Aluminium Conference 2022
Düsseldorf 29-09-2022

Aluminium Footbridges and their Footprint

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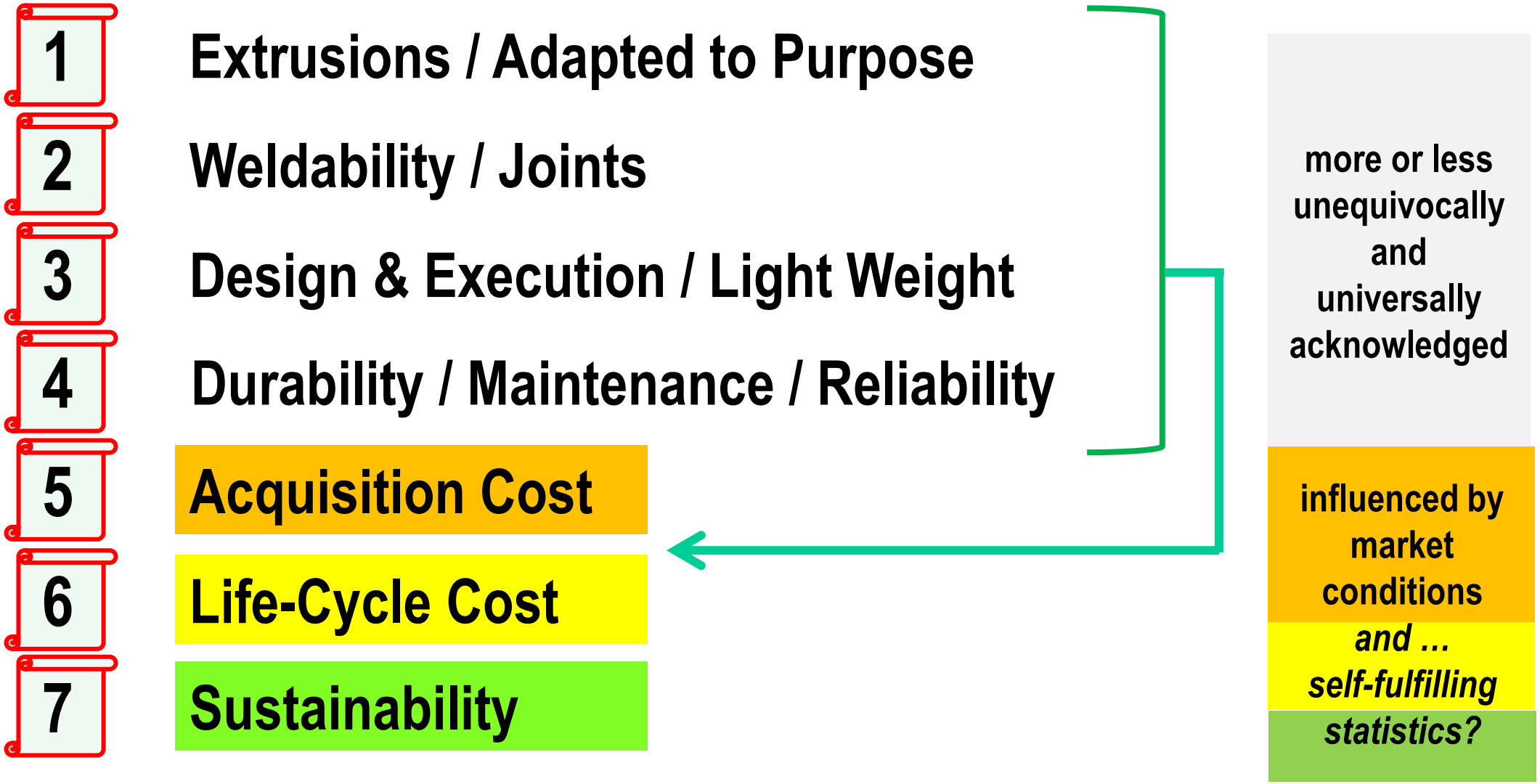
Aluminium Footbridges - *"The Seven Pillars of Wisdom"*



