



Der Ampelmann

Offshore Access  
as easy as crossing the street

# The Problem



# The Problem



# The Story of finding the solution

# Berlin, summer 2002

- World Wind Energy Conference
- Something about a maintenance vessel



# Berlin, summer 2002

- Solve the problem with offshore and control engineering
- Ship based
- Safe
- Easy
- Fast
- No requirements on turbine
- Personnel and equipment

# Berlin, summer 2002

- Motion compensation: flight simulator



# Berlin, summer 2002

- Motion compensation: flight simulator
- Put it on a ship



# Berlin, summer 2002

- Motion compensation: flight simulator
- Put it on a ship
- Code name: Ampelmann

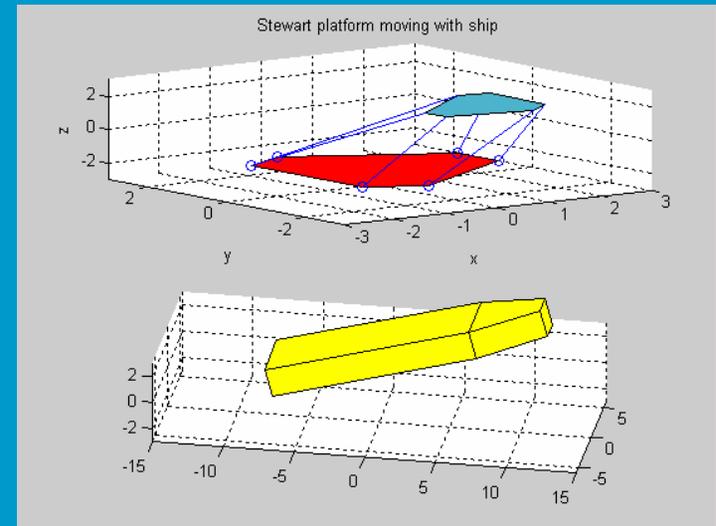


# Does it work?

- Experts: why not
- Marine engineering uses Stewart platform the other way around
- Size of DUT flight simulator already >2m

# Does it work?

- 2 typical vessels
- Check motions
- Find best spot on deck
- Find cylinder requirements



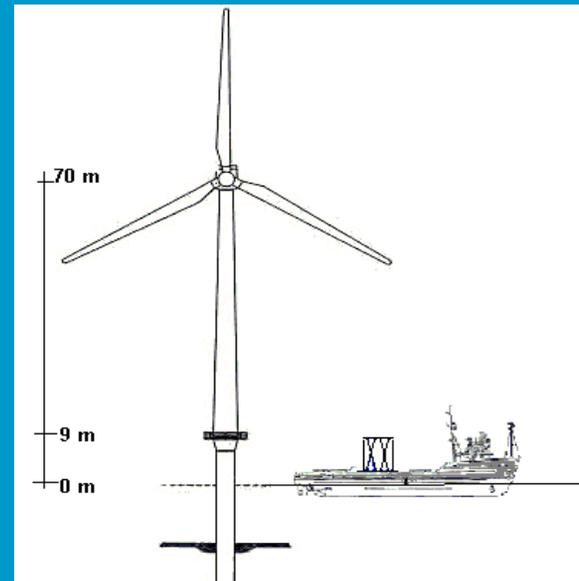
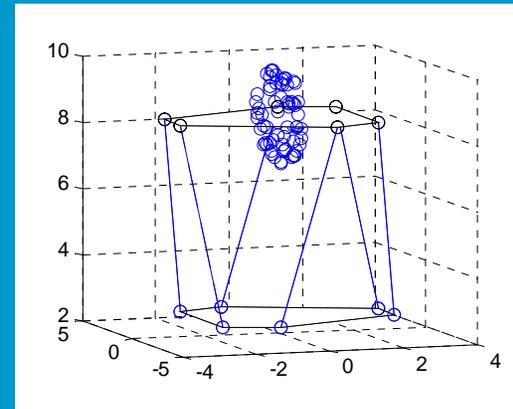
# Does it work?

