

Press Release

Active head restraints prevent whiplash

DEPRAG has manufactured an assembly system for GRAMMER which produces 360 headrests an hour.

Today's headrests form part of every vehicle's passive safety system. They reduce sudden impact on the sensitive spinal area at the base of the skull. One of the most important responsibilities of the automobile industry is to protect vehicle occupants from injury during car accidents. In the past year the number of traffic deaths on the streets of Germany was 4500 which is 10% less than the previous year. Increased vehicle safety is one reason for this reduction. Intelligent headrests, which automatically tilt forward in the event of a collision and support the head for valuable milliseconds, play a big part in this.

If a vehicle is brought to a violent stop by slamming on the brakes or by impact with an obstacle, the following occurs: according to the physical laws of inertia the car occupant's head shoots forward and then in the moment when the car comes to a standstill the head snaps back again. Without a headrest the neck would be stretched backwards beyond its physical limit. The medical consequences range from whiplash or contortion of the nerves, to cranium cerebral injury.

Therefore, headrests are compulsory on the front seats of vehicles over 3.5 tons. A headrest helps to prevent strain on the neck particularly during rear-end collisions. Innovative, so-called crash-“active headrests” go one step further. They prevent the head from snapping backwards and consequently help to prevent injuries to the neck.

Karl Meier, from the company Kamei, first invented safety headrests which he presented to the world in 1952. Since then the development of the automotive headrest resulted in the “active” version which automatically moves forward to support the head during accidents. In some headrests there are also flat screens built into the headrest as part of the car's multimedia system. Passengers in the rear of the car can then watch television, surf the internet or play computer games.



Crash-active headrests are part of the product spectrum of GRAMMER AG in Amberg. GRAMMER is an international company active worldwide in 17 countries with over 7,200 employees in 24 subsidiaries. GRAMMER specializes in the development and manufacture of components and systems for vehicle interiors as well as driver and passenger seats for off-road vehicles, heavy goods vehicles, buses and trains. In its top-selling business sector "Automotive" GRAMMER supplies amongst other components, headrests to well-known automobile manufacturers and sub-suppliers to the automobile industry.

How is a headrest produced? As a part of the passive safety system of a vehicle the components must be manufactured with the highest precision. Processing safety is top priority as all assembly steps must be electronically monitored and documented. GRAMMER AG recently awarded the automation specialist DEPRAG SCHULZ & CO. a contract for the development of a new assembly system for innovative crash-active headrests for front seats. These assembly systems are now producing Active Head rest systems in Poland and Mexico.

The "technical internal systems" of the crash-active headrest are assembled over 14 work stations. The active head rest consists of three major components, which are described as "ZB-release unit", "Carrier-CAK" and "Slide".

Station 1: These are two manual work stations at the start of the assembly line where operators manually position these core components of the head rest system on to a precision locating pallet along with two guide springs. An operator then releases the pallet with the sub-components to the automated assembly process: The remaining headrest systems are systematically assembled and tested by the automated stations.

Station 2 is an automatic inspection cell to insure that all necessary sub-components are present and in the correct position on the pallet.

Station 3 is an inspection and assembly station: The "ZB-release unit" is tested with sensors: Is the label present? Are the manually positioned "centering devices" correctly configured? If yes, then the ZB release sub-assembly is automatically positioned onto the Carrier-CAK and snapped into place.

At **Station 4**, using a linear track feed system; two guide tubes per assembly are separated, aligned and placed in position into the Carrier-CAK. Also two grooved pins are shot into place, using a vibratory feeding bowl with blow feed separator, and automatically pressed into the Carrier-CAK, securing the guide tubes.

On to **Station 5** where a lock-pin is separated, via a vibratory bowl feeder and automatically inserted and secured into the "Slide" sub-assembly.

Now we are at **Station 6** where the interior of the ZB release/Carrier-CAK sub-assembly receives the two guide springs, which were manually placed onto the part pallet at the 1st station. They are picked up with automatic grippers, and placed with precision into the Carrier-CAK.

Station 7 confirms the quality of the work from station 6 and also automatically feeds and separates two washers, which are placed with a vacuum gripper over the guide tubes.

The assembly of the active headrests continues at the **8th Station**, where two coil springs are simultaneously sorted, controlled and set in place over guide tubes and washers, using an automated dual gripper.

Stations 9 and 10 are presently open positions on the assembly system reserved for possible future expansion or additional processes.

At this stage the Slide, ZB-Release and Carrier-CAK sub-assemblies are complete! The two pressure springs are positioned and tensioned and the guide tubes are in position. At **Station 11**, the Slide is automatically located and locked on to the ZB-Release/Carrier-CAK sub-assembly. This slide unit causes the intelligent headrest to move forward towards the head of the driver at lightning speed during an accident so that they are effectively protected. The processing of the Carrier-CAK is the most important function of the crash-active headrest. But does it function correctly?

A simulated emergency test is performed: At **Station 12** the ZB release unit is activated and the assembled CAK-Slide module is triggered so that the function of the finished headrest can be checked. The statistics received from this test, including date, time and the operator's employee number, are all transferred and saved to the connected computer system where they can be processed in Excel and printed out. At **Station 13**, the completed CAK-module receives a label with the test results generated at the previous test station.

At the **14th and final Station**: The completed assemblies which have passed the functionality test at station 13 are removed from the part pallet and packaged by the operator. Faulty assemblies (NOT OK) are sorted and redirected to a rework station by the conveyor system, There a display panel indicates the specific assembly or test failure so that the assembly can be reworked.

The headrest assembly system developed by DEPRAG SCHULZ GMBH & CO. in Amberg (Germany) is 8.34 meters long, 2.55 meters wide and 2.40 meters high (without special purpose feeding equipment). The complete machine with all systems weighs 9,500 kilograms. The cycle time is less than 10 seconds enabling a production rate of more than 360 headrests per hour.

Custom made, application specific automation is one of the main areas of expertise at DEPRAG. Their engineers have over 75 years of experience in providing solutions for almost every sector of industry. In cooperation with their clients they develop top quality and cost-effective systems.

Short profile of GRAMMER:

GRAMMER AG, Amberg, specializes in the development and manufacture of components and systems for vehicle interiors as well as driver and passenger seats for off-road vehicles, truck, buses and trains. In its top-selling "Automotive" product line, GRAMMER supplies headrests, armrests, center consoles, as well as integrated child safety seats to well-known automotive manufacturers and system integrators in the automotive industry. Their secondary line "Seating Systems"



covers driver and passenger seats. GRAMMER is the original equipment manufacturer for driver seats and they also provide refitting services. They cater to some of the most recognized manufacturers of trucks and off-road vehicles. In their passenger seat product line, GRAMMER produces top-quality seats to supply train operators and train suppliers. GRAMMER is represented worldwide in 17 countries with over 7,200 employees in 24 subsidiaries. GRAMMER shares are traded in S-DAX and are also handled on the electronic platform Xetra in the stock markets in



Munich and Frankfurt as well as in the open markets in Stuttgart, Berlin and Hamburg.

Further information can be found at their website www.grammer.com.

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