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Cougar: High-performance Mower

Operational Economics and the Technical Solution

Claas has developed a considerable selection of high-capacity harvesting machines, the flagship of which is the new Cougar. Its target market is customers with a high annual utilisation rate. This project could be realised through optimally consolidating knowledge from different facilities within the Claas group. This technologically advanced, ultramodern concept makes high capacity, in combination with economics, possible for the customer.

Over the past years, due to the change in agricultural structures, the offer of larger engines in tractors has been continually rising. Accordingly, the offers for more efficient mower technology grew, too. Front / rear combinations and trailed mowers make working widths to approximately 6 m possible. Butterfly combinations with tractors allow for outputs per hour of 6 to 10 hectares with self-propelled characteristics.

With the Corto 8100 (introduction on the market 1993), Disco 8550 C (introduction on the market 2000) and Liner 3000 (introduction on the market 1999) Claas already had set yardsticks for high output forage systems. There, Claas had the best range for big customers within the forage harvest sector. It was there that a need was recognised for a self-propelled mower above the current mower output. These outputs must lie above the output possible with today's large tractors or the self-propelled machines in the same capacity. In comparison between tractor driven and self-propelled mowers in the class around 8 to 9 m working width, in nearly every situation the tractor driven mower solution is more economical. Thus it was necessary to make a "quantum leap" with the working width.

Planning Phase

Included in the development stage of the prototype were numerous potential customers with several thousands hectares of mowing per year. That's why efficient and professionally designed technology is needed.

On the expenditure side, development was possible through work-spreading and co-operation of Claas Saulgau GmbH, Claas Special Products and Claas Industrietechnik. Thus, an ultramodern machine was developed to target costs, which are economical for the target clientele.

Through this Claas internal co-operation, it was ensured that the maximum amount of existing components could be implemented into the system. This benefits the customer, not only on initial cost, but also repair and

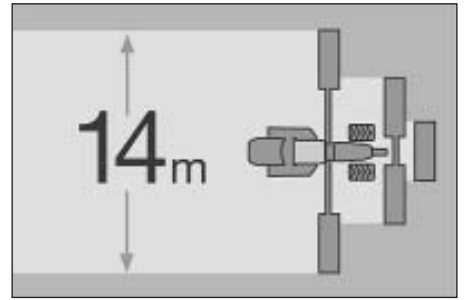


Fig. 2: With 14 m cutting width, the Cougar is the current world record holder

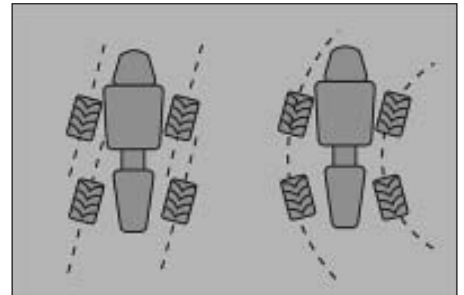


Fig. 3: Four wheel steering with different steering modes

overhaul facilitation within the products life cycle.

By the input of knowledge and experience of Claas' self-propelled vehicles, it was possible to complete the project in record time. Despite the high degree of new technology implementation, the target development costs were not exceeded.

Concept consistently based on customer profit

Demands rose as a result of the evaluation of existing large mower systems which led into the conception. Claas has extensive knowledge in building of special vehicles. To this experience belong hydrostatic drives, steering and axle technology, electronics and cab technology.

Many advantages are made possible by the concept of a swivelling cab.

In the mowing season, drivers must work for at least 8 hours per day non-stop on the machine. The machine concept was developed concentrating on travelling comfort, machine monitoring and optimum ergonomics.

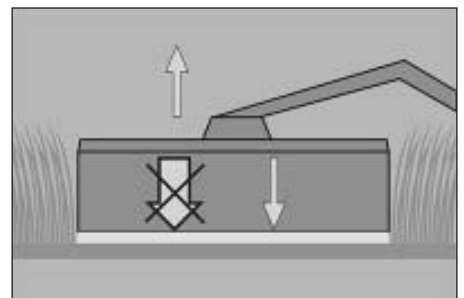


Fig. 4: Active, hydro-pneumatic compensation on all mower units



Fig. 1: Outstanding ergonomics and excellent visibility to all mower units

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The seating position makes a substantial effect on these factors. Contrary to other “butterfly” tractor driven solutions and other self propelled mowers, the driver has all mowers comfortably in his field of vision.

World Record in Working Width ??

The Cougar opens a new dimension of technology and output, with 14 m mowing width. This is complemented with innovative technological solutions.

With the development, a goal was to use the available forage harvesting time optimally. High transport speed of 40 km/h, agile speed-up and quick transfer time between work and transport (1 min) reduce downtime and increase economy even in areas with many small fields.

