanical hooks, swivel hooks, nets, [...]

should be manufactured according to

- applicable rules or
- recognised standards.

[...]



*... an applicable rule could be ...*

## EC Directive on Machinery Safety 2006/42/EC

This directive applies to the following products (art. 1.1):

d) lifting accessories (e.g. load lifting devices)

### Why?

- because EC MD 2006/42/EC is the legal basis for ALL EU countries and ALL types of load lifting devices

### Why do load lifting devices fall under machinery?

- because a lifting gear, such as a crane or helicopter, needs LLD for the lifting of loads.





## ***EC Mach. Dir. 2006/42/EC***

### **Annex I, art. 4.1.2.5**

**Working coefficients (factors of safety) required:**

**(a) steel ropes  $\geq 5$**

**(b) metallic components used with slings  $\geq 4$**

**(c) textile ropes or slings  $\geq 7$**

### **ABSOLUTE MINIMUM VALUES**

**$\geq 7$  means at least 7 or higher  
at the beginning of service**



## ***EC Mach. Dir. 2006/42/EC***

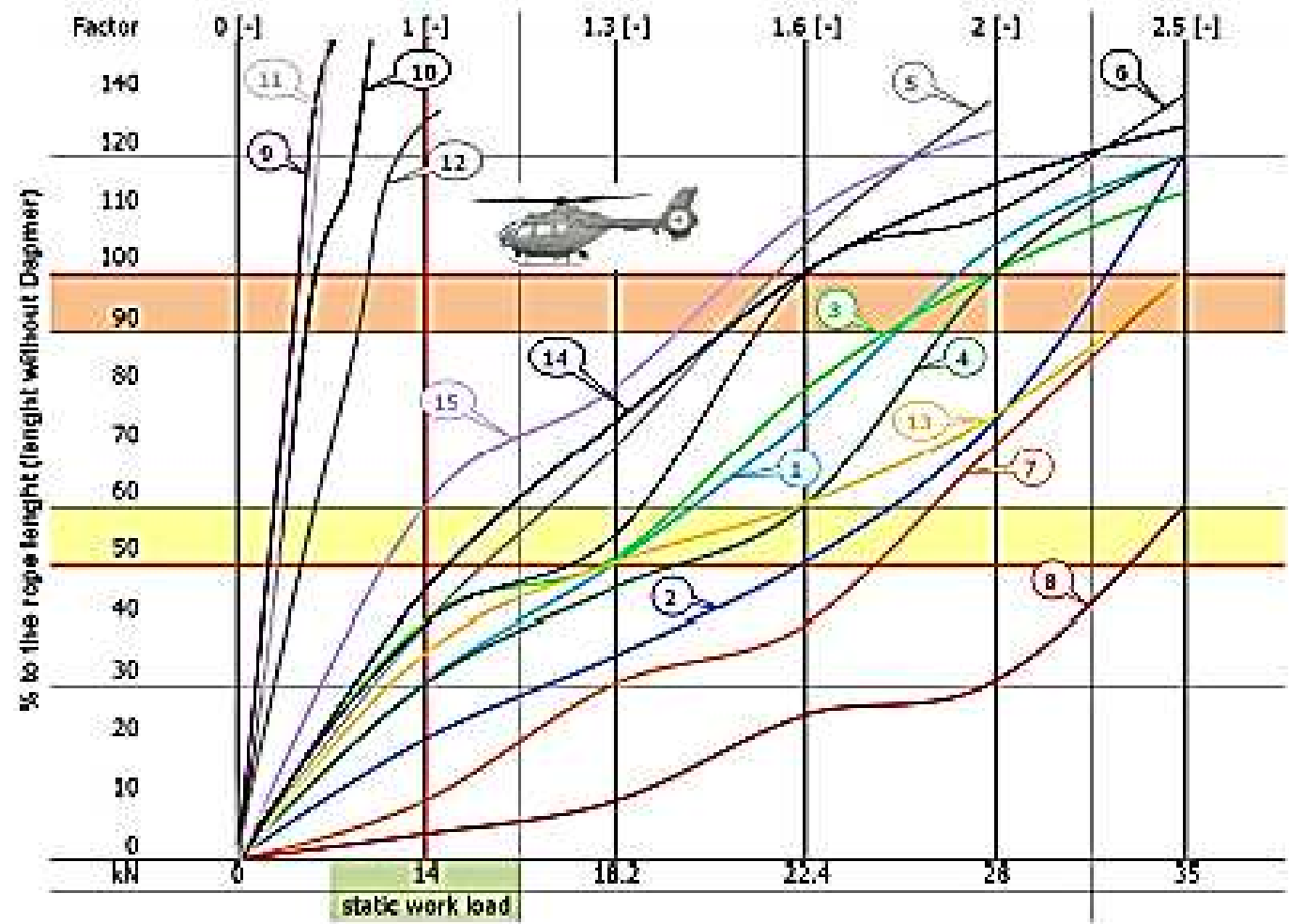
The manufacturer must conduct a HAZARD ANALYSIS in order to evaluate external influences such as environmental factors, consider the production methods of the materials selected (steel, textile, others), the load type and the type of operation.

