The Riddle of the Tay Bridge Disaster

Bill Dow's theory

Melissa Berry
There are many theories that try to explain how this weakness caused the bridge to collapse. Retired physicist, Bill Dow, who still lives in the area, has made it his lifelong study. He's spent decades analysing hundreds of pages of reports and correspondence from the time of the disaster.

Bill Dow
I suppose that nowadays we tend to think of the Lockerbie disaster where, in fact, every single bit of that aircraft was recovered and then was reassembled on a framework back in Farnborough. Nothing like that happened in the Tay Bridge disaster.

When you do not gather the detail, you can't explain all of the things which actually happened.

Melissa Berry
Bill's theory revolves around the train de-railing.

Bill Dow
The dimensions of both the carriages and the bridge were such that it would be very easy to get a very high-speed wind going over the tops of the carriages.

Whereas the same wind, as it entered the bottom of the bridge, or near the bottom of the carriages, it would be impeded by all the wheels, the break gear, the steps and all that stuff. This is exactly what you get in an aircraft wing and the result is that you get a lift from this.

Melissa Berry
It was a strong wind like this that caused two girders to fall into the river during construction. Bill Dow has discovered that one of these toppled girders was nevertheless re-used in the finished bridge.

Bill Dow
Any girder which has fallen and which has been straightened out is quite naturally weaker than any other. Also there's a tendency for it to go back to the shape which it had when it was bent.

Something must have happened within that girder because the various platelayers and surface men described the engines as nodding into the girder. The descriptions suggest that there was a slight change in direction in the rails as you passed from the low girders into this high girder. And that change was reasonably sudden just at the point where the two girders met.

And with that wind blowing and the combination of the kink in the rails was such that at least the second-class vehicle came off the line. Once the second-class vehicle was off the line it would roll along the floor of the girder quite well at the same speed as the train. But it couldn't pass between the fourth and fifth girders because there was a triangular plate there. It would have hit this plate with a severe jolt.

This jolt would have cracked the cast iron lugs. But it would have had very little effect on the wrought iron.

Melissa Berry

A sudden impact is the key to his explanation.

It was accepted at the time that the cast iron lugs were a weakness but Bill thinks they broke as a result of a shockwave down through the cast iron.

This could be true, but modern engineering requires explanations with the highest possible levels of evidence and analysis.