

DEVELOPMENT OF A METAL DAMPER RAIL PAD FOR MODERN RAILWAY FASTENINGS

PDIC COMPETENCES COMPLIANCE - EIDEIC 2018



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R+D(+I) MANAGER - TEJASA TC S.L.

POSTGRADUATE PHD PROGRAM (GRUPO LADICIM) – UNIVERSIDAD DE CANTABRIA



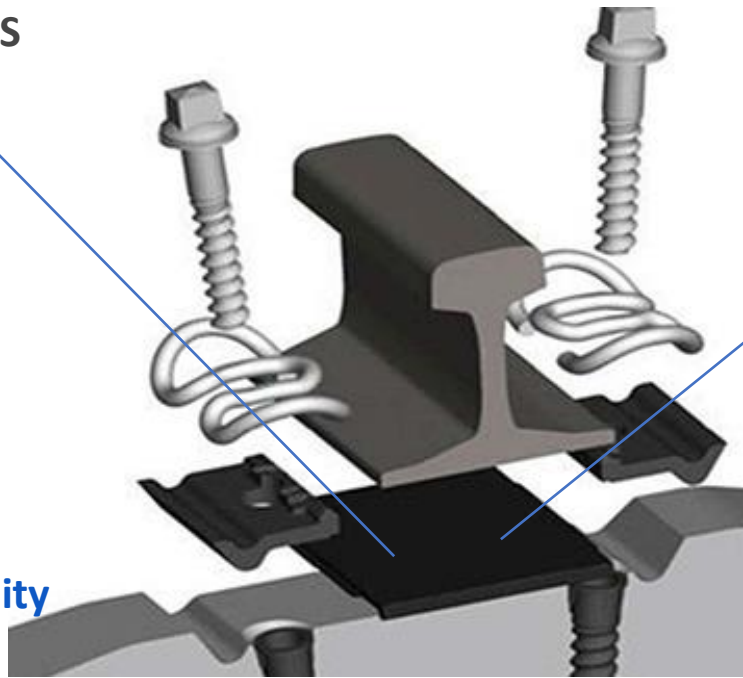
PROJECT AIMS

RUBBER (ELASTOMERIC) RAIL PADS FOCUS

- Vibration Isolation
- Shock Absorbing
- Sleepers protection

WORKING LIMITATIONS

- True life cycle: ~5 years
- uV radiation
- Chemical environment vulnerability



METAL CUSHION DAMPERS SUBSTITUTION

- True life cycle: ~continuous
- uV radiation proof
- Chemical environment proof

ADVANCED TRANSVERSAL TRAINING COURSE FOR DOCTORAL STUDENTS

October 2017, from 16nd to 27th

EDUC

What's about the future for us - the Doctorates?

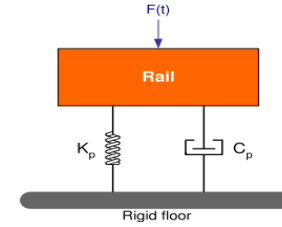
- **R+D+i National Program:** foremost guidelines
- **Application within National & European funding programs**
- **Companies + University** collaborative association
- **Undertaking:** knowledge based entrepreneurs
- **Post-doc contracts**
- **Knowledge transfer processes:** patenting, intellectual property



