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# Developing a new yarder- controlled mechanical slack- pulling carriage for double- drum winches

The Norwegian Forest and Landscape Institute

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1986 Igland A/S



Wildcat (hydraulic system)





> 1986 Igland A/S



Wildcat (hydraulic system)

> 2009 Mecano prototyp



Mechanical



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- > 1986 Igland A/S → Wildcat (hydraulic system)
- > 2009 Mecano™ prototyp → Mechanical
- > 2010 From Idea → Design  
Construction  
Assembly  
Testing



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- The material and construction of prototype carriage must tolerate falling 5 m without functional failure.
- Material must be decided on in cooperation with the constructor. Especially the advantages of lightweight alloys over steel, but the ease of repairing steel in remote workshops.
- There must be horizontal distance between mainline and haul-back line to avoid twist.
- Carriage must be operated by wireless remote control.
- Shifting operation from slack-pulling to travelling by hydraulic or electric actuator
- Speed of skid line ca. 1m/sec
- It should be easy to mount lines on carriage.
- Colours - should be orange with black on capstan for good visibility



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- > The final design and construction was outsourced to the same consulting engineer that constructed the Owren 400 mini-yarder.
- > There were many challenges, meetings and discussions during the construction phase.
- > Laser cutting and welding of the chassis was also outsourced, leaving only mounting and painting to be completed by the institute workshop.

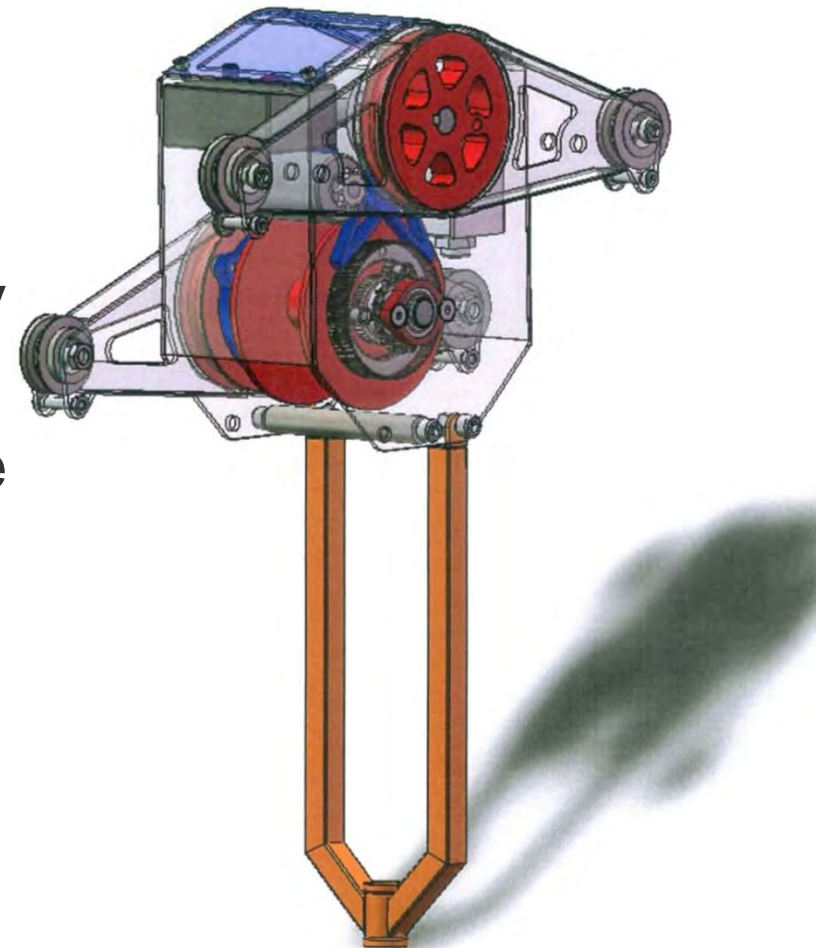


# System



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- > Mechanical system with planetary gear inside
- > Two solenoids engages either the skidding line cog or the travelling cog by wireless remote control
- > The carriage has two capstans; one for the mainline, and one for haul-back line.







Assembly of carriage





1:3 scale mechanical slack-pulling carriage undergoing testing





Testdriving with Owren 400 mini.



# Results of initial testing



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- > Balance in carriage was incorrect, and two metal bars had to be attached to the swing-arm as ballast.
- > Adjustments on shifting arms.
- > Beginning of June numerous tests were done, modifications were necessary to the planetary gear.
- > By the middle of June the carriage was working according to expectation. In a run of 15 cycles requiring 30 shifts between the travelling and slack-pulling gear, only 2 malfunctioned.
- > The most significant problem has been slippage on the driving gear when the switching arm does not engage in a synchronized way.
- > Testing to date has only been carried out on 10% slope.
- > Further tests, will be done on 20 and 30%.



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# Conclusion

- > More development is necessary
  - > Cog wheel?
  - > brake disc ?
  - > lock plunger ?
  
- > **We will succeed in developing a new yarder-controlled mechanical slack-pulling carriage for double-drum winches.**



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Thank you