

Geodetic Concepts for Collision Avoidance along Industrial Transport and Assembly Lines

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Chair of Geodesy – TUM



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Transport and Assembly Lines



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Task

- Preventing any collisions of carriers or transported products (e.g. engines) with installations and manipulators alongside the transport and assembly line
- Preventing any collision between two carriers themselves, in particular at stop events in bends.

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Approach

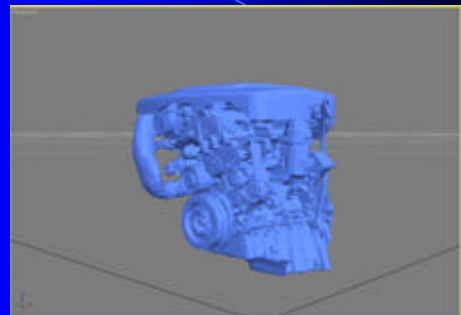
- Scan the entire line(s) and its (their) environment (as up-to-date CAD maps are usually rare)
- Get CAD-models of carriers and products (e.g. voxel) and adapt them properly
- Define and combine different coordinate systems (transformation parameters)
- Create a realistic simulation of the carrier motion (even passing bends) in a virtual scenery
- Detect possible collision spots virtually before happening in reality

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carriers and products

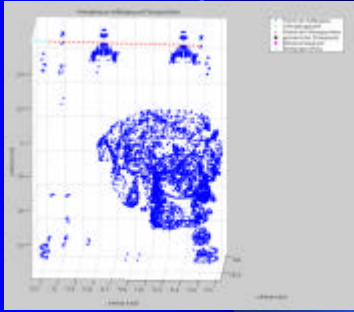


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treating the voxel model

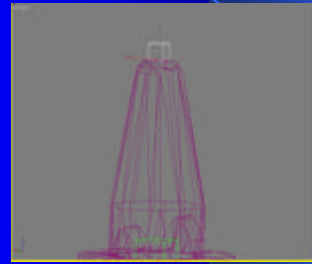


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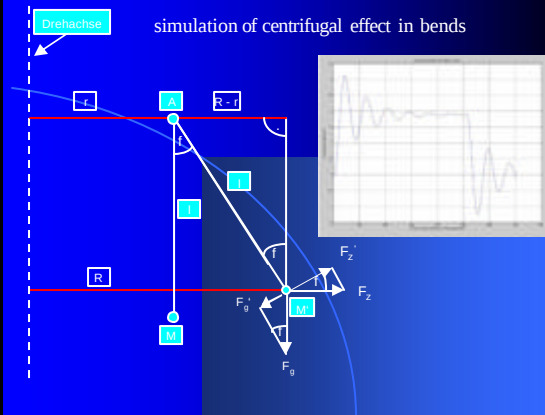
defining tie points



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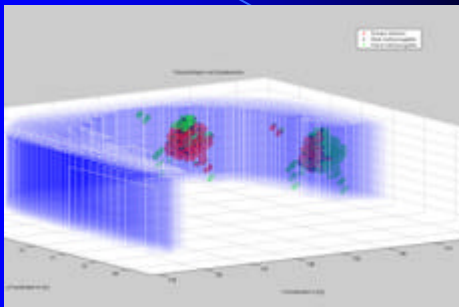
simulation of centrifugal effect in bends



deciding between 3 individual collision cases

Keine Kollision	Pseudokollision	Wirkliche Kollision
		

virtual collision detection



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results & conclusions

- segmentation in cubes containing points of carrier's and product's shell and testing in- and circumscribed spheres for intersection represents a fast means to test a vast number of points for possible collisions with installations close to the transport and assembly line.
- the newly developed software KOSIMU proved to be an efficient tool to detect certain and probable collision areas by simulation and thus to prevent real collisions during production!

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