- Continuous
- to  $H_s = 2.5\text{m}$ ,  $H_{\max} = 4.5\text{m}$

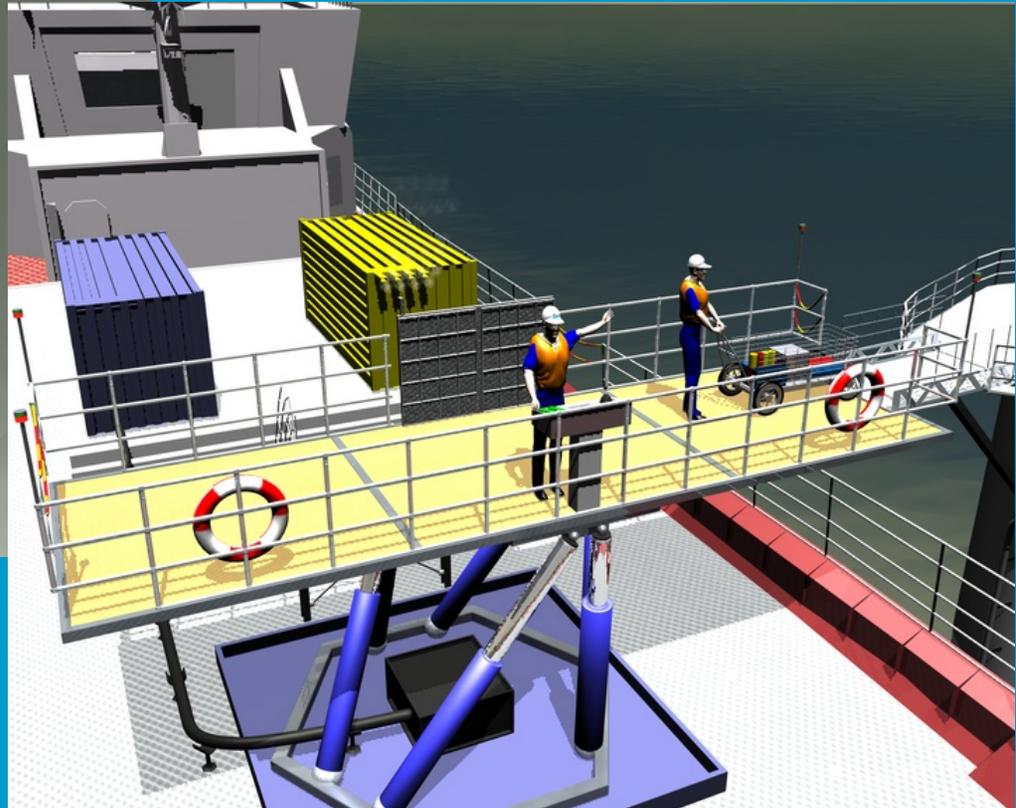
Hs	Tz	0.5 s	1.5 s	2.5 s	3.5 s	4.5 s	5.5 s	6.5 s	7.5 s	Sum	
6.25 m									0.08	0.08	7.1 %
5.75 m								0.04	0.34	0.38	
5.25 m								0.38	0.15	0.53	
4.75 m								1.18		1.18	
4.25 m								3.61		3.61	
3.75 m							4.07	4.83		8.90	
3.25 m							18.83	0.38		19.21	
2.75 m							37.96			37.96	
2.25 m						26.51	42.44			68.95	92.9 %
1.75 m					0.08	113.6	4.83			118.51	
1.25 m					5.93	219.4	0.57			225.95	
0.75 m					237.2	143.0	0.87			381.19	
0.25 m		0.76		1.10	117.1	14.22	0.11	0.11		133.49	
Sum		0.76	0.00	1.10	360.46	516.81	109.68	10.54	0.57	999.93	

# Does it work?

- Master projects:
  - 2 approaches
  - 1 answer:
  - 4m stroke cylinders
  - max height: 8m