Alternative careers, apart from the University

KV MODEL CHARACTERIZATION

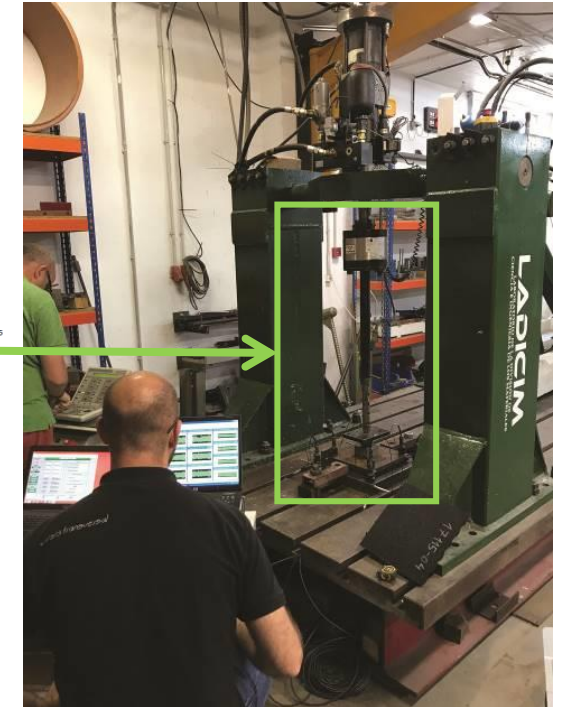
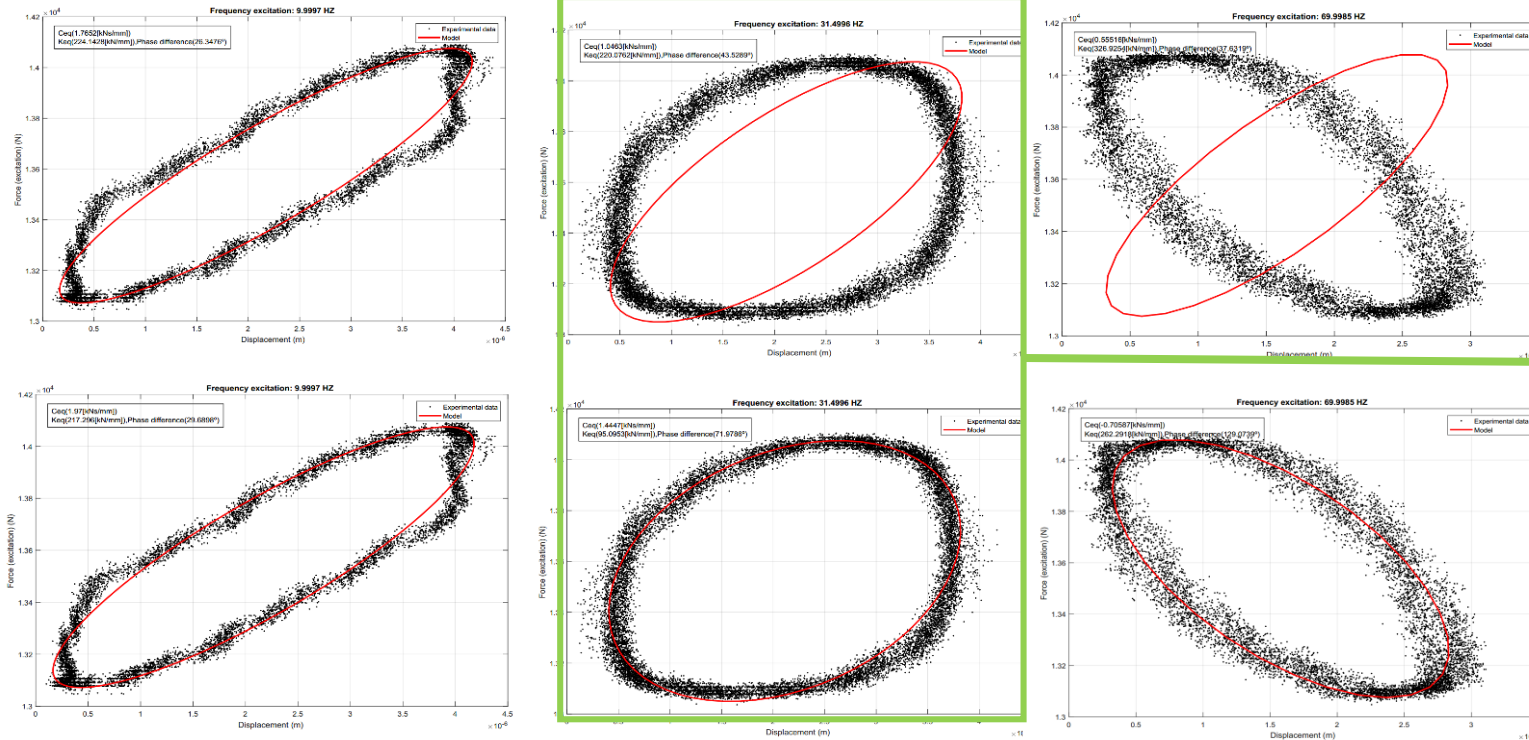
31,5 Hz



S. Kaewunruen, A. M. Remennikov (2007)

Analytic
calculation

Numeric
matching



Tools:

Proprietary algorithm (Matlab)
ANSYS, LabView

Facilities:

