

IMS.52 Pro

# Rescue Without Compromise





### Technical Tools / Rescue Shears

# Situations, in which every second counts.

Situations, in which every second counts. With professional helpers. And state-of-the-art equipment: Help after traffic accidents, help after natural disasters, help after explosions. When robust, effective rescue devices are indispensable. LUKAS Hydraulik (Erlangen) is one of the leading suppliers of these tools. The traditional enterprise uses planetary gears from IMS Gear for its mobile spreading devices and shears of the eDRAULIC series. To make them work when it really matters. And every second counts.

- High efficiency
- Stable service life
- High flexibility & wide range of applications

With its modular system, IMS Gear's spectrum ranges from quick quality solutions to customer-specific adaptations and sophisticated special gear configurations. The same applies to our solutions for modern agricultural technology.

**“By using the eDRAULIC, you save about 50% of weight compared to the conventional equipment of a complete rescue set.”**

## Clear Matter: Rescue in an Emergency

For decades, powerful rescue devices have ranked among the indispensable hydraulic tools of fire departments. The pictures are impressive: Cut up cars at the end of traffic jams from which wedged victims of accidents have been saved, cut up wagons after train crashes, spread out steel doors to gain access after gas explosions.

**Conventional solutions**, however, have a few drawbacks and limitations. First of all, conventional hydraulic units need to be set up as drives and put into operation, while hydraulic hoses have to be connected before help can set in. This costs **time**. The equipment is heavy and takes up a lot of **space** in the vehicle, and the range of hydraulic hoses is limited by their reach and accessibility. Consequently, a vehicle that has slid down the slope can sometimes not be reached.

## Clear Stipulation: No Compromise on the Performance of the Device

These limitations led LUKAS Hydraulik to develop a **mobile solution**. Dietmar Lindner, design engineer with LUKAS, sums up the basic requirements of the specifications: **“No compromise in terms of power, portable, to be operated by one person”**. The strategy to reach the goal: Driving the hydraulic pump by a strong electric motor powered by a high-performance battery. “Quite soon, it became evident that the hydraulic pump was over-

strained by the very high rotational speed of the electric motor, that doesn't work”, Lindner recalls. The theoretical possibility to install a significantly higher-torque motor providing the required torque at a bearable rotational speed cannot be put into practice: “The dimensions and weight of such a motor would have blown the whole concept”, Lindner explains.

## Clear Technological Requirement: a Gear Between Motor and Pump

Due to the technological requirements it was necessary to install a **gear between electric motor and hydraulic pump**. “It soon became apparent that IMS Gear was the desired partner as they really committed themselves, although naturally we just enquired non-automotive quantities”, Lindner explains.

This commitment reflects both the tremendous experience of IMS Gear and the technological ambition to enable innovation: “It quickly became clear that the task to transmit a **great force in a very small installation space** could only be realized by a planetary gear”, explains Andreas Sigwart, Sales Engineer at IMS Gear. “With our modular system we have the platform to be able to quickly respond to enquiries, provide a technology assessment and subsequently work on a solution.”

## Clear Challenge: the Extreme Rotational Speed

The project proved to be **extremely challenging**. "The modular system from IMS Gear recommends input speeds of 3,000 revolutions. In this case, the electric motor provides 24,000 revolutions at a torque of 0.4 Nm" reports Sales Engineer Andreas Sigwart. "As the installation space is strictly limited, only a 1-stage PLG could be considered. Plastic planetary wheels that due to their lower weight would be advisable had to be ruled out, and the same was true for the gear drive of the product line with a diameter of 42 mm that was first taken into consideration.

"After the first test runs it was clear that we could meet the requirements but had to dig very deep into the module kit", Sigwart remembers. The 52 mm gear drive proved to be a sufficiently stable basis. As the **output speed** with about 5,000 revolutions per minute is still ambitious, metal spur gears are used to prevent excessive axial forces resulting from helical gearing. A larger bore of the planetary wheels can provide for a **better bearing**. The optimized bearing plays a major role anyway: "With a slide bearing, the enormous rotational speed would generate too much heat, thus burn the grease and wear very fast in case of dry running", Sigwart explains. For this reason, our current series solution features a needle bearing complemented by a special lubricant.

## Clear Benefits: the Efficiency of the Modular System

As the individual components are taken from the modular system of IMS Gear and **samples are available at low cost and without great loss of time**, the test effort is significantly decreased. "With quantities of a few thousand gear drives per year a special development would not have been feasible", Lindner praises the fruitful cooperation. Especially since IMS Gear is extremely flexible at the output side and the optimum connection to the hydraulic pump could quickly be realized. The hydraulic gear ratio of the pump coming after the planetary gear is 10,000:1 which explains the force of the shears, spreaders and cylinders.

In this way, a **compact rescue device** was created that offers **high handling benefits with identical power**. "By using the eDRAULIC, you save about 50% of weight compared to the conventional equipment of a complete rescue set including shears, spreader and rescue cylinder", Lindner explains.

If further advances of the batteries, the electric motor or the hydraulics require modified gear reductions of the planetary gear, all can be implemented from the modular system. "The **variability of the IMS Gear module kit** and the access to proven components allow **quick and cost-efficient derivation**", Sigwart emphasizes the special added value for customers in this strategic option.

He adds that with respect to ever shorter innovation cycles quick and above all reliable availability are major preconditions for success not only in technological but also to economic terms. As a first modification, a slimmer motor pinion could save weight. In this case exactly 77 grams. "Weight optimization is a continuous process with individual components adding up to the savings", Lindner states.

## Summary

**In this project, the modularity and flexibility of the module kit that has been proven for many years pays off particularly well. An efficient and powerful solution, made for emergencies all over the world.**

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