# Does it work?



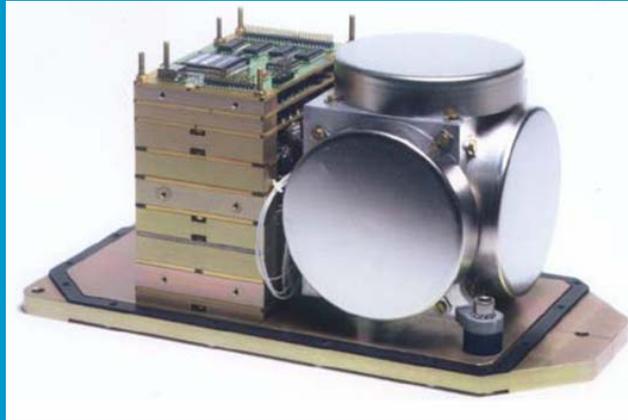
- 4m stroke cylinders

# Does it work?

- Safe
  - Velocity and acceleration reserve in system
  - Back-up pumps/power
  - Back-up control systems
  - System still works in more severe sea states

# Show that it works

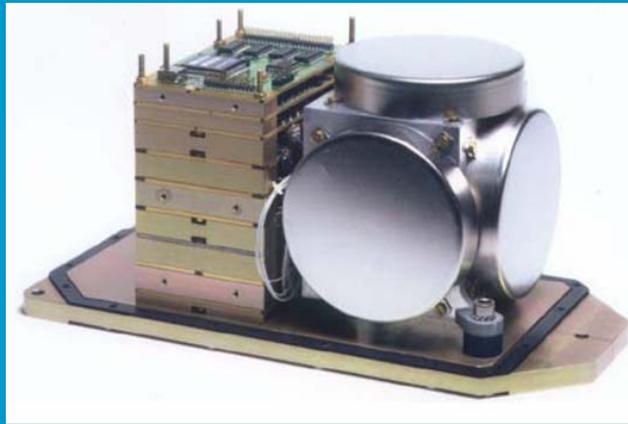
- Make live model
- Do proof-of-concept test