Structural Concept

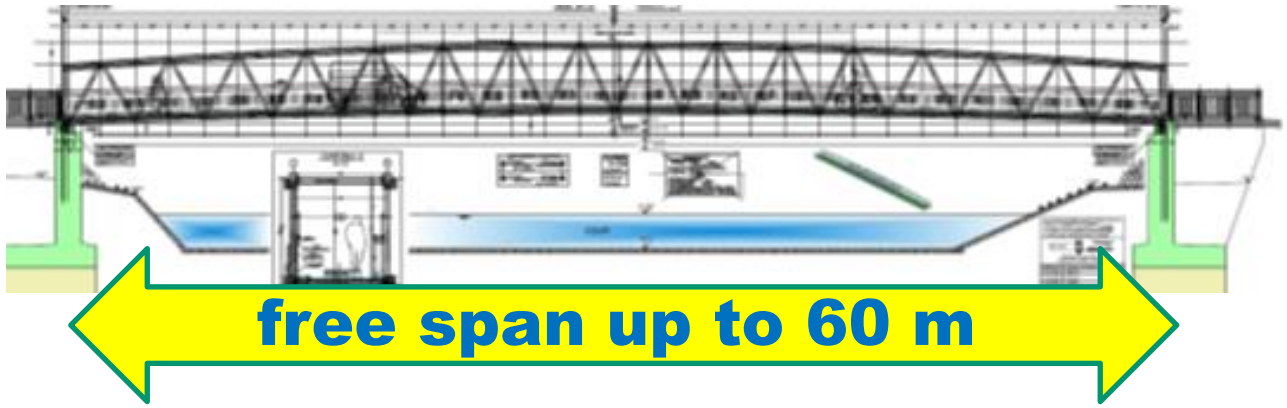
Bespoke Extrusions

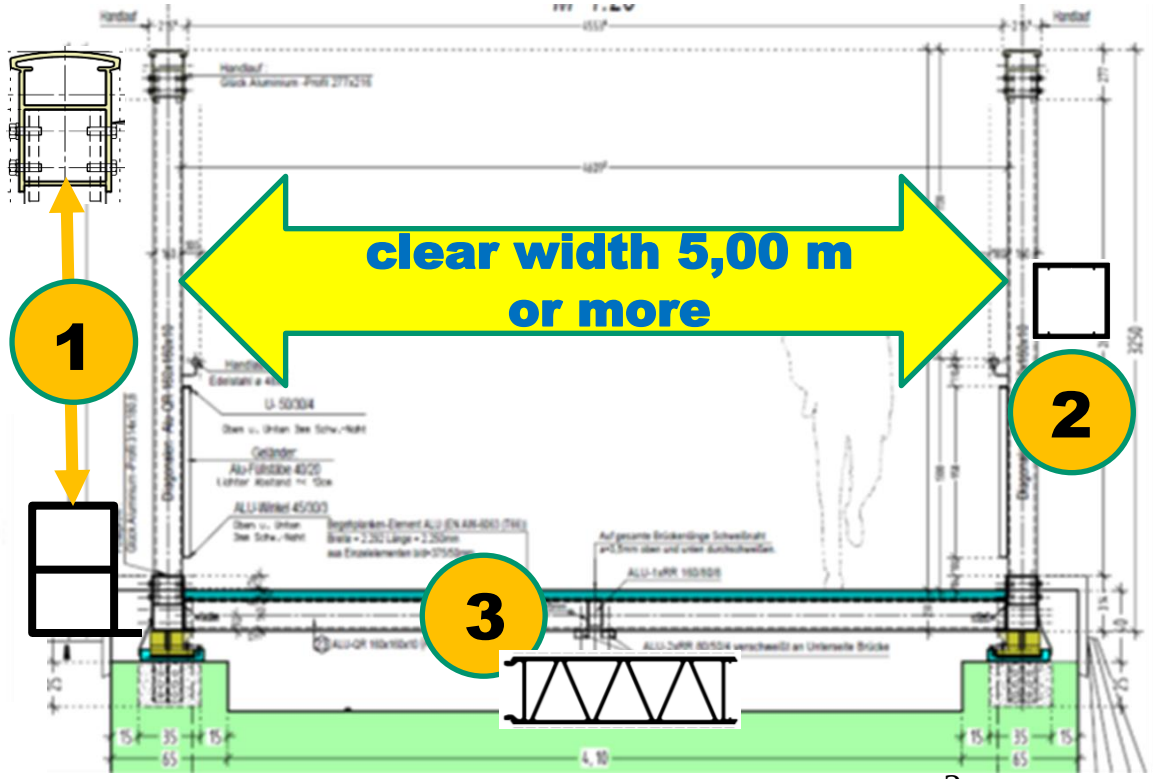
- optimum cross-section
  high-% utilization
- low depth deck 50/80mm

