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At the heart of your supply chains

30th September 2021

BPDWG

Dynamic Load Security Testing - Building Products

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Dynamic Load Security Testing

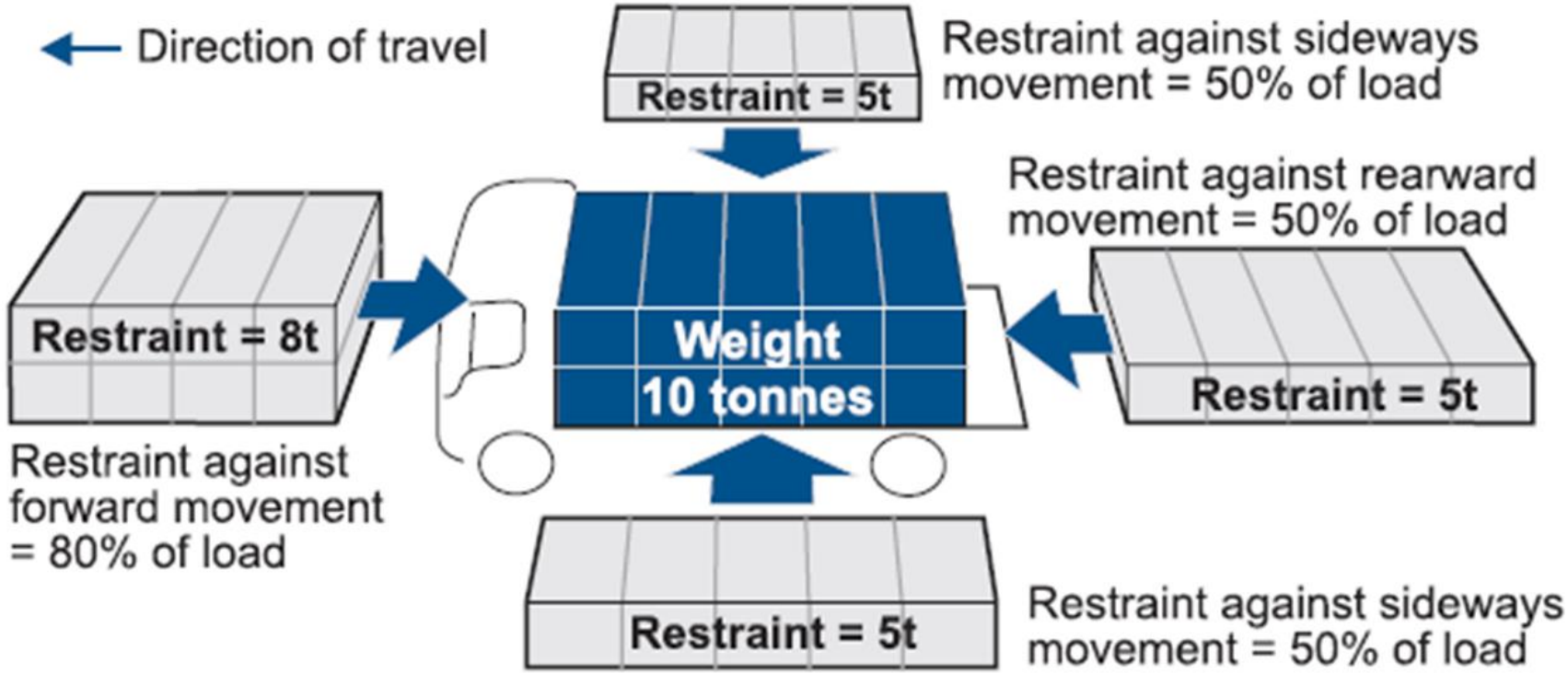
Overview

- In March 2021, following a number of reported loads for a key customer moving ‘in transit’ specifically on ‘standard’ curtain side trailers hauled by Sub-Contractors, and particularly during the winter months of 2020, a small working party conducted ‘dynamic testing’ on various ‘paving’ products in order to understand and resolve the issue.

- The main issue identified from reports received was that product was moving laterally across the bed of the trailer. Given the size and dimension of paving products, typically a load consists of 3 x longitudinal rows (loaded to the headboard), with ‘air gaps’ between the rows due to being loaded with clamp type fork lift trucks.

