



Noise Abatement Issues

Improving Quality of Life in
Chicago

Primary Objective

- Work with the CTA to encourage testing of resilient wheels on trains
 - CTA currently not interested due to cost of wheels and training of employees
 - Assessing community awareness and interest in quieting the “L”

Concentrations

● Policy and Social

- Identify interested organizations
- Assess awareness
- Lay foundation for working with CTA

● Engineering

- Collect data on wheel
- Perform cost effectiveness analysis
- Explain benefits of wheel to lay person

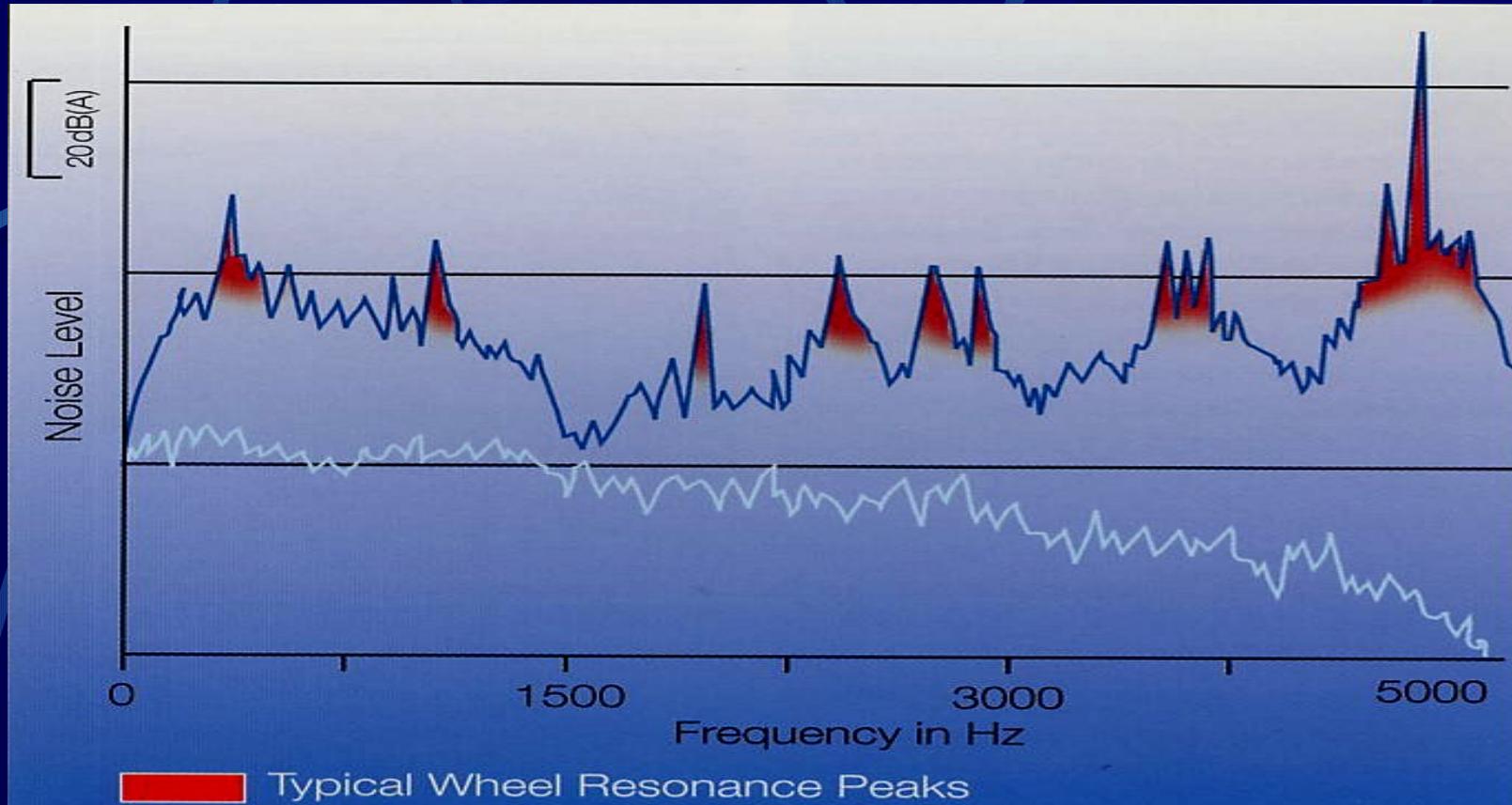
Engineering of Resilient Wheels



Origin of Noise

- **Noise generated due to :**
 - **Wheel / Rail Contact Resulting in Friction and Vibration**
 - **Aerodynamic behavior of train**
- **Sound measurements taken & analyzed seek to identify the fundamental frequencies of the noise generated**