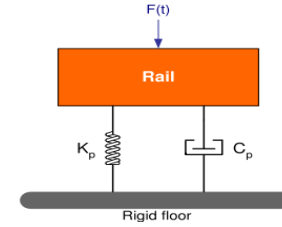
Hydraulic actuator in Frequency
Datalogger LMS + accelerometers

Collaborations:

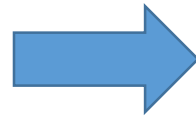
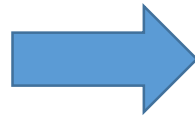
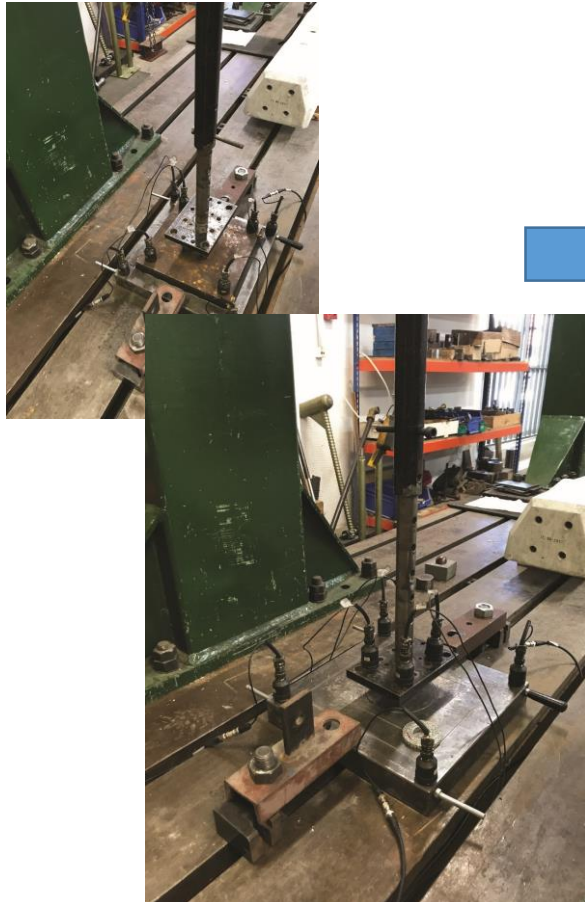


LEAM - Laboratorio de Ingeniería
Acústica y Mecánica (UPC)

KV MODEL CHARACTERIZATION

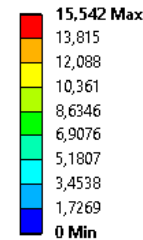


S. Kaewunruen, A. M. Remennikov (2007)

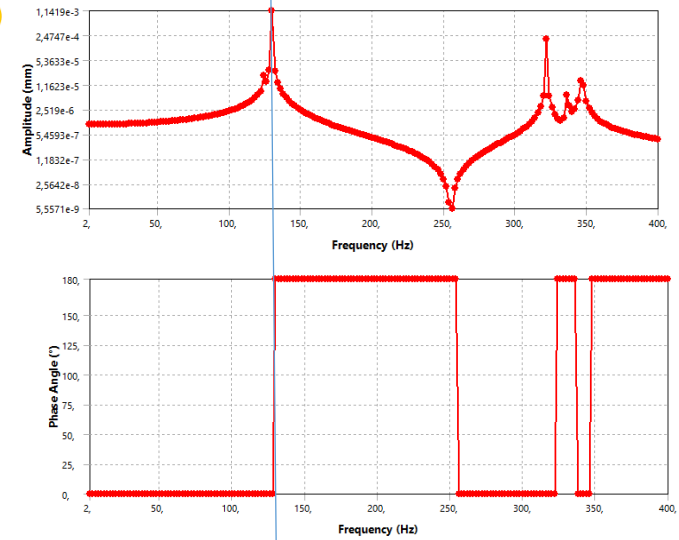


ANSYS

C: Modal
Total Deformation
Type: Total Deformation
Frequency: 124,04 Hz
Unit: mm
28/04/2018 8:03



3D mechanical model



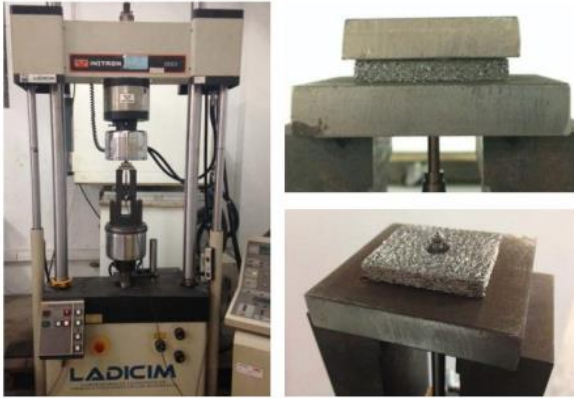
124 Hz! (31,5 Hz)

Ongoing research.

