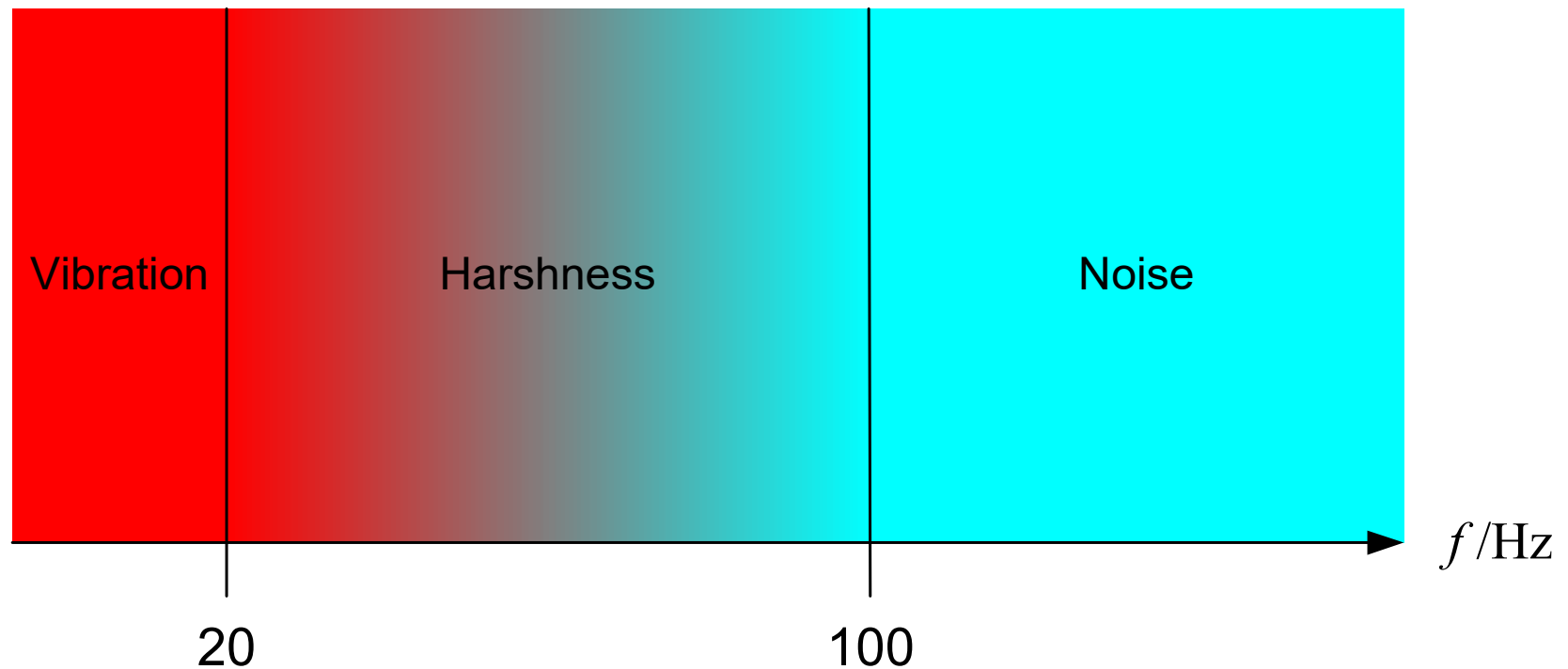


Contents

- 1 Internal Combustion Engines**
- 2 Overview of Engine Test Cells**
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NVH Definition

NVH: Noise, Vibration, Harshness



NVH Definition

NVH Sources inside Engine

- **Combustion Noise**
- **Air Inlet**
- **Reactive Forces**
- **Valvetrain**
- **Injectors**