Evaluating Noise Data

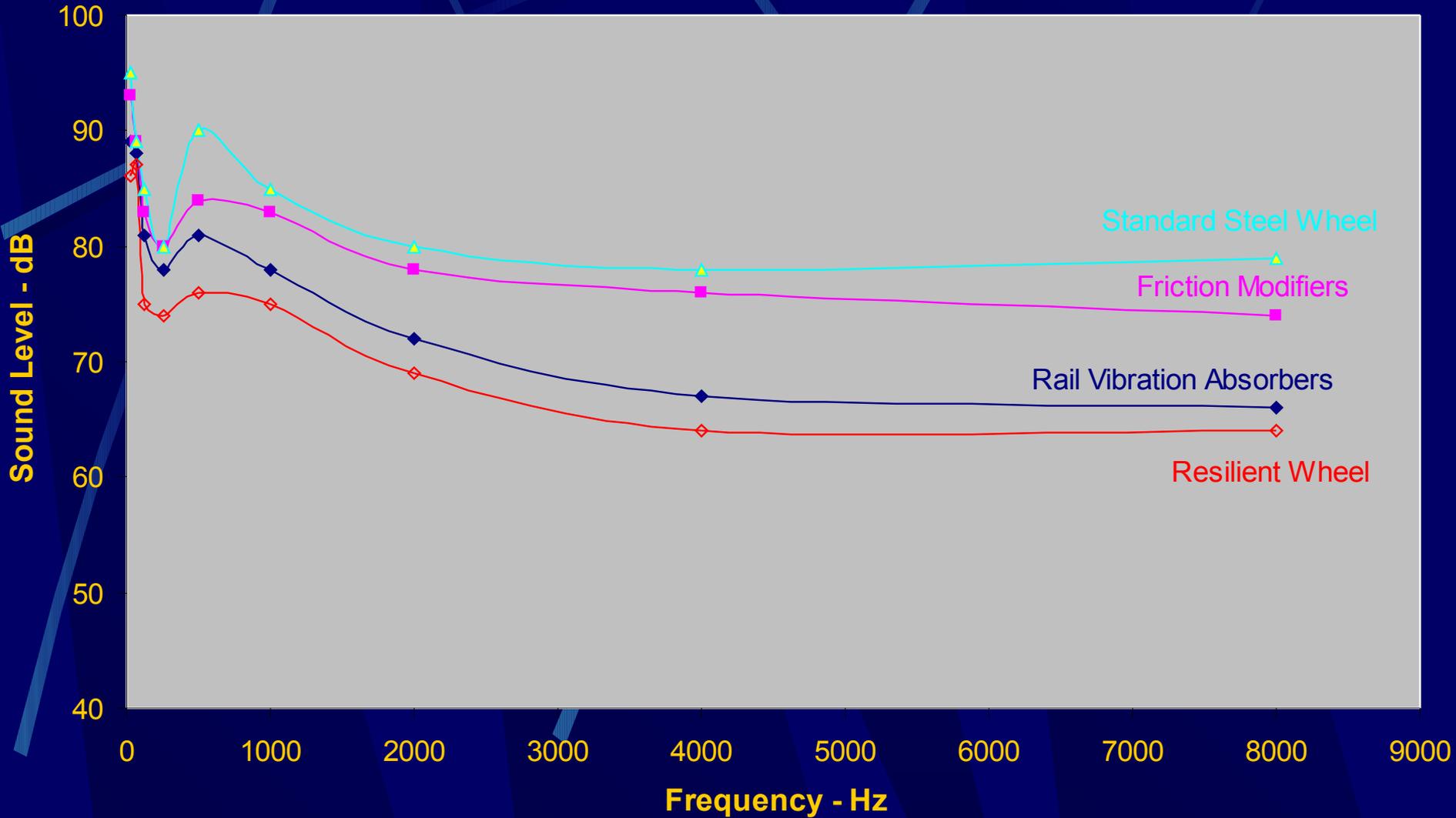


- Peaks are identified as natural frequencies of the wheel where noise amplitude is highest

Mechanics of Sound Damping

- Sound damping techniques include methods by which the vibrational energy of the wheel/rail interface is turned into heat energy
- Several Techniques Include Using :
 - Noise Absorbers (Axial & Radial)
 - Damping Rings
 - Friction Modifiers
 - Resilient Wheels

Comparison of Noise of Several Sound Damping Techniques at 35mph



Resilient Wheels

- The term resilient wheel refers to a unique three piece construction consisting of a rubber insert between a metal hub and tire.
- The resilient material (rubber) dampens noise by reducing the resonant noise radiation.
- The resilient material acts as a vibration isolation system that reduces the dynamic forces applied to the rail and reduces vibration transmitted from the wheel/rail interface back to the car body.

