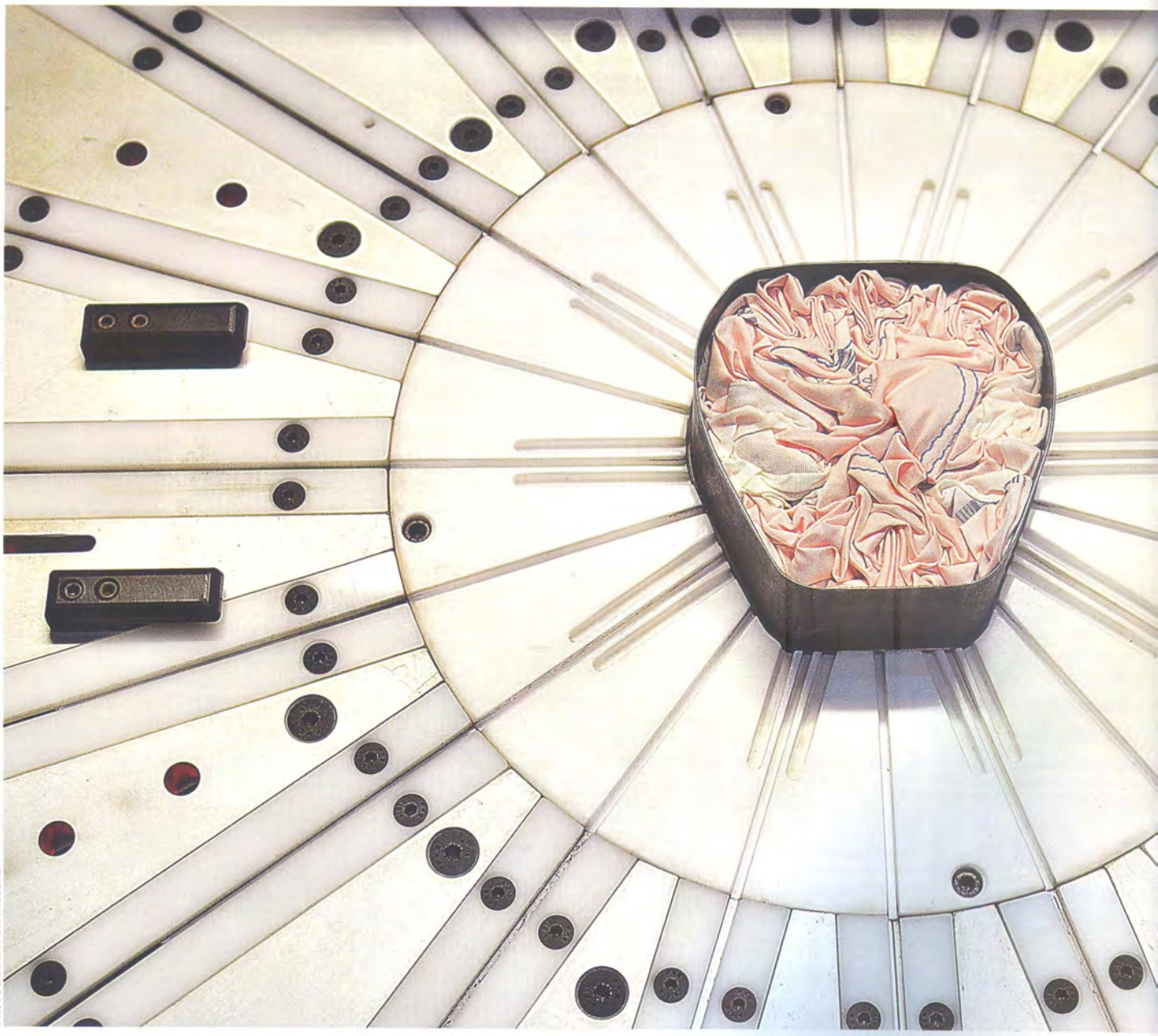
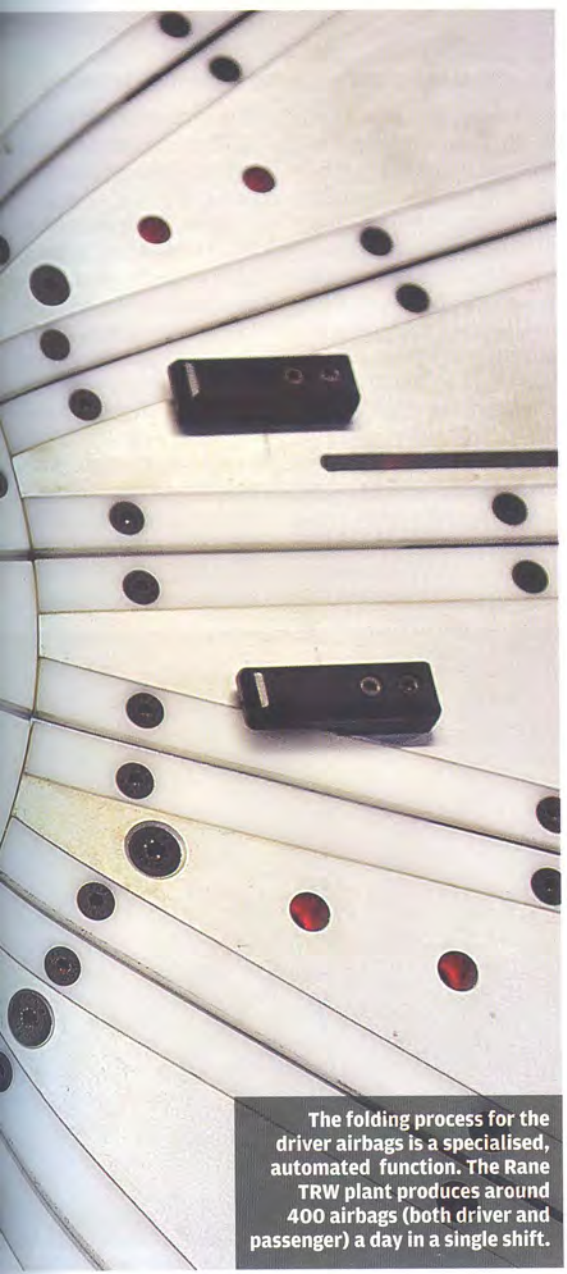
For a safer automotive future

