



# System optimization by integrated design: the Dana case

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- 1 DANA & integrated design approach
- 2 Free-wheeling winch system with incorporated safety function
- 3 High power to move the world
- 4 Winch with integrated motor for extreme environment
- 5 Smart & scalable system control design
- 6 Summary & Conclusion



# DANA & integrated design approach

## SPICER®

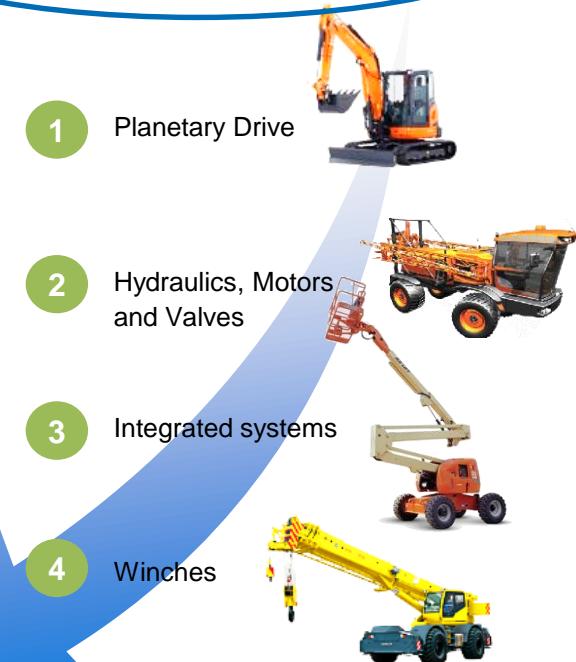


- 1 Drive Axle
- 2 Hydrostatic Driveline System  
Electric Drive Axle  
Hybrid technologies
- 3 Hydrodynamic Drive System  
Electronics and Controls
- 4 HVT Drive Systems



## Off-Highway Drive and Motion Technologies

## BREVINI®



- 1 Planetary Drive

- 2 Hydraulics, Motors and Valves

- 3 Integrated systems

- 4 Winches

**the only solutions provider that can manage energy  
and power conveyance from engine to wheels and  
engine to machine work circuits**



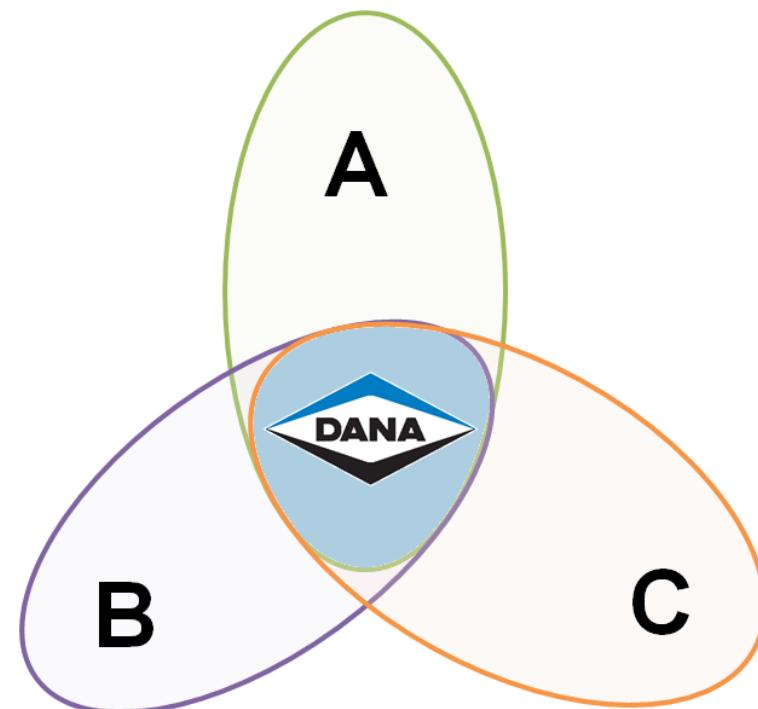
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# DANA & integrated design approach

**A****B****C**

- Combine different strategies
- Higher number of manageable variables
- Unique target



