

# SISU AUTO IS GETTING READY FOR FUTURE

– a new Finnish technology  
innovation for heavy trucks  
and special vehicles



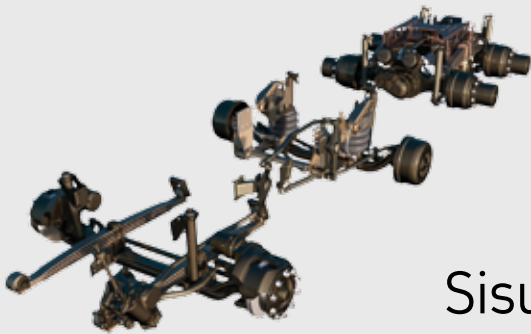


# Finnish transport industry in new upswing

Right from the start, since 1931 SISU has furthered know-how and the commercialization of industrial technologies in Finland and internationally. The high domestic content of the products has created a broad sub-supplier and component manufacture cluster to support the vehicle industry. The cluster is doing well today, and grows especially thanks to the new rise of Finnish shipbuilding industry.



The often harsh and continuously changing arctic conditions and related special requirements have been the driver for SISU to be the technology leader and innovator of the vehicle industry. SISU truck products are intended for the heaviest duties in the harshest conditions. The SISU vehicles comprise customer specific solutions, cost-effective production methods and high product quality, ensuring the high utilization rate for the customer. Reliability comes from the structural durability. The frame and chassis structures of each SISU truck are designed keeping in mind the purpose and intended end use of the vehicle. Sisu Polar is a comprehensively planned and optimized structure, in which the vehicles electronics, hydraulics and bodywork are already connected seamlessly together at the SISU factory. Design documentation for the complete delivery content enables a smooth service and spare parts functions, and clear responsibility in warranty issues. The Sisu Polar series, a combination of the robust SISU chassis and frame solutions and world's leading manufacturer Daimler AG's components, now covers widely the needs of the heaviest end uses of the demanding customers.



Sisu Polar  
series meets  
with the requirements  
of demanding customers



# Sisu Auto's new businesses are advancing

Design and project services business for the Chinese vehicle manufacturers, which commenced in early 2010's, has since become a sustained part of Sisu Auto's business activities. The first mobile workover rig vehicles for Romanian oil fields, built on SISU 10x10 special vehicle chassis, have been in operational use for good two years already, and the delivery project for further units is ongoing also during this year.

The latest SISU product innovation, Sisu Polar Super, is now ready and the first unit is in operational use with a leading global producer of industrial minerals, having worldwide presence in more than 50 countries. The Super-Polar is based for the real tridem driveline consisting of three driven axles, with robust frame and suspension design. The truck thus is suitable for heavy payloads in demanding mining environment.



Workover & Drilling Equipment

### Mobile heavy duty Double Workover Rig 90 tons

- SISU heavy duty truck with Caterpillar engine, 16x12 drive for extreme off-road capabilities
- road approval (Germany, Romania) dimensions and weight within the permitted legal limits for special trucks
- 8 hydraulic supports, mechanically locked
- 90 tons hook load
- drasworks with closed-loop cooling and API 7K monogram
- stand-down for 2006 in working depth (higher depths possible)
- powerful hydraulic by truck engine via Allison transmission 4700 DPS
- mast with automatic lock in and position (retracted and extended) and API 4F monogram
- electric safety according to EN 60204
- automatically unfolding working platform while mast telescoping
- stairs foldable for transport
- store capacity for 140 double tubings up to 3 1/2" / 7"
- turning circle under 20 m
- working temperature range -25°C / +45°C (+55°C for special operations)

Well Servicing Products

D-001



## Sisu Auto is developing new vehicle technology

The further development of Sisu Polar series in coming years shall be covered mainly by market based update requirements. Sisu Auto's focus is now in technology oriented product development. With efficient and rapid innovating Sisu Auto constantly provides the customers with most efficient products based on new technologies. SISU, together with research and development network is now concentrating in producing a wide range of driveline solutions for forthcoming vehicle development needs.