Looking for modals in machine structure frame...

New method (harmonic excitation)

DESIGN MODEL: STANDARD STIFFNESS



Tools:

Proprietary algorithm (Matlab)
 UNE-EN Guidelines

Facilities:

Instron 8800 servo-hydraulic machine
 Datalogger LMS + accelerometers

OUTPUTS

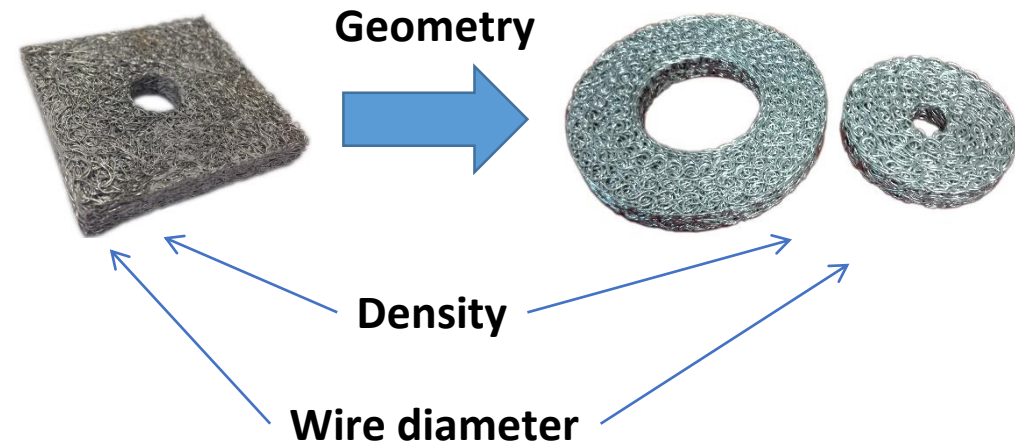
Static Stiffness
 (UNE-EN 13146-9)

$$k_e = \frac{F_{SP2} - F_{SP1}}{d_{SP}}$$

Dynamic Stiffness
 (UNE-EN 13146-9+A1)

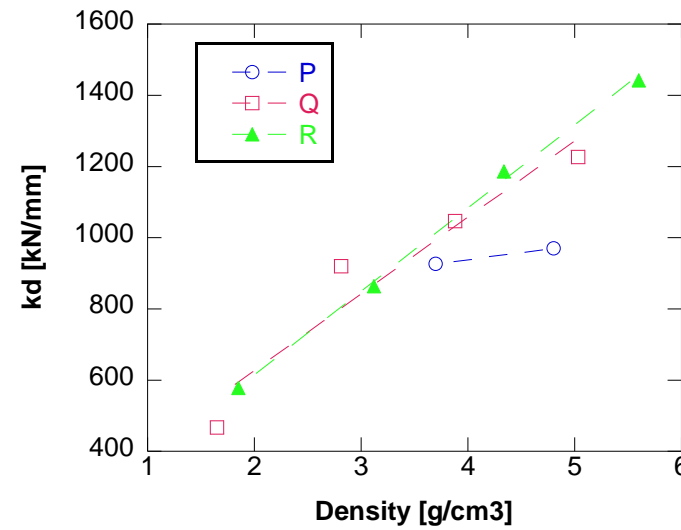
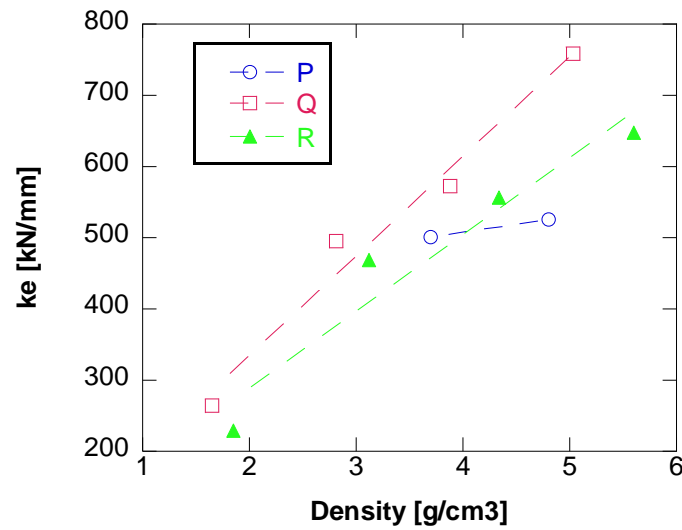
$$k_{d(5/10/20\text{ Hz})} = \frac{F_{LFP2} - F_{LFP1}}{d_{LFP}}$$

