

Case Study L1-014

Semantic Precision & Domain Disambiguation

The "Radio Interference" Heart Valve (Mechanical Fit vs. Wave Physics)

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Case Study Metadata

Dataset ID: L1-014

Category: Semantic Precision — Level 1

Focus: Cross-Domain Polysemy (Mechanics vs. Electronics)

Model: Generic NMT

Domain: Cardiovascular Implants / Mechanics

1 The Context: Interference Fit in Prosthetics

In transcatheter heart valves, structural components must be secured without invasive fasteners. An "interference fit" utilizes the friction generated by forcing a component into a slightly smaller seating to create a permanent lock.

2 The Glitch: The "Signal Noise" Hallucination

The generic model misinterpreted "interference" as a wave/signal phenomenon (*interférence*) rather than a mechanical state of friction (*serrage*).

Term	Source (English)	NMT Failure (French)
Mechanical Lock	connected with interference	✗ reliés avec interférence (Radio)
Surgical Result	entrap and lock leaflets	✓ pincer et verrouiller les feuillets

Table 1: Cross-Domain Register Failure in Cardiac Claims

3 Alignment Methodology

Alignment Methodology

Mechanical Register Disambiguation:

1. **Entity Relationship Analysis:** Detect the presence of [Structure] + [Anchoring Member] + [Connection].
2. **Domain Suppression:** Lower the probability of "Wave/Physics" terminology when the active entities are solid medical implants.
3. **Precision Mapping:** Map "Interference" → *Serrage* or *Ajustement serré* to maintain the physical reality of the invention.