NVH Sources outside Engine

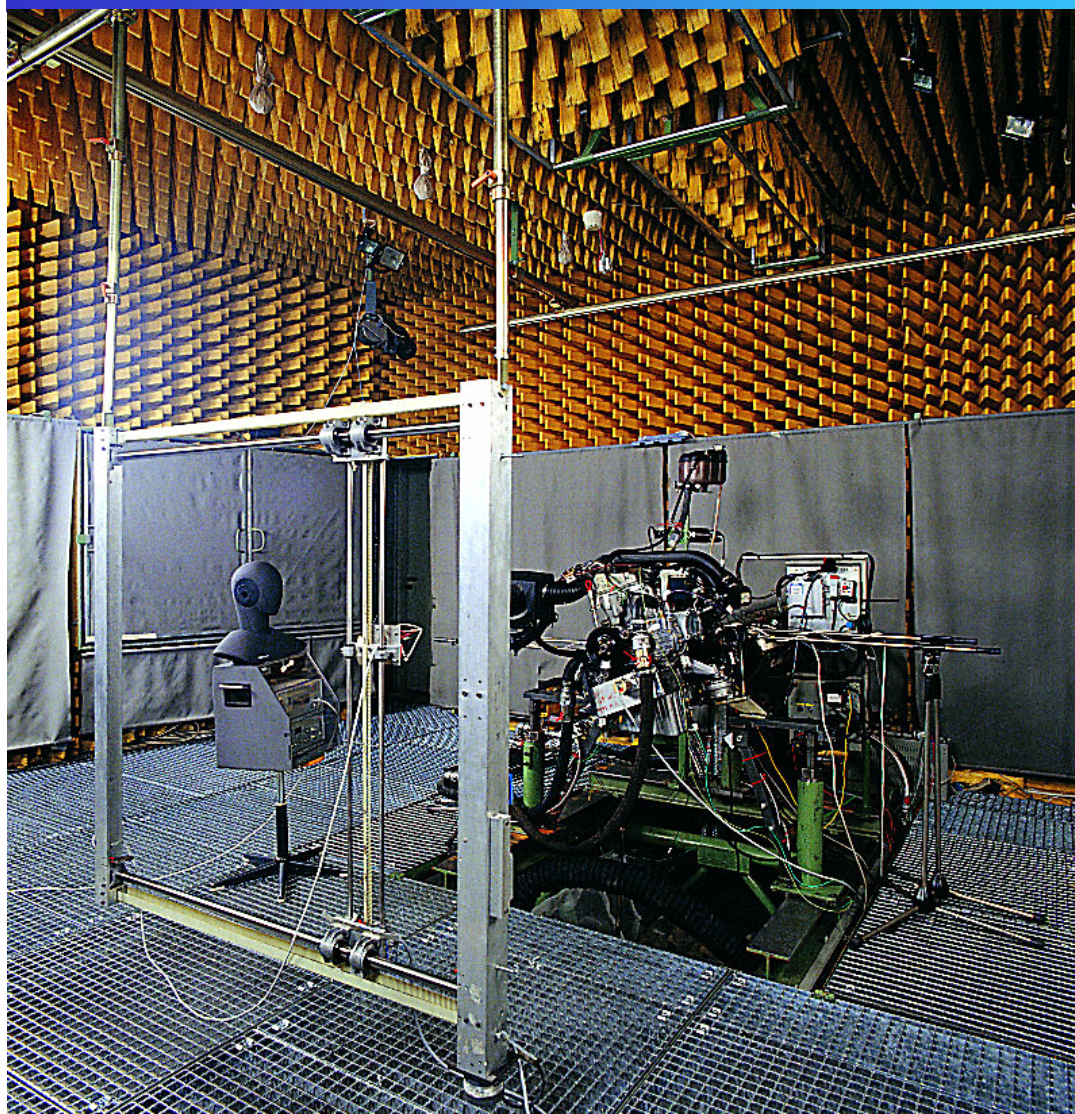
- **Interaction Chassis/Road**
- **Exhaust**
- **Wind**