INPUTS



DESIGN MODEL: STANDARD STIFFNESS

LINEAR DEPENDENCE WITH DENSITY



Ring-shaped metal cushion implies an increasing of stiffness respect to squared-shaped pads

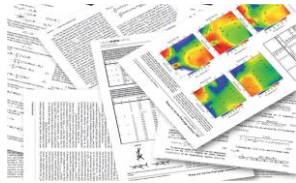
Dynamic hardening is influenced by shape factor

$$k_{da}/k_e$$

A decreasing in wire diameter causes an increase in the rigidity

DISSEMINATION OF RESULTS

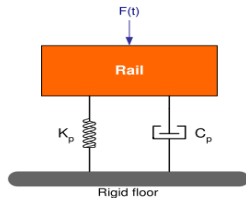
ESTATE OF THE ART



Article: "Metal Cushion Dampers: A Review"
For sending soon. Goal: Q1-2 journal



KV MODEL CHARACTERIZATION

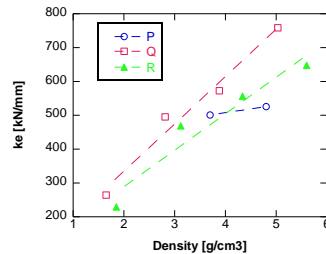


Oral presentation accepted (September 18)



Oral presentation accepted (July 18)

DESIGN MODEL



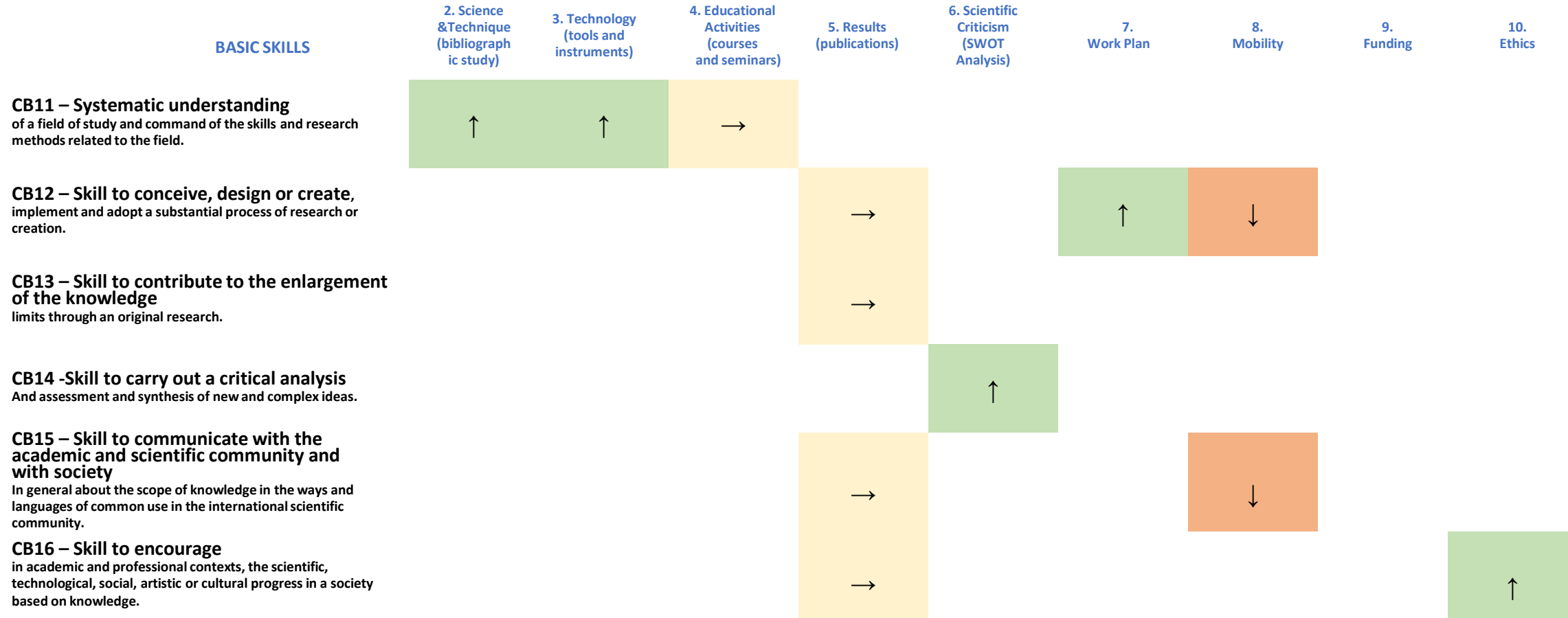
Article: "Experimental study of metal cushion pads for high speed railways"