lean structure

Pratt or Warren truss

Only 3 main extrusions (chords / diagonals-verticals / deck) in 22 form and dimension variations





3 Light Weight

Weight ~47% as in steel

Delivery / Installation

**light-weight one piece units,
cost savings in supports,
few large size units handled
easily and rapidly,
low crane capacity,
short possession times,
remote installation sites**

3 Design & Execution / Light Weight

4 Durability / Reliability

Design

Basis of Design EuroNorm 1990

Actions EN 1991

Aluminium EN 1999

Execution Maintenance EN 1990

National Annex to British Standard EuroNorm

Specifications & Recommendations

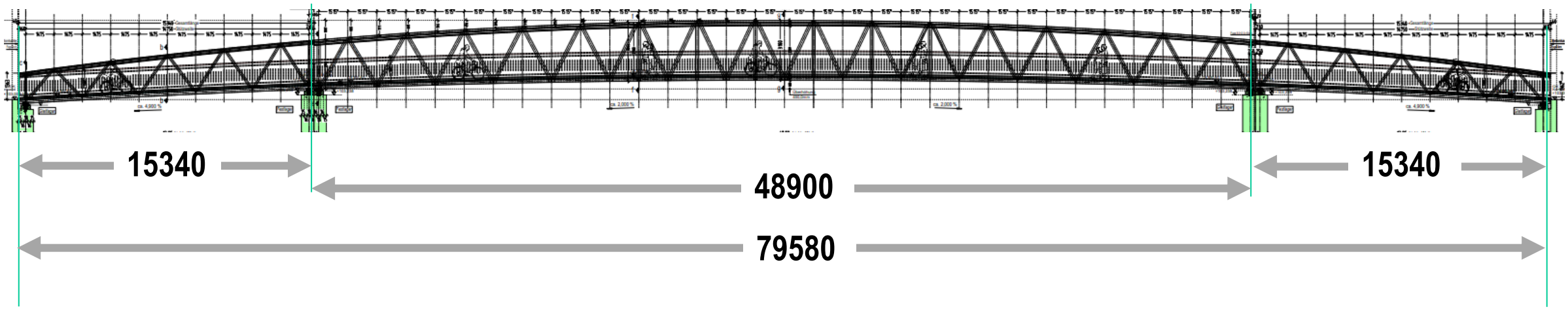
All Manufacturing In-Shop / Accreditation / Self-Control

Structure – outfitting elements
Bearings bespoke in aluminium
Anti-slip surfacing
Surface painting optional / off-shore quality / anti-graffiti