Other standards must also be taken into account, e.g.

- CS-27.865 et sqq. or CS-29.865 et sqq.
- EN 1492-2 Round slings (textile)
- EN 1677-1 Components for slings (steel)

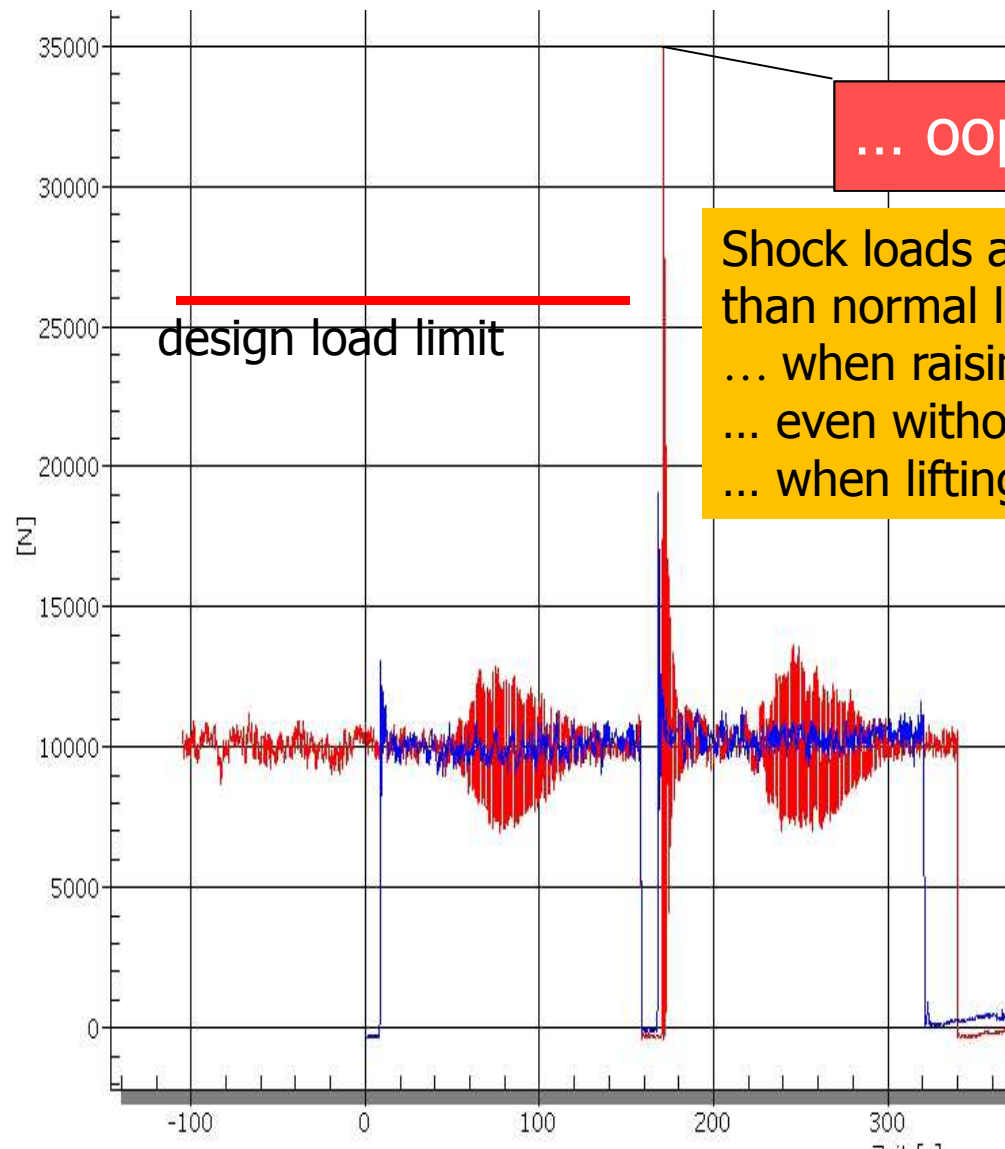


## Analysis: rope turn-up behaviour





## Analysis: forces and shock loads





## ***Analysis in relation to type of assignment***

### **Level of possible shock loads**

- |                        |           |     |
|------------------------|-----------|-----|
| - Construction work    | low       | < 3 |
| - Transport in general | medium    | > 3 |
| - Logging              | very high | > 4 |
| - ...                  |           |     |



## *Results of hazard analysis*

**Factor 7 for textiles when using Long Lines is inadequate**

- **dynamic shock loads regularly occurring > 2.5 times higher than the normal load**
  - **i.e. shock loads exceed the Design Load Limit of 2.5**