In recent years, the European Commission has focused on reducing the pollution of road vehicles, and emission regulations within EU member countries have therefore gradually tightened. However, especially with heavy trucks still a lot remains to be done. Fully electric and hybrid driveline solutions have already become common in cars. The current political consensus obviously shall be requiring corresponding development in heavy vehicles respectively.



# POLAR

## diesel-electric-hybrid

As a part of SISU technology development Sisu Auto already has come up with new driveline solutions of which the currently most advanced development case, the diesel-electric hybrid driveline is now being introduced. This new technology solution is built with electric driveline components in parallel with Mercedes-Benz OM471 and OM473 diesel engines, which are well known already in connection with Sisu Polar truck products.







SISU hybrid project is carried out in close co-operation with a network of Finnish pioneering companies, the technology leaders of the business segment. The SISU hybrid driveline consists of mature technology and components, thus production phase can be reached rapidly after the ongoing control system development and testing phases.



Components for the electric powerline are supplied by Finnish company Visedo Oy. The core of the powerline is PowerDRUM permanent magnet motor, which is connected to same axle with the diesel engine. The principle is to assist the diesel engine during the peak, and charge the energy storage during the off-peak of the diesel engine. The Diesel engine still has a mechanical connection to the driven axles, thus the system is so called parallel hybrid drive. The parallel hybrid drive suits especially well to heavy truck use, enabling the maximum peak power and peak torque, at same time keeping the component size and price reasonable.



Location of the electric motor in between the diesel engine and the gearbox makes the assembly simple and quick. The existing chassis and suspension structures do not need to be changed, or altered. The solution enables also the use of the vehicle with, or without the electric system, since the power line is mechanically continuous from the diesel engine all the way to the driven wheels.



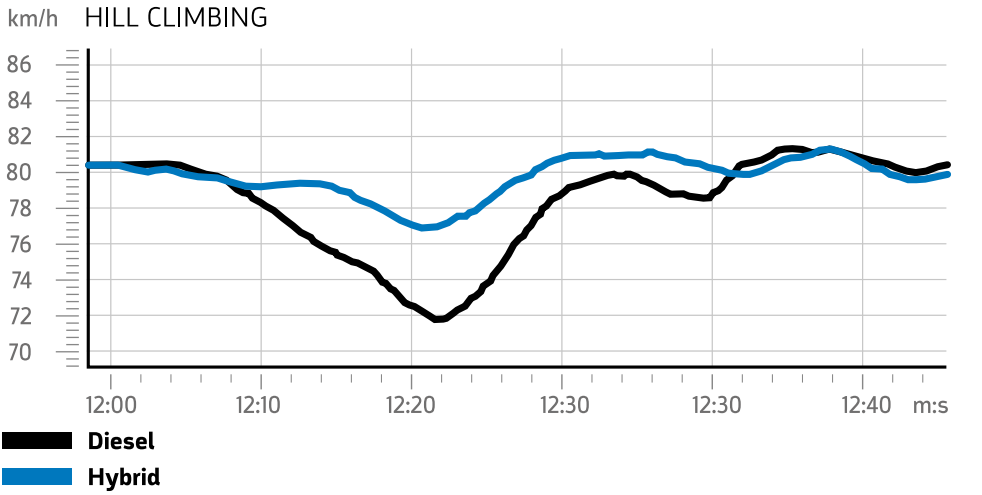
Sisu Polar hybrid's control system takes care of the controls and communication between the diesel engine and the electric motor. Meanwhile, the driver can concentrate on driving whilst the system handles the supply of additional power, charging of power storage, and naturally keeps the driver up-to-date of the system modes. If required, the automated system can be bypassed by the driver controls.



Main objective for the hybrid driven Sisu Polar is to reduce the fuel consumption and emissions of the vehicle. However, at the same time usability of the vehicle in extreme operational conditions becomes substantially better when the available low speed torque is remarkably greater, thanks to the hybrid drive system. Also the torque and power ratings of the power line are growing significantly from the current figures. The hybrid driveline can supply above 5000Nm torque and around 850kW (1140 hp) max. power when needed.



Electric motor technology is entering now to drivelines of heavy vehicles. Through this development project, SISU has taken a quantum leap in the technology segment in order to provide the customers with the best products on the market.





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