Superior Quality
Reliable & Safe Service Life

Bad Ems Laurenburg 79,58x2,70m

Installed in August 2022 ***video delivery*** ***https://www.facebook.com/watch/?v=1118527705410719***



weight 18,3 t or 0,374 t/m

weight 3,6 t or 0,235 t/m

Coburg Weir - total length 172x2,68m

longest successive span aluminium footbridge

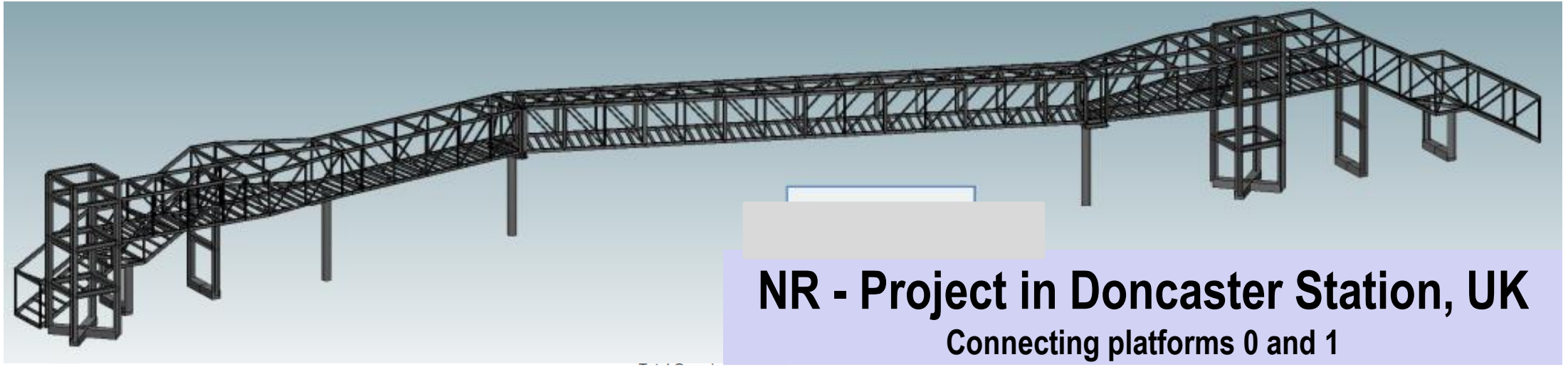
Lancashire, Carnforth 31m/2m &
St Michael´s 37,12m/2m

Application Examples in the UK

Gillingham – NR - 32m FB+Trestles+Stairs

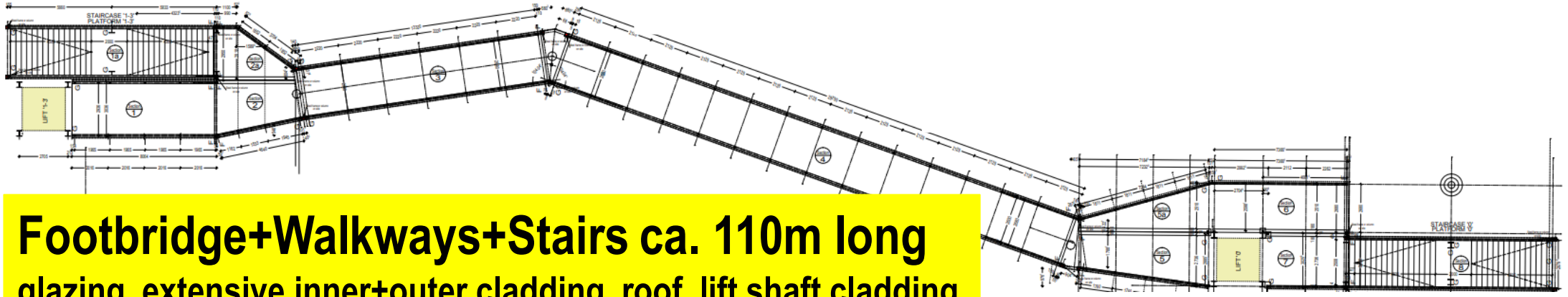
Harrow - LEC1-FB45 – NR - 36,26m/2,46m

Waterhaughs, Scotland – 17,50m/1,56m



NR - Project in Doncaster Station, UK

Connecting platforms 0 and 1



Footbridge+Walkways+Stairs ca. 110m long

glazing, extensive inner+outer cladding, roof, lift shaft cladding

4 Durability

"Workhorse" alloy EN AW 6082 (AlSi1MgMn) practically unlimited even in marine environment