  - **shock loads induce rapid fatigue on all kinds of ropes and fittings**
- **ageing occurs as a result of**
  - **rough handling, abrasion, sunlight exposure (UV)**
  - **unproper splicing and design techniques**
  - **high quantity of cycles and loads p.a.**



***Solution...  
... based on the applicable rules***

***HESLO.100(c)(3) compared to EC Mach. Dir. 2006/42/EC***

**with reference to CS-27./29.865 and corresponding articles**

<b>CS-27.865</b>	<b>Limit static load</b>	<b>2.5 [-]</b>
<b>CS-27.625(d)</b>	<b>Fitting factor, texiles</b>	<b>1.33 [-]</b>
<b>CS-27.303</b>	<b>Safety factor</b>	<b>1.5 [-]</b>
<b>CS-27.619(d)(2)</b>	<b>Special factors</b>	<b>2 [-]</b>
	<b>such as ageing, tolerances, etc.</b>	

**Safety factor for longlines** **10 [-]**



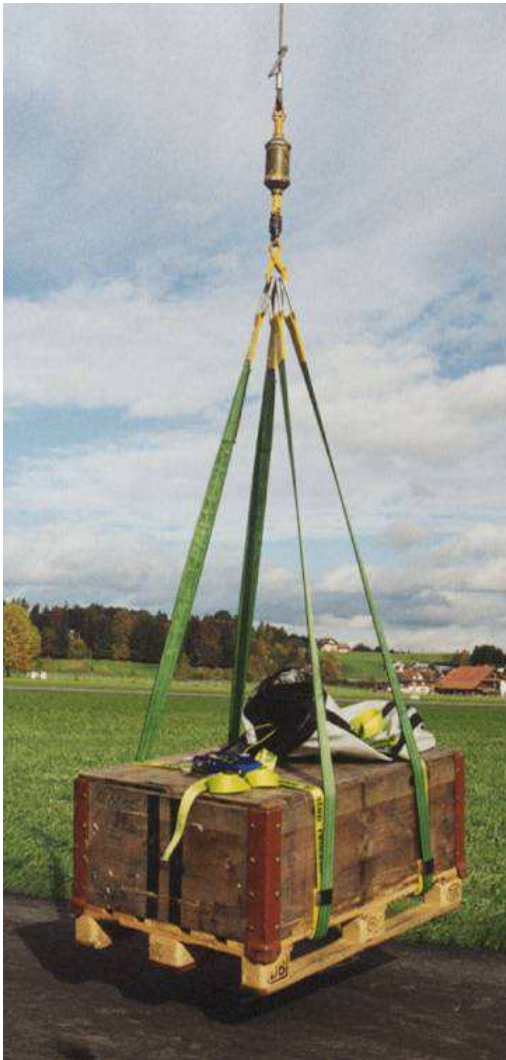


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***In safety.***

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