NVH Definition

Transfer

- **Structure borne**
- **Air Borne**

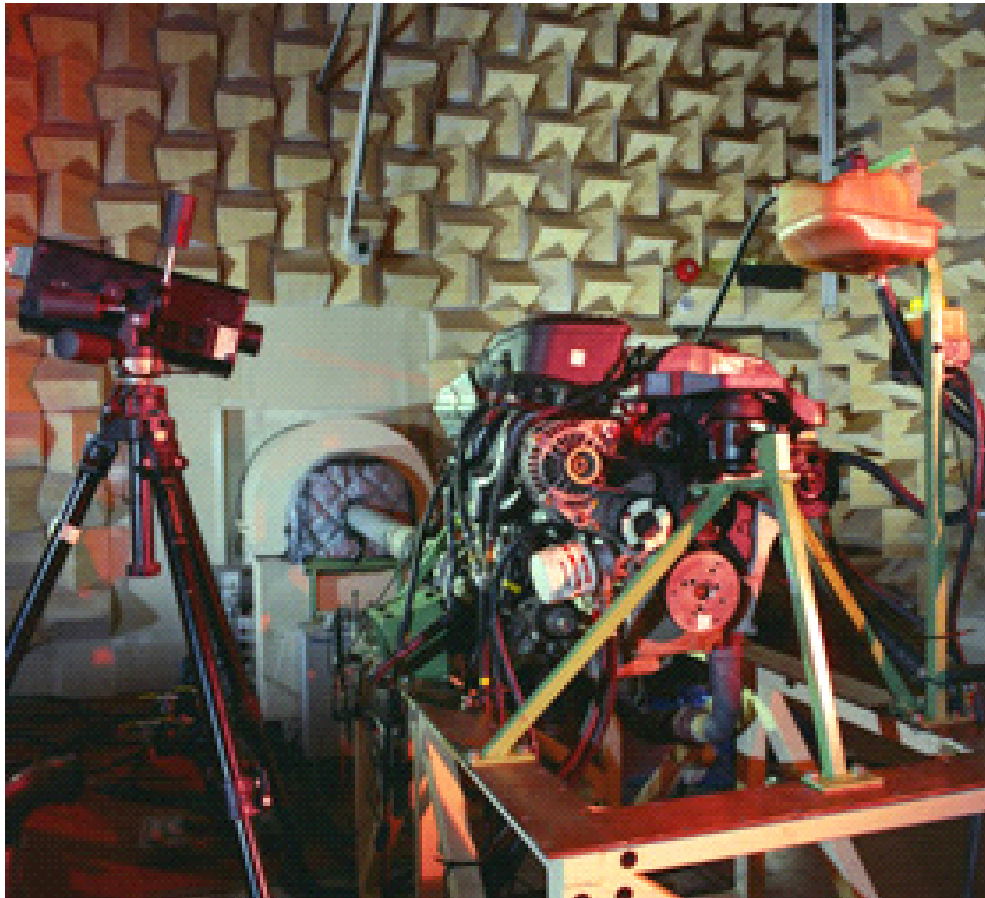
NVH Testing



**(Semi-)Anechoic
Test Cell**

**(Source: M. Helfer,
FKFS
Forschungsinstitut für
Kraftfahrwesen und
Fahrzeugmotoren,
Stuttgart)**

NVH Testing



**Detail: Shaft
Connection**

(Source: mira.co.uk)

NVH Testing

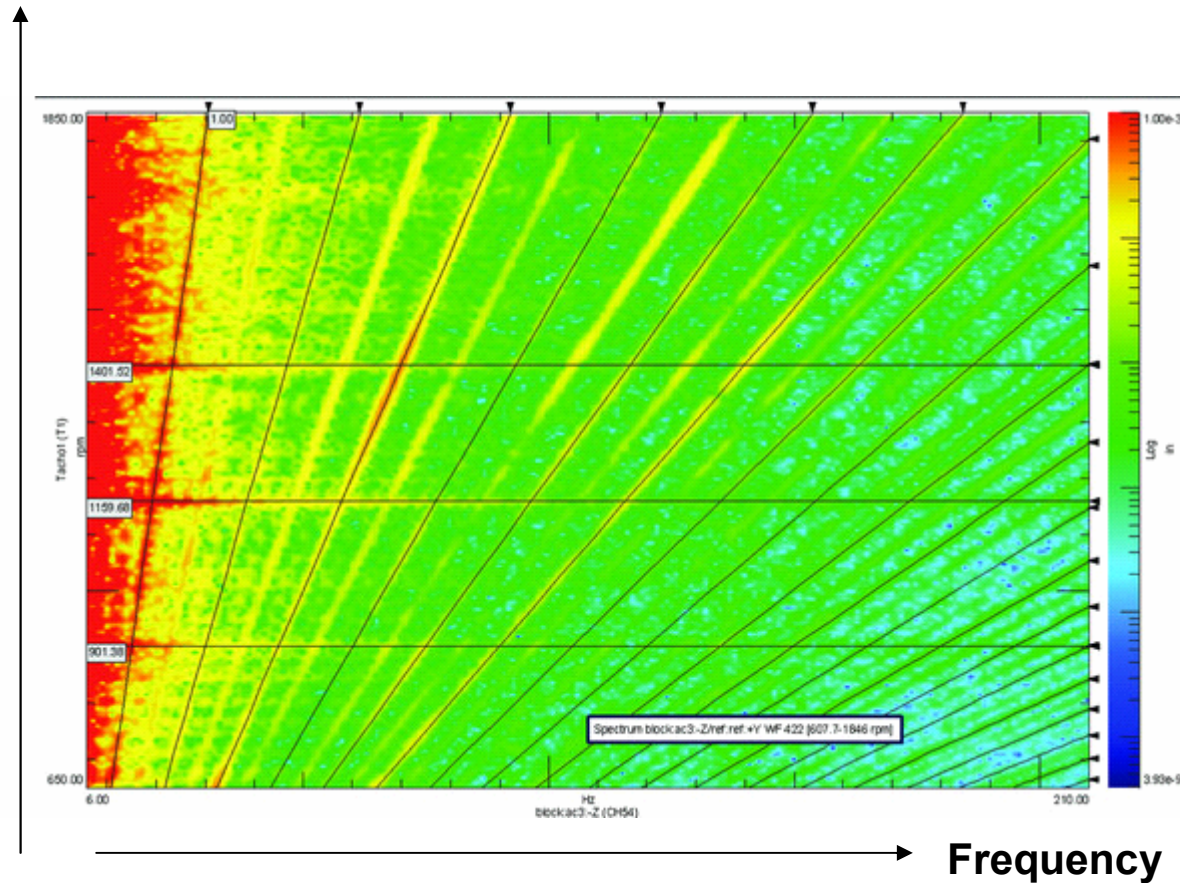


**Acoustic Camera,
Visualizes Sound
Field**

**(Source: Süddeutsche
Zeitung)**

NVH Testing

Time
(here: speed variation with time)



Waterfall Plot
(Source: OEM Off Highway.com)