Excellent Record in Practice

Long Island Road Bridges, NY, USA

Clive Road Bridge - Des Moines, IA, USA

Bascule Bridge Scotland, Sunderland, UK, 1948

Clunie, Scotland. 1950

JAPAN - Ariake (1984), Tenkorin (1986), Kinkei (1961) - 20-year weathering tests, in urban – rural – industrial – marine environments

70m above sea level rainwater offers adequate protection even in marine environment

High strength at low temperatures

First German Road Bridge (Ruhr, 1956)

44.20m – 6082 alloy, industrial pollution, remains in excellent state, hardly any maintenance costs, never necessary any corrosion protection or repair

4 Maintenance

Maintenance = no brainer / Inspection

1. Recommended: cleaning debris (moss repellent option on final coating); rain-wash hollow extrusions; annually
2. Coating (160 µm), renewal, if necessary easily on site and locally - wear: ~1µm/a
3. Platform re-surfacing: if necessary on site; ~25 years
4. Bearing renewal: parts easily/rapidly replaced using mobile hoist; ~25 years

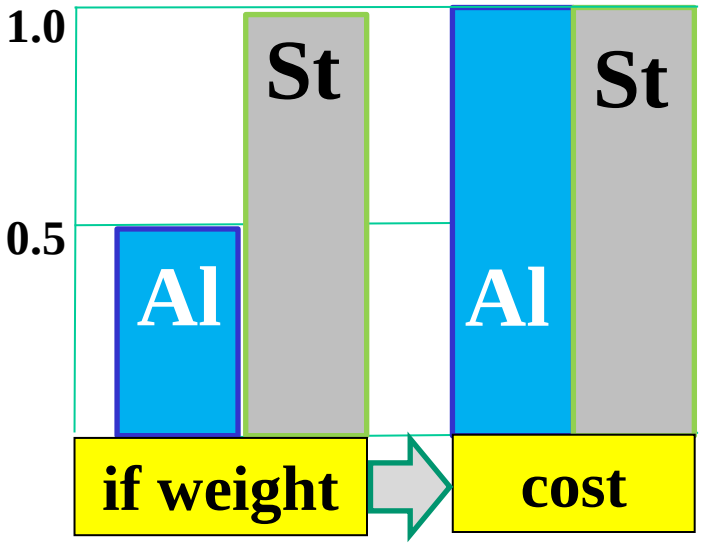
Inspection Interval: for aluminium 6 year sufficient