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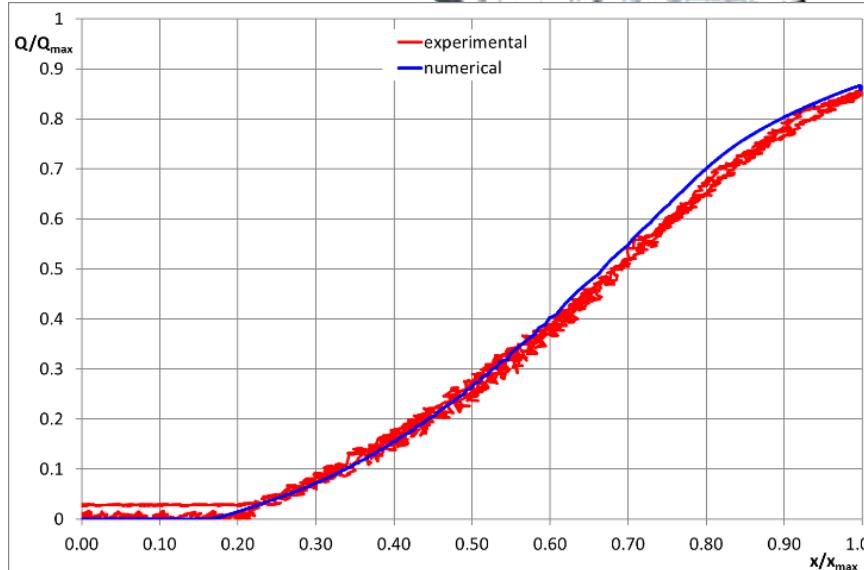
# Free-wheeling winch system with incorporated safety function

## AHTS (→ Anchor Handling Tug Supply) Vessels



**Safety**

Validation of Standard Virtual Submodels



Various Virtual Tested Solution



New components models



Better Solution tested & delivered in less time (-15%)



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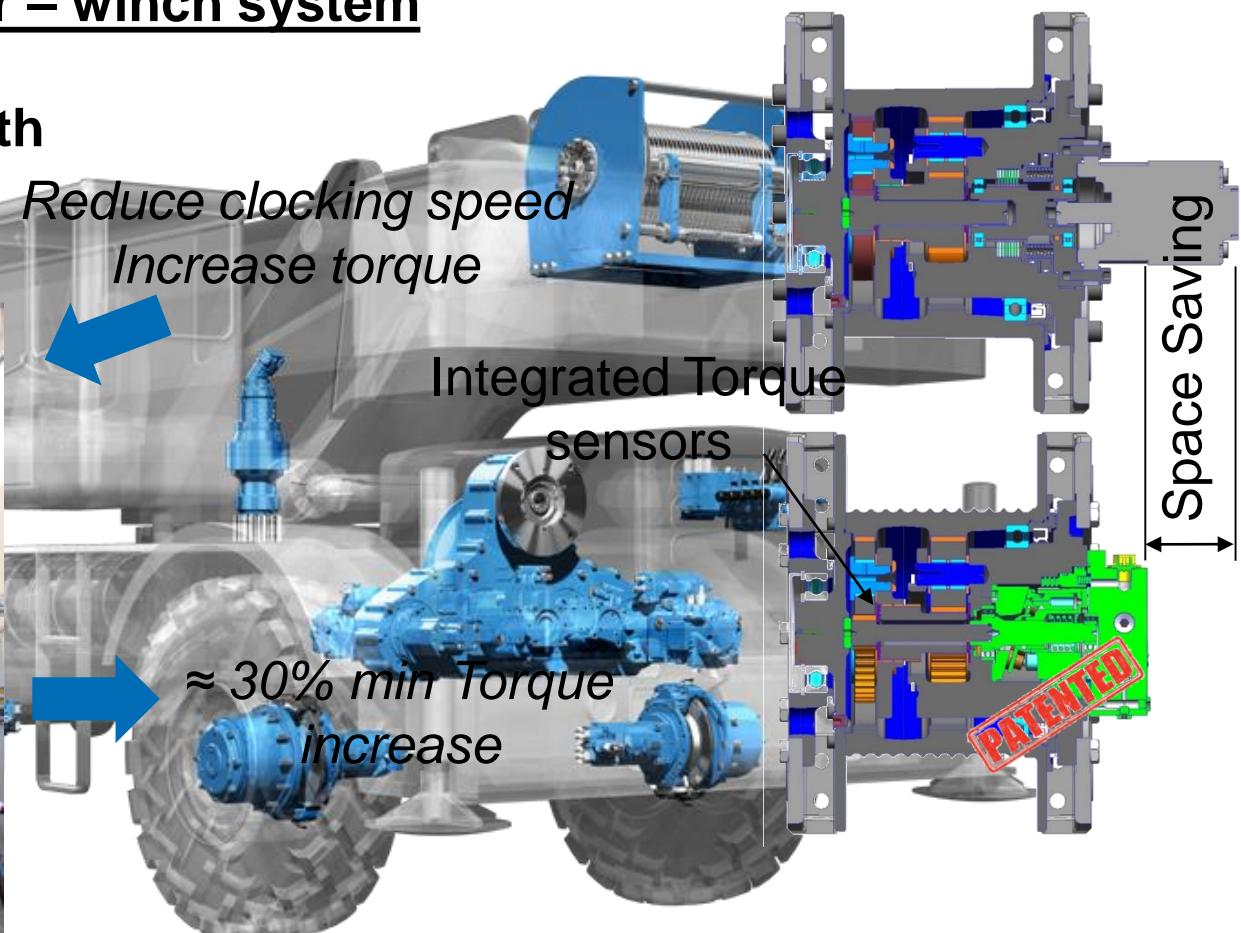
## Mobile crane with motor – winch system