Noise Comparison



● Solid Steel Wheel

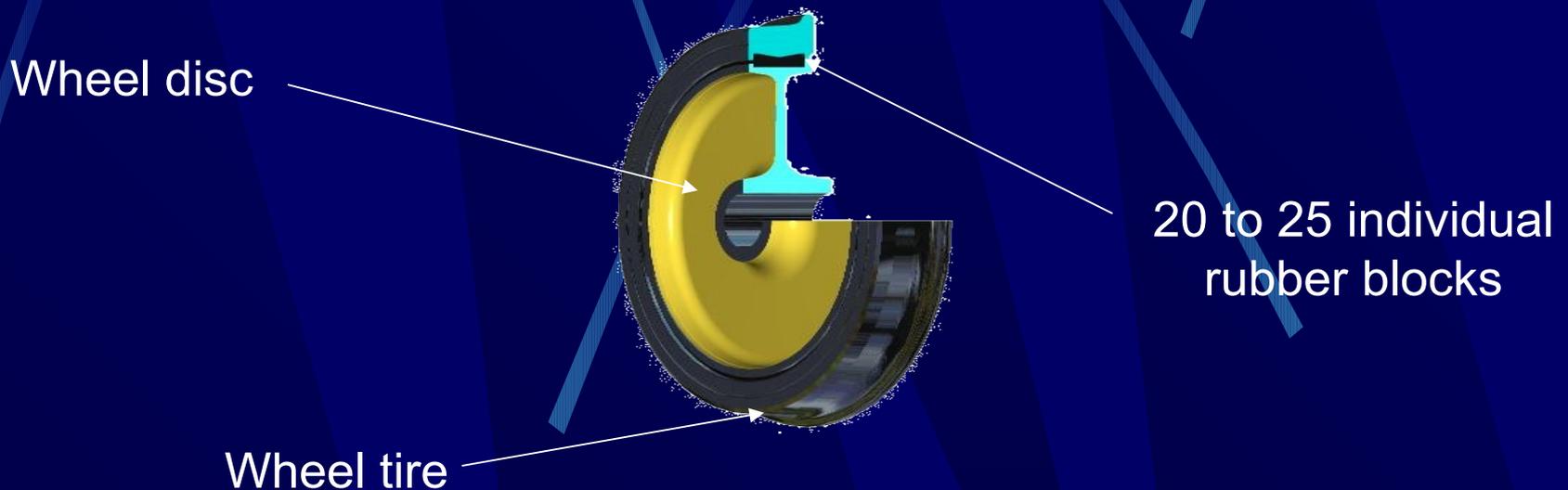
● Resilient Wheel

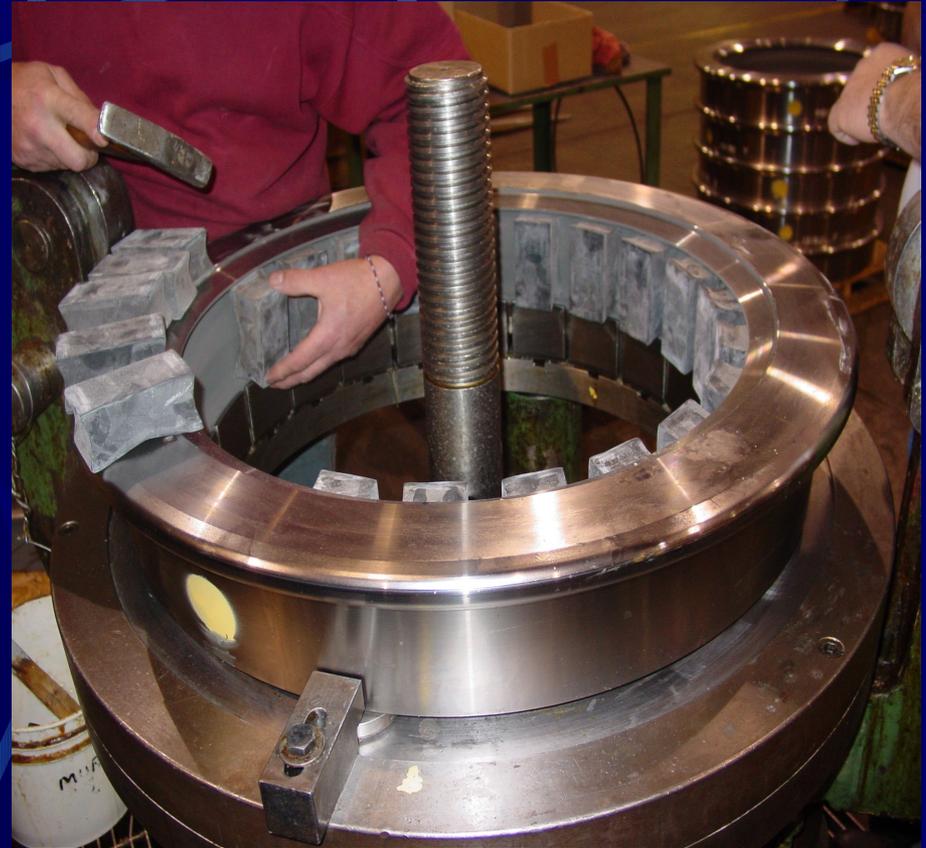
Resilient Wheel Example: Penn Machine Bochum 54