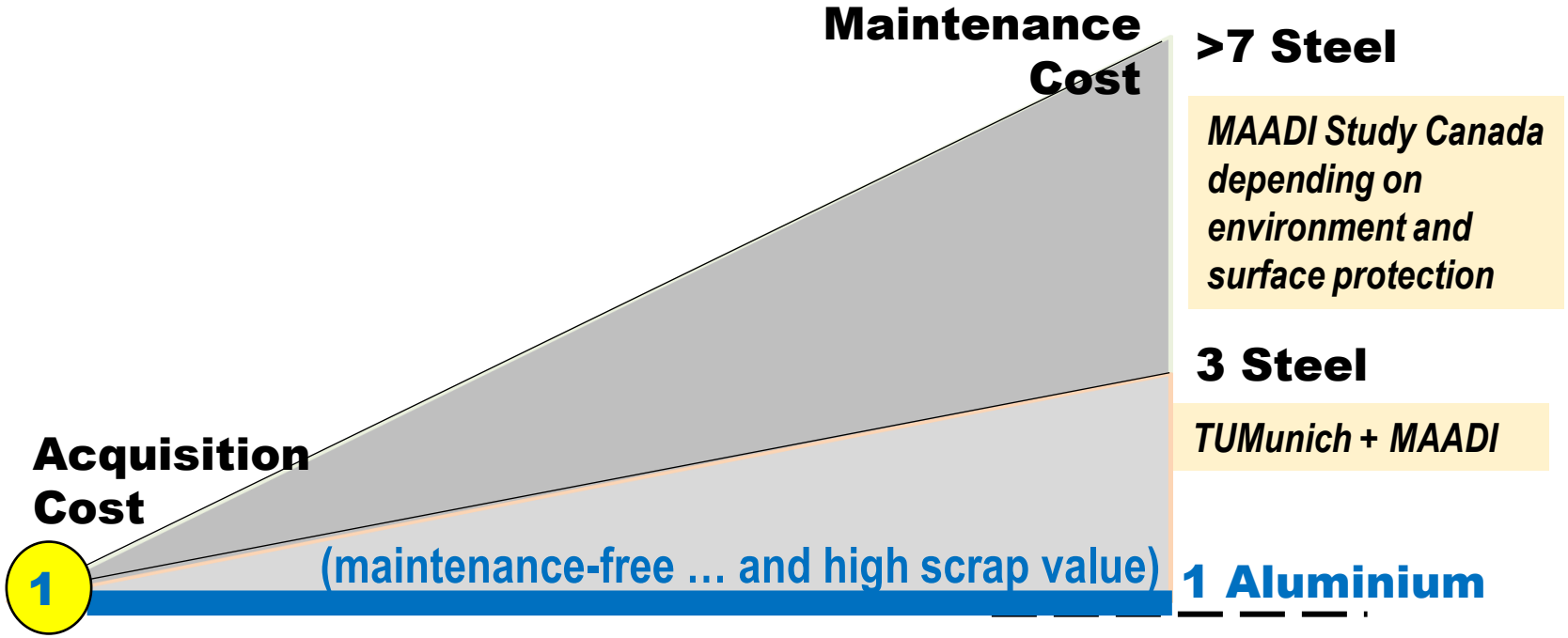
CBM - Condition Based Maintenance

Inspection intervals may depend on local environmental conditions, but even for marine atmosphere the alloy 6082/AlMgSi1 itself provides sufficient durability.