# Show that it works

- Stewart platform
- Seatex MRU
- Octans
- Transport etc.
- Manhours

Rexroth Hydraudyne  
Boskalis  
Boskalis/IXSea  
Shell Wind  
SenterNovem



# Show that it works

- Testing the motion sensors



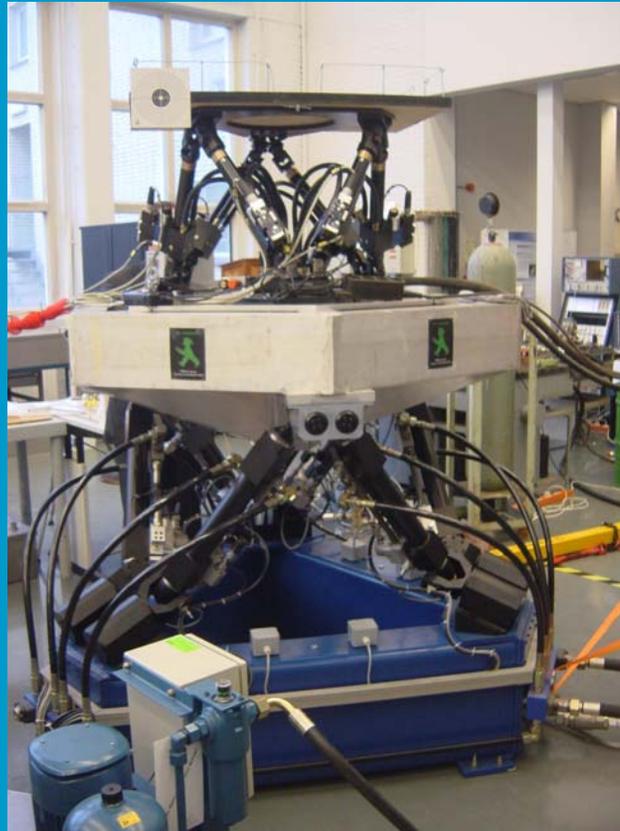
# Show that it works

- Establish communication between MMS and Octans



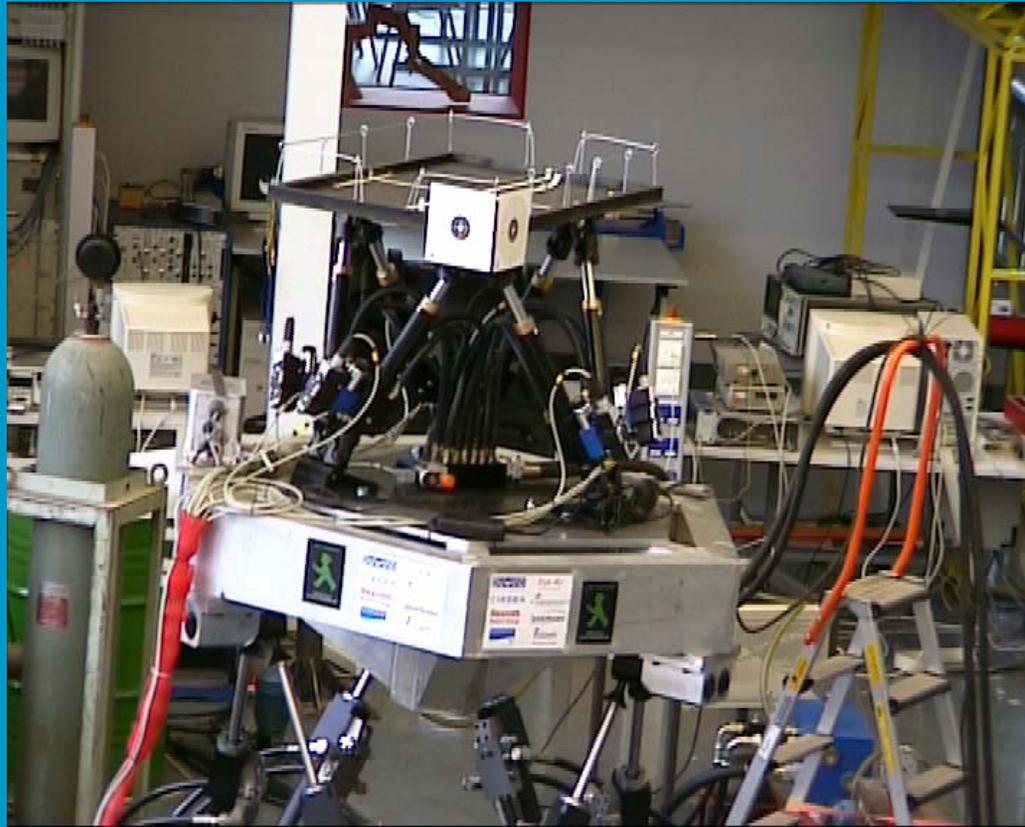
# Show that it works

- Dry testing on Simonita



# Show that it works

- Dry testing on Simonita



# Show that it works

- Dry testing on Simonita



# Show that it works

- Wet testing in wave basin



# Show that it works

- Wet testing in wave basin



# Demonstration





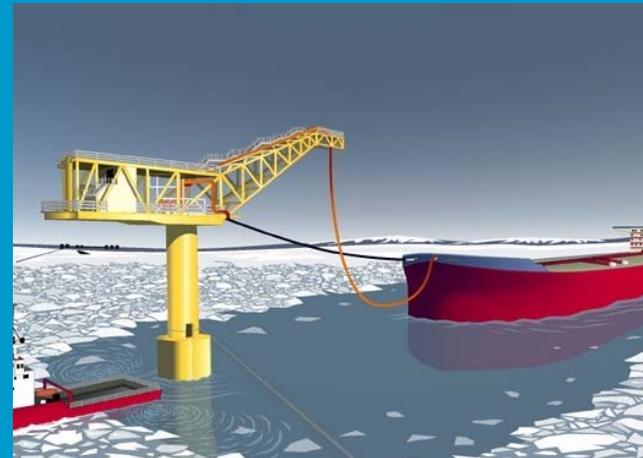
# Response

- Offshore manned:
  - Crew change
  - replace helicopter
  - bus service on North Sea
  - appr. 15 platforms per week
  - contact Shell/Nam



# Response

- Offshore unmanned:
  - Sakhalin
  - tanker loading station
  - increase workability
  - operational: beginning 2007



# Next steps

- Partnership with Rexroth (part of Bosch)
- Designing safety system
- Negotiations with potential launching customers
- First system in operation in summer 2006



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[www.ampelmann.tudelft.nl](http://www.ampelmann.tudelft.nl)