Resilient Wheel: Bochum 54

- The Bochum 54 is a resilient or rubber cushioned wheel, containing rubber blocks pre-stressed in the radial direction throughout its circumference.





- Bochum 54 wheel design is unique in that it uses high quality rubber blocks and not a solid rubber insert

Bochum 54 Qualities

- Very effective at reducing noise squeal on a curved track
- Bochum 54 reduces sound most effectively at levels above 500 Hz by reducing the amount of airborne noise from wheel/rail vibration (Ground borne vibration much lower than 500 Hz)
- Bochum tire averages 40% longer tire life than solid steel wheels
- Only tire replacement is necessary as opposed to the entirety of solid wheels

Quality of Life



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Quality of Life Model

- Factors that contribute to the goodness and meaning of life, as well as people's happiness
- Quality of life studies promote means for people, within their environment to live in ways that are best for them
- Quality lives: lives that are meaningful and enjoyed
- Enjoyment: the experience of satisfaction or the possession or achievement of some characteristic

Quality of Life

- The degree to which a person enjoys the important possibilities of his or her life through the interaction of personal and environmental factors



Conceptual Framework

Quality of Life
for the community

Decision-Making Opportunities

- People need to be highly satisfied with the possibilities of their lives, given their surrounding environment
- Sometimes people may be unaware that a better quality of life is possible

Quality of Life Concerning the CTA

- Chicago Public Transit infringing upon quality of life of the city's citizens
 - Physical being: physical health
 - Community and social belonging: neighborhood involvement and recreational programs
 - Leisure Becoming: activities that promote relaxation and stress reduction

Community Groups

- People coming together for a specific cause
- In this case, individuals and previously established interest groups would come together to work with the CTA to improve quality of life within Chicago
- Other groups in Chicago are concerned about noise; for example, the building of Midway airport and the expansion of O'Hare

The Business Aspect



The Initial Steps

- CTA lines around the loop can be valuable
- Along wells, Wabash, Van Buren, and Lake, however, detrimental
- Can be seen by the depressing and dark look. Can this be caused by the noise?
- First began contact by going from building to building along Wabash Ave., seeking out managerial firms that had a stake in the development along these corridors

Making Contact in the Business Community

- Contacted managerial firms, as well as the Chicago Chamber of Commerce
- Most described the noise as unavoidable and had no solutions
- forced to install and replace storm windows, which repel noise better than conventional windows
- This places burdens on businesses.

Finding Some Information

- L. J. Sheridan & Co
- Buildings are 'C' level, meaning they command a price between \$17 and \$21 per square foot
- Other buildings in the loop are 'B' level, \$29 and \$34 per square foot
- 'A' level, downtown command up to \$40 and more per squarefoot

Onward and Upward



- Disparity in price due to environment surrounding Wabash Ave
- Convince businesses that there is a solution to the noise in the loop

Getting Out Into the Community



Building a Relationship

● Step One: Researching

- Searching newspaper articles
- Internet research
- Calling phone numbers found

● Step Two: Contacting

- Telephone contact
- Setting up appointments
- Presenting information
- Discussing and answering questions

Contacts

- Metro Seniors in Action
 - Involved with CTA to make transit accessible for seniors
 - Seeking to increase members quality of life
 - Attended sub-committee meeting of transportation
 - Invited to share further information

Contacts, cont'd

- Neighborhood Capital Budget Group
 - Seek to pursue “public good”
 - Campaign for Better Transit
 - Creating a discussion group of engineers and community activists for educational purposes

Further Interested Parties

- Chicago Area Transportation
- Harold Washington College
- Merchant's Association
- Chicago Police Department
- South Commons Condo Association
- Cosmopolitan Chamber of Commerce
- Roosevelt University
- De La Salle High School

Future IPRO

- Continue to contact community groups and assess concern related to “L” noise
- Inform the CTA of results
- Work with CTA to explore options of improving quality of life