Rane TRW Steering Systems has begun assembly of airbags as part of the first phase of its latest diversification. In Phase 2, it kicks off localisation that promises to give a key boost to automotive safety. **Brian de Souza** visits the company's airbag assembly line in Chennai.



PHOTOGRAPHY ADITYA BEDRE



The folding process for the driver airbags is a specialised, automated function. The Rane TRW plant produces around 400 airbags (both driver and passenger) a day in a single shift.

Automatic folding of the driver airbag is a fascinating process. The components for the airbag are supplied by TRW Poland.

Mission safety (L-R): Rane TRW's key team – B Ayyappan, vice-president, Occupant Safety Systems, with TR Sudarsan, head – Operations, and L Radhakrishnan, general manager – Engineering.

To the average car buyer, the thought of airbags and its role in occupant safety may not be top of mind as media coverage on safety issues in general tends to focus on seatbelts and helmets. Moreover, most cars in the entry level and B-segment do not come equipped with airbags unless you buy the top-end variant where it is not likely to come as standard equipment and costs more than regular variants. In a cost-sensitive market, OEs in India have been generally loathe to top up on features as that would only add to the final sticker price.

Based on on-road prices, the Hyundai Eon would be the most affordable car on Indian roads today that comes with one airbag. The hatchback costs Rs 4.15 lakh, on-road, Mumbai.

The fact is that airbags are not mandated by law in India at the moment. Along with seatbelts that constitute the primary restraint, airbags are the other part of the overall car safety system.

