Prevention of rollover accidents of trailer trucks loading containers by the detection of three dimensional center of gravity (D3DCG)

Prof. Dr. Yutaka Watanabe
Tokyo University of Marine Science and Technology

- Rollover accidents frequently happened.
- Experiment of a rollover accident.
- Why D3DCG was innovated.
- How D3DCG works.
Container rollover accidents have been frequently happening in Japan.
It also happened nearby the university!
A passenger car driver was killed by the accident!!

This truck rolled over on a Japanese highway at less than legal speed limit.
Neither Electric Breaking System nor Roll Stability System can prevent it!

Trucks with EBS or RSS frequently cause rollover accidents in Japan!
Experiment of Rollover Accident

A real truck loaded a container crushed!

Executed by Prof. Yutaka Watanabe
Tokyo University of Marine Science and Technology
The gravity center causes rollover!
Procedure of estimating critical speed of rollover

- **a**: 砂袋, **b**: パレット
- **c**: トラクター後輪から重心までの距離
- **d**: 重心からシャーシ車軸中間点からの距離
- **e**: 設置点からトラクター後輪までの距離
- **f**: トラクター前輪から設置点までの距離
- **G**: 重心位置, **L**: トラクター後輪からシャーシ車軸中間点までの距離

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JP Patent No. 2006-315042
Only 37 km/h caused Rollover!

- **Experiment**
- **Critical speed of rollover PAT. pending**
- **Legal speed limit (Japanese local roads)**
What's inside of containers?
Infinite variety of load conditions in containers! How to find the gravity center? Is it possible??
Imported containers are all locked. We are not allowed to open it until delivering it to the final destinations!

How to find the center of gravity?
3-D Detection of Gravity Center
Automatic Rollover Warning System
by 3-D Detection of Gravity Center

Invented by Prof. Yutaka Watanabe
Tokyo University of Marine Science and Technology
Gravity Center

 PATs with Know Hows  PATs only

Radius of Curved Road (m)

Intersection  Local Road  Highway

Roll Rate

Critical Speed (km/h)

Pitch Rate
Vertical gyro (Two axes)

Onboard mobile computer in cabin

System application
前後重心位置

左右重心位置

曲路半径 R (m)
80 160 240

横転限界速度 (km/h)
51 72.2 88.4
Continuously exhibiting D3DCG not only at domestic exhibitions
but also at international ones.
D3DCG can be applied for any kind of objects!

- Trucks, Automobiles,
- Trains, Ships,
- Aero planes,
- Missiles,
- Etcetera's.
Welcome to join us!