Four wheel steering and all-wheel drive provide for extreme agility and driving stability in each situation. Due to steering geometry, there is good turning circle, with little scrubbing, leading to less surface damage, and also good hill side driving due to crab steer. Thus use in irregular shaped and sloping fields is made possible.

With the hydro-pneumatic mower suspension system, the suspension in each mower can be set optimally. Thereby, the traction resistance and the cutter-bar wear can be reduced. As well as this, there are added benefits for the soil surface. The suspension is readjusted constantly and is evenly effective in each mower mechanism position.

To maintain long lasting grassland quality, wide tyres with large diameters can be selected depending on ground loading. Standard size of the tyres is 800/65 R32. The tyres 900/55 or 1050/50 are also possible optionally. At the same time, the large tyres provide traction on hills and in difficult conditions. Through the large width of tyre, the contact area is greater, spreading the load of the machine. Altogether, the machine is better for the soil and grass, and better for the customer with output compared to other self propelled machines.

Professional Mower Technology

While so far with large mower combinations and self propelled machines, normal mower bars from the standard design have been used, with the extra output of the Cougar the operating conditions changed accordingly. For this reason, heavy duty mower bars have been developed to increase lifetime. Each individual mower is protected by a break back device, and also start-up protection. This decreases downtime through impacts, and increases the economy of the Cougar.

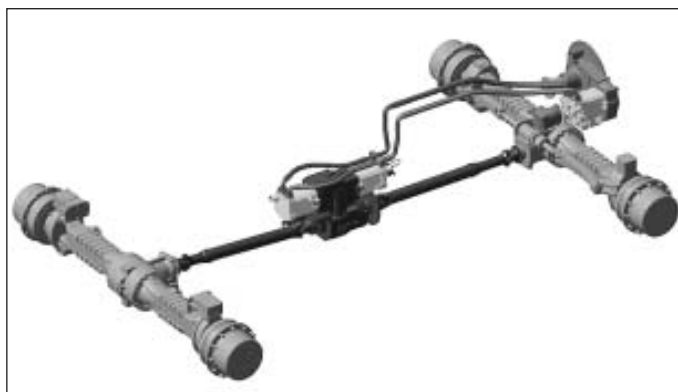


Fig. 5: Electro-hydraulic drives with mechanical four wheel drive. Automatically controlled engine speed in transport

Application Safety

To use a machine of this investment volume, it must be fully used in the available working hours with full safety. Besides the safety features already described, the machine technology also offers technical characteristics to monitor the machines performance, and recognise what could cause possible damage, and to inform the operator before it happens. For example, all mowers are fitted with revolution sensors to monitor the speed of the shafts. These sensors immediately warn of excessive power usage/wastage, so the cause can be investigated immediately.

Output

Efficient interpretation of all aspects of performance provide for optimal utilisation of the installed engine power. Although high operating speeds are not highly desired, the working speed range will allow up to 21 km/hr in light conditions. The travelling comfort of the machine permits this. Besides over approximately 50 % higher working width, compared with existing self propelled mowers, other aspects effect increased output: fewer headland turns, high off-road capability, very good slope adaptation, and travelling comfort. Therefore the Cougar can be used even in the most difficult situations.

An example of how to increase drive efficiency is through the electronically controlled hydraulic drives via the EFA module. This technology has been used for some years on Claas self propelled forage harvesters. The drive system is fed by a pump which gives constant power in the first speed range, and regulates the second. Additionally, the engine speed is automatically controlled when travelling on the road. The back to back driving arrangement of the motors is new. Here, two motors sit on an axle longitudinal to the drive shaft. This gives high torque characteristics. From here, the all wheel drive is distributed to the opposite axles, which is substantially more efficient.

Economy

A positive answer to improved customer economics was a condition for the release of this project. Comparative economy calculations between existing self propelled mowers and large mower/tractor combinations show that, for the majority of customers, the tractor/mower combinations were substantially more economical than self propelled vehicles in the same performance class. Claas offers different configurations of the Disco 8550 C for customers of this output class, and the high sales numbers of these items confirm the economic evaluation. A goal for the development of a self propelled vehicle must, therefore, be to put the investment in as large a working width as possible. For this reason, the greatest possible next step in technology was taken. Thus, the Cougar aims itself clearly at the customers who mow an area of 2000 ha and above. This number sounds at first very unrealistic, the machine is, however, already feasible on a range of substantially smaller grassland areas based on several cuts per year. For example, this corresponds to 3 to 4 cuts on areas between 500 to 700 ha per cut.

From this point on, the application of one or more large scale mowers increases the costs for the customer in large steps. From the point where more than one large scale mower is required, the Cougar becomes very interesting for the large scale contractor. With a gradual increase in annual area covered, the Cougar develops its economic advantage further. (Source: Internal Computations Thesis Diploma, Bernd Henn, Triesdorf).

Also full and consistent utilisation of the harvest time window by perfect management contributes to economy of the machine. From this, the end result for the customer is high annual output at better economy.