At Rane TRW Steering Systems' Chennai plant, seatbelts have been made since the year 1997. In 2013, the company, leveraging technology from its joint venture partner TRW, began assembling airbags for the Indian auto sector. Among its first clients is Mahindra & Mahindra and from 2014, the company will add the Ford's compact EcoSport SUV to its client roster.

Even as the company gears up to assemble airbags in India for its client, it will soon inaugurate its Conformity of Production (COP) centre at its plant on the outskirts of Chennai.

Autocar Professional was given an exclusive tour of the plant in which we saw the process by which airbags are assembled, checked for quality and then despatched to the customer. The plant rolls out approximately 400 a day running a single shift. With the COP coming up, Rane TRW is ready for the next level.

The airbag assembly line at Rane TRW's Singaperumal Koil facility is a copy of the TRW line in Germany, B Ayyappan,

The process of both driver and passenger airbag assembly begins with the housing and logo.

A staffer at Rane TRW carries out a final visual inspection.

vice-president – Occupant Safety Systems, tells this correspondent. There are two lines – one for the driver airbag and the other for the passenger airbag. The components of the airbag are brought in from the TRW plant in Poland.

In stage one, the logo assembly takes place even as the airbag housing is bar-coded and scanned. As all machines are inter-locked, information on parameters is stored on a server connected to TRW Germany. This records the parameters of the product and can be accessed if needed. One of the complex operations on this line is the equipment that folds the airbag, which is fascinating to see. It is a patented process and the key function is to have the airbag packed efficiently, which cannot be done manually.

The stage after this includes bag assembly and housing after which the unit is taken to the control station where a trio of high-speed cameras ensure that the product has been assembled properly.

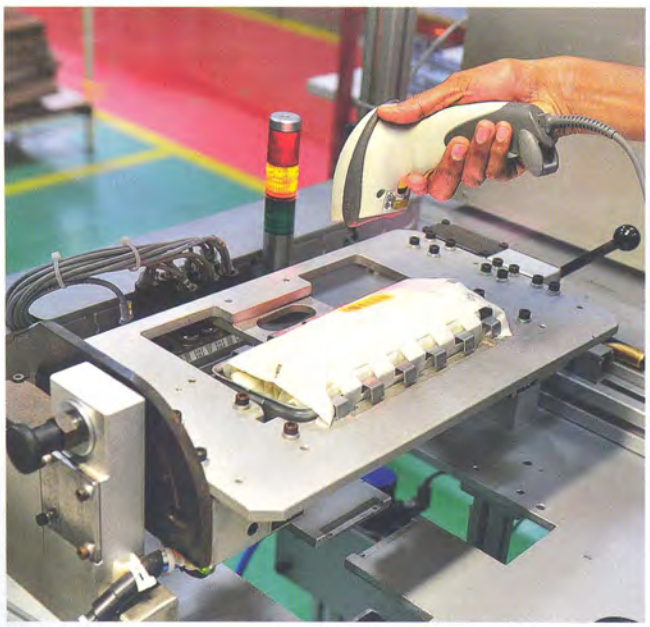
AS ALL MACHINES ARE INTER-LOCKED, INFORMATION OF THE ASSEMBLED PRECUTS IS SENT TO A SERVER BACK IN GERMANY.

"We send the product in boxes from here for the COP, as advised by the shop supervisor," explains Ayyappan. At present, the COP is done at the Pune-based ARAI but soon it will be done in-house.

The process of airbag assembly is repeated for the passenger airbag, albeit on a separate line. As for the driver airbag, the housing is the starting point. Airbags are typically made of nylon 6, which is imported. What's important is that the fabric has to be of top quality and the cutting done accurately. The COP process ensures that the folding is done properly.

Rane TRW's decision to foray into airbags is part of its strategy to be a full-systems supplier. With the COP centre to be set up, the company wants to gear up to cater to more business.