Dynamic load security testing

Load security requirements



Dynamic load security testing

Dynamic load security testing - Methodology

- Testing primarily focused on complying with the lateral / sideways force requirement of 0.5g

- Methodology – Essentially, the force required to move products (of known weight) on a trailer bed was measured by using a calibrated load cell attached to the hydraulic boom of a forklift truck with slings. Various combinations of load restraint were measured in conjunction with different products and pack configurations. All products were shrunk wrapped.

  The (static) co-efficient of friction was then calculated as –

  - Force to initially move product (Kg) / weight of product (Kg) = Co-efficient friction

    100 100

    eg - **500 Kg / 1000 Kg = 0.5**

    100 100

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Methodology – testing criteria

- no load restraint
- with and without cornerboards
- palletised and non-palletised
- palletised – product banded and non-banded
- with 1 x ratchet strap
- with 2 x ratchet straps
- with ratchet straps and non-slip friction mats
- single pack weights – approx. 600 Kg
- for reference, the ‘dynamic’ co-efficient of friction was calculated as 0.7 of static

Dynamic Load Security Testing

Testing

Dynamic load security testing

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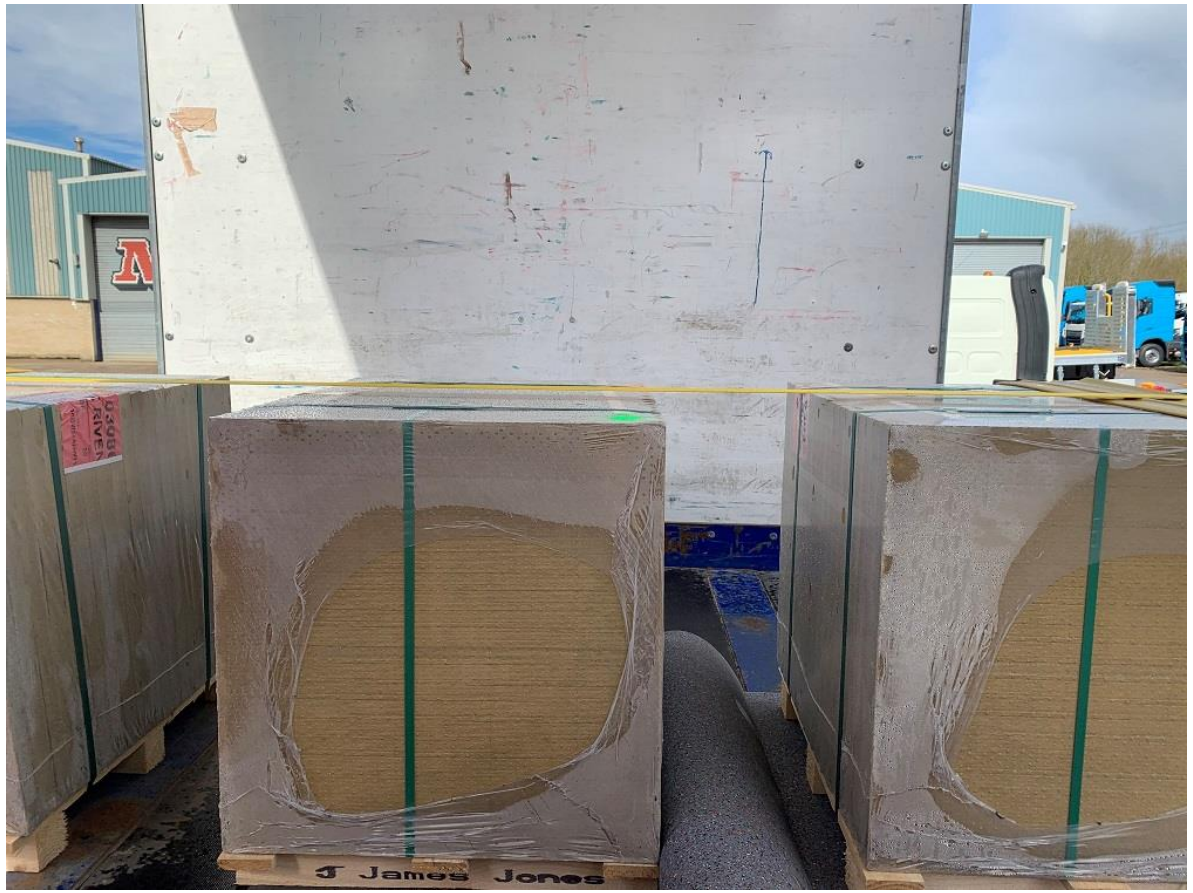