**Compact & Smooth**



Tower test in actual conditions



**Compact & Intelligent**



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# Winch with integrated motor for extreme environment

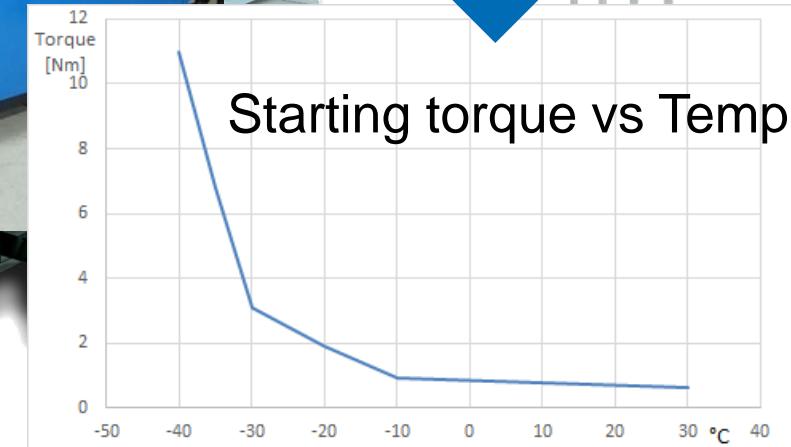
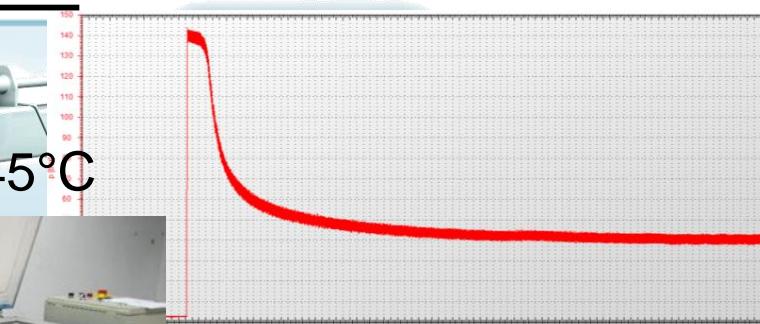
## Truck with winch for very extreme environment



Extreme low temperature

Warm Up test @ -45°C

Oil properties test



Solution tested in actual condition



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## Telehandler control strategy

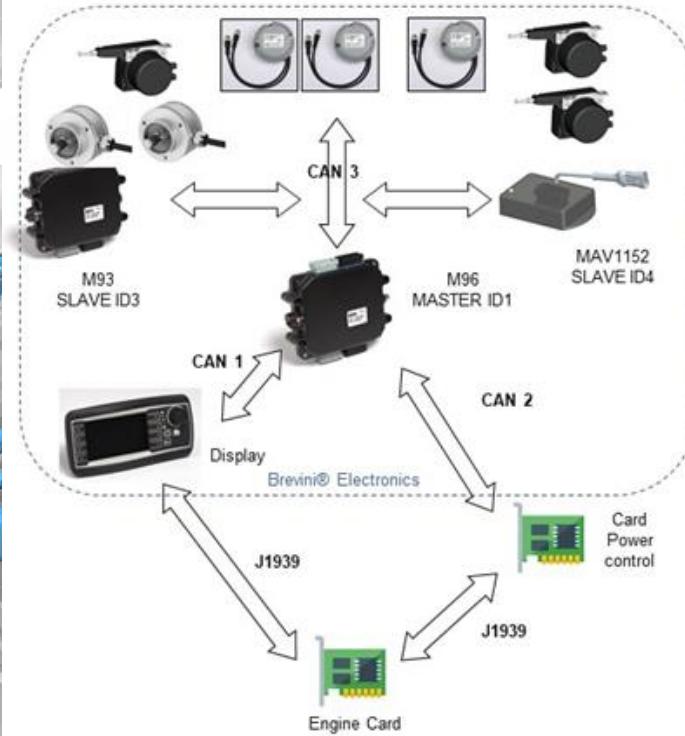


Customized firmware

Brevini® Electronics Bricks



Drag & Drop Object firmware definition  
No programming skills & debug required



- 25% firmware development time

## Quick & Flexible firmware



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## Integrated design: the keypoints

### Mechanics

Integrated component development & design

### Hydraulics

Virtual & actual test of solutions (-15% test time need)

### Electronics

Integrated sensors for intelligent component

### Software Development

-25 % firmware development time



## Conclusion



Overall performance & design improvement



Smart & Customizable controls



Increased capability to overcome design roadblocks



Condition Monitoring Integration

Enhanced Connectivity



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10

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# Thank you for your attention!

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11