Construction & Building Materials

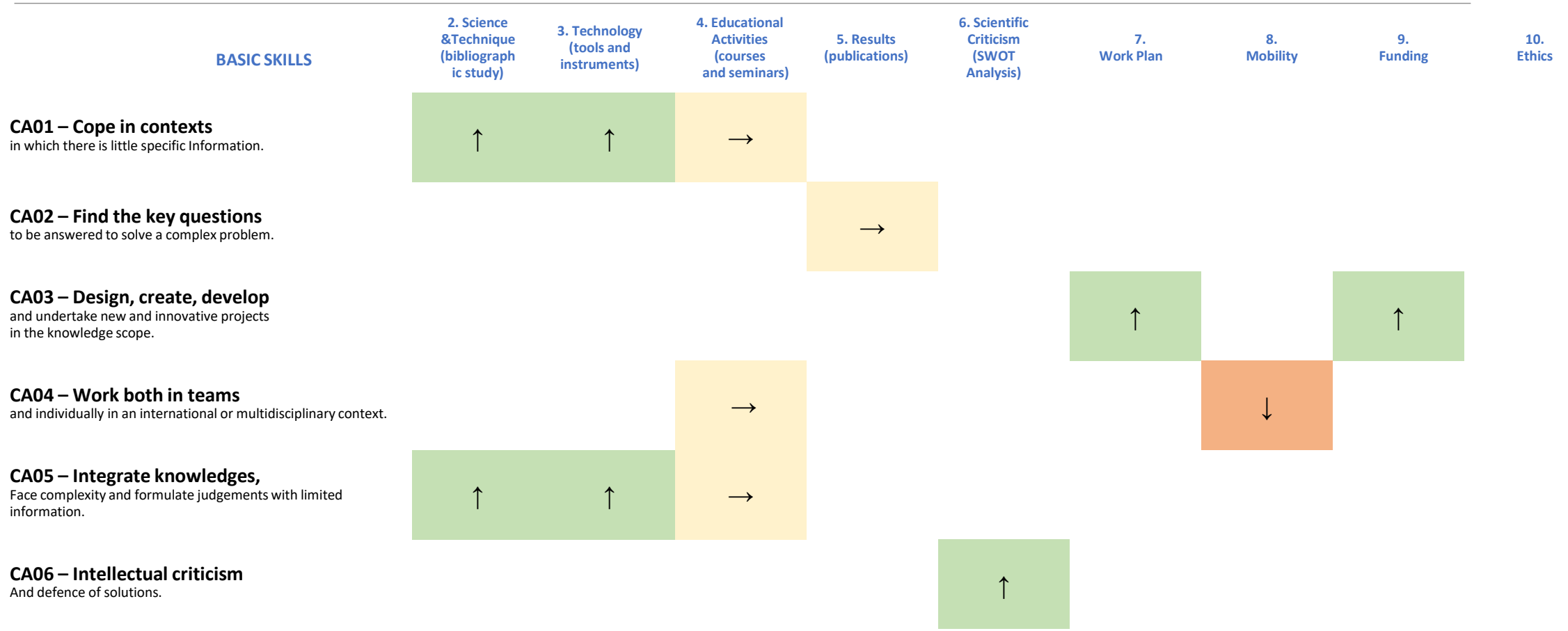
On fight ...



BASIC SKILLS



CAPACITIES AND PERSONAL ABILITIES



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thank you!