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Results 1

Palletised	Banded to Pallet	Corner Boards	Straps	Anti Slip Mat	Action	Result	μ - Static	μ - Dynamic
No	No	No	0	N	Pull to outside	0.007	0.11	0.08
No	No	No	0	N	Pull to rear (0.8 g)	0.005	0.08	0.06
No	No	No	1	N	Pull outer pack to outside	0.010	0.16	0.11
No	No	Yes	1	N	Pull outer pack to outside	0.028	0.46	0.32
No	No	Yes	2	N	Pull outer pack to outside	0.048	0.79	0.55
No	No	Yes	2	N	Pull outer to pack to outside	0.058	0.95	0.67
Yes	No	No	0	N	Pull outer pack to outside	0.021	0.34	0.24
Yes	No	No	0	N	Pull outer pack to outside	0.025	0.41	0.28
Yes	No	Yes	1	N	Pull outer pack to outside	0.051	0.83	0.58
Yes	No	Yes	1	N	Pull outer pack to outside	0.055	0.89	0.62
Yes	No	Yes	2	N	Pull outer packto oustide	0.090	1.46	1.02
Yes	No	Yes	1	N	Pull outer pack to centre	0.025	0.41	0.28
Yes	No	Yes	2	N	Pull outer pack to centre	0.035	0.57	0.40
Yes	Yes	No	0	Y	Pull outer pack to outside	0.036	0.58	0.41
Yes	Yes	Yes	1	Y	Pull outer pack to outside	0.095	1.54	1.08
Yes	Yes	Yes	2	Y	Pull outer pack to outside	0.130	2.11	1.47
Yes	Yes	Yes	1	N	Pull outer pack to outside	0.057	0.92	0.65

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Results 2

Palletised	Banded to Pallet	Corner Boards	Straps	Anti Slip Mat	Action	Result	μ - Static	μ - Dynamic
Yes	Yes	Yes	0	N	Pull outer pack to outside	0.032	0.52	0.36
Yes	Yes	Yes	0	N	Pull outer pack to centre	0.033	0.53	0.37
Yes	Yes	Yes	1	N	Pull outer pack to centre	0.033	0.53	0.37
Yes	Yes	Yes	2	N	Pull outer pack to centre	0.033	0.53	0.37
Yes	No	Yes	1	N	Pull across bed of trailer	0.052	0.39	0.27
Yes	No	Yes	2	N	Pull across bed of trailer	0.093	0.70	0.49
No	No	No	0	N	Pull centre pack to outside	0.021	0.36	0.25
No	No	No	1	N	Pull outer pack to outside	0.052	0.90	0.63
No	No	No	2	N	Pull outer pack to outside	0.058	1.00	0.70
No	No	No	0	Y	Pull outer pack to outside	0.026	0.45	0.31
Yes	No	No	0	N	Pull centre pack to outside	0.029	0.50	0.35
Yes	No	Yes	1	N	Pull outer pack to outside	0.045	0.77	0.54
Yes	No	Yes	2	N	Pull outer pack to outside	0.097	1.66	1.16
Yes	Yes	No	0	N	Pull centre pack to outside	0.036	0.62	0.43
Yes	Yes	No	0	Y	Pull outer pack to outside	0.045	0.77	0.54
Yes	Yes	Yes	1	Y	Pull outer pack to outside	0.097	1.66	1.16
Yes	Yes	Yes	2	Y	Pull outer park to outside	0.140	2.39	1.68
Yes	No	Yes	1	N	Pull across bed of trailer	0.113	1.93	1.35
Yes	No	Yes	2	N	Pull across bed of trailer	0.124	2.12	1.48

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Conclusion

Following the exercise and given that the results confirmed that the current load security policy of strapping with corner boards, etc, is effective, in the final analysis the main issue (for this particular product) has been identified as the gaps between the (3 x) rows of product.

Another factor, is the location of one of the Customers main Works – Derbyshire Dales.

The site is very exposed, especially in Winter and the potential for formation of ice on exposed vehicle and trailer flooring is also a prime consideration.

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Conclusion - Actions

- With the load movement issue having being more prevalent in Winter –
    - Product is now configured and loaded for the winter months from November 1st
    - Product is now loaded to the centre of trailer beds eliminating all the ‘gaps’ between the rows
    - 3 x rows now all ‘abutted’
    - Product is strapped with corner boards
    - ‘Gaps’ are now either side between the load and the side raves

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End

Any Questions ?

Thank You