6 Life-Cycle Cost

Established decades ago
by Norwegian studies





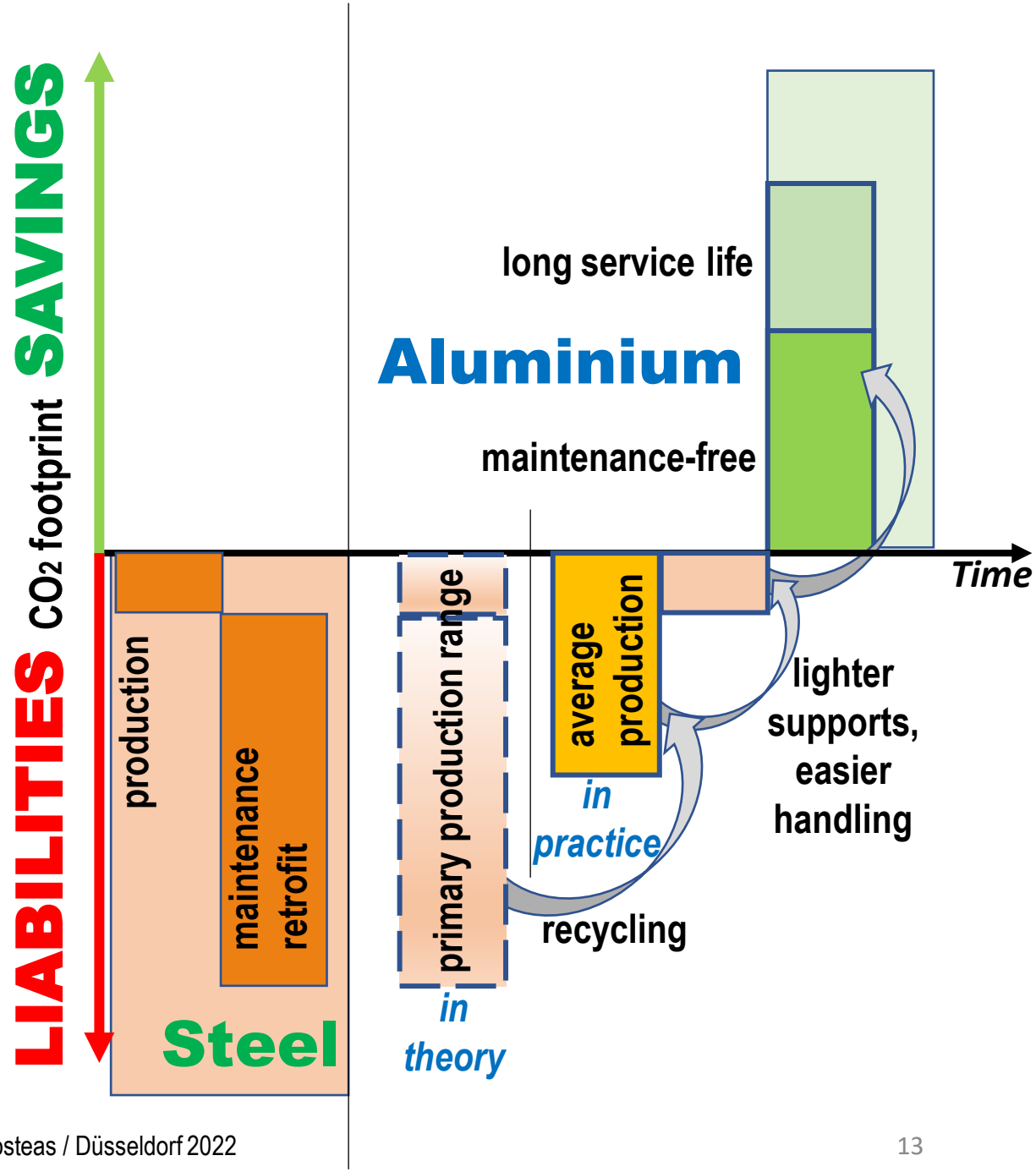
(Supporting research studies and literature available)