In phase 2, the company will embark on localising its airbags, for customers who want them this way. For one, localisation needs a good supply base and the company will have to keep a close lookout on costs.



Quality is paramount in the process with one stage involving the use of high-speed cameras to ensure assembly and positioning of all airbag parts are in order.

Assembly of the inflator is a key part of the passenger airbag safety process.

Manual assembly of a passenger airbag on a dedicated line.

The line at Rane TRW is manned by women as the operations are regarded as a women-friendly operation.

India has one of the highest rates of road accident fatalities in the world, estimated at over 125,000 a year. Close to a decade ago, the use of seatbelts in cars was made mandatory and that has no doubt helped save lives. Unfortunately, a lot of people in India remain callous to safety issues.

Only if the installation of airbags is made mandatory on all cars can automotive safety receive a key boost. But airbag technology does not come cheap. Companies like Rane TRW are trying to make these bags locally and affordably so that motoring can become safer for both drivers and passengers.

India has taken several strides in incorporating the latest technologies in engines and cars interiors, thus making them truly world-class. It's high time we harnessed our frugal engineering skillsets to make our vehicles safer. ■

Once ready, the airbags are packed and despatched for COP.

30 SECONDS ON... HOW AIRBAGS WORK

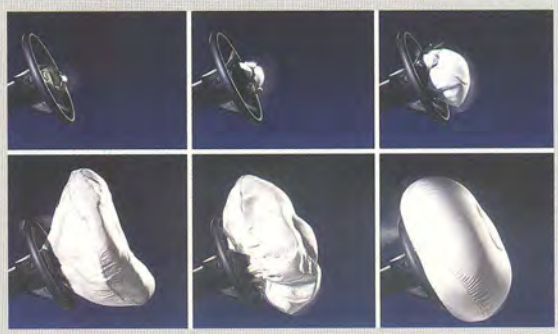


PHOTO COURTESY: DAIMLER

THE GOAL OF an airbag is to slow the passenger's forward motion as evenly as possible in a fraction of a second. There are three parts to an airbag that help to accomplish this feat:

- The bag itself is made of a thin, nylon fabric, which is folded into the steering wheel or dashboard or, more recently, the seat or door.
- The sensor is the device that tells the bag to inflate. Inflation happens when there is a collision force equal to running into a brick wall at 10 to 15 miles per hour (16 to 24kph). A mechanical switch is flipped when there is a mass shift that closes an electrical contact, telling the sensors that a crash has occurred. The sensors receive information from an accelerometer built into a microchip.
- The airbag's inflation system reacts sodium azide (NaN3) with potassium nitrate (KNO3) to producenitrogen gas. Hot blasts of the nitrogen inflate the airbag.
- Early efforts to adapt the airbag for use in cars bumped up against prohibitive prices and technical hurdles involving the storage and release of compressed gas. Researchers wondered:
- If there was enough room in a car for a gas canister.
- Whether the gas would remain contained at high pressure for the life of the car
- How the bag could be made to expand quickly and reliably at a variety of operating temperatures and without emitting an ear-splitting bang.

The inflation system uses a solid propellant and an igniter.

They needed a way to set off a chemical reaction that would produce the nitrogen that would inflate the bag. Small solid-propellant inflators came to the rescue in the 1970s.

The inflation system is not unlike a solid rocket. The airbag system ignites a solid propellant, which burns extremely rapidly to create a large volume of gas to inflate the bag. The bag then literally bursts from its storage site at up to 200mph (322kph) – faster than the blink of an eye! A second later, the gas quickly dissipates through tiny holes in the bag, thus deflating the bag so you can move.

Even though the whole process happens in only one-twenty-fifth of a second, the additional time is enough to help prevent serious injury. The powdery substance released from the airbag, by the way, is regular cornstarch or talcum powder, which is used by the airbag manufacturers to keep the bags pliable and lubricated while they're in storage.

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