7 Sustainability / Environment

CO_2 balance

Aluminium saves energy ultimately

in-service successive gains

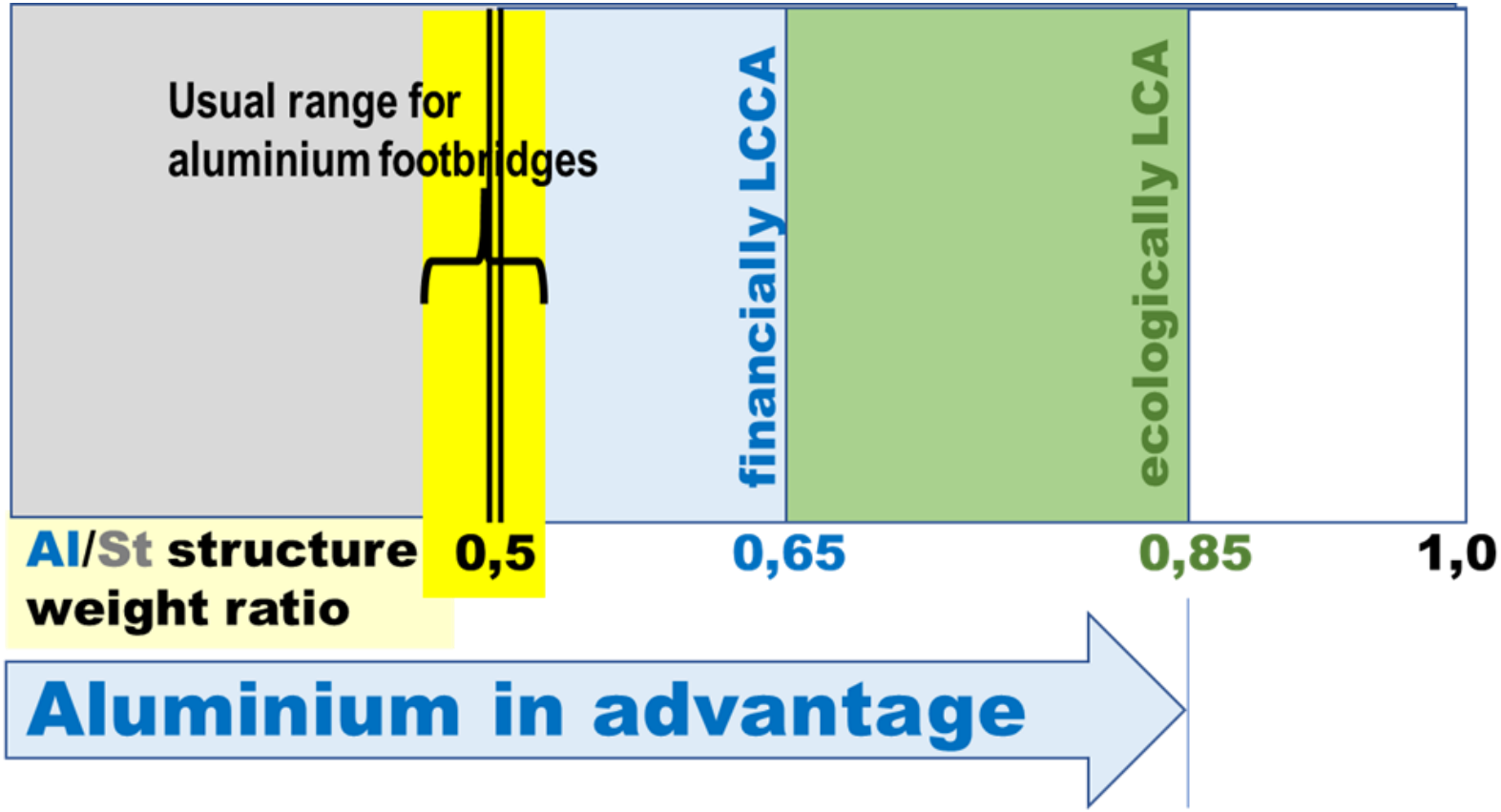


(Supporting research studies and literature available)

7 Sustainability / Environment

Sustainability through holistic LCA (Life-Cycle-Analysis)

Literature available: e.g. TUM-LME Studies and PhD Thesis Radlbeck



Al-(Re)-Upcycling
most efficient
leads again to Al - no intermediaries

does not contain fossil fuels like alternative materials ending in expensive landfills as hazard to later generations

7 Sustainability / Environment - Legislation

Growing sensitization in society in matters of energy saving and environmental pollution, while maintaining a balance to economy and acceptable living standards.

Finally tangible legislative action begins to appear (ECCS information Brussels 17 January 2022). The ECCS position on Circular Economy and Module D (EN 15804) addresses the need for relevant information to achieve carbon neutrality 2050, extending the scope of current Life-Cycle-Analysis methodologies (based on product´s linear life cycle) and account the impacts of recycling, re-use and promote the adoption of circular economy.

closed material loop

Compare to holistic LCA performed at TUM and PhD Thesis C. Radlbeck (2006).

Remark on Acquisition + Maintenance Cost (LCC)

or how the project tendering process may be influenced by arbitrariness and incoherence