AUTOMOTIVE engineer

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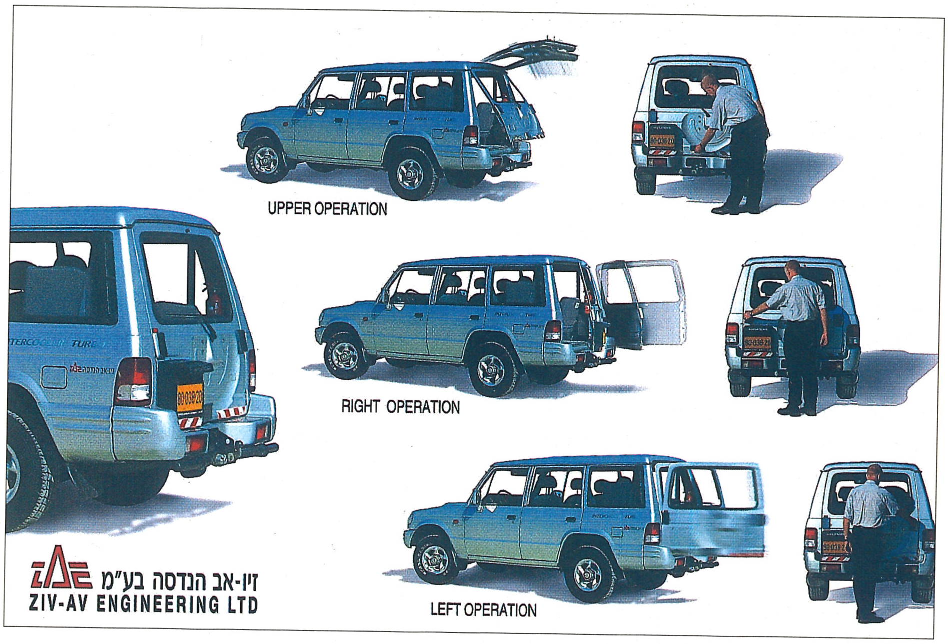
door open to greater **convienience**

Ziv-Av Engineering of Israel has invented a new type of functional rear door for vans, station wagons and sport-utility vehicles. The single integral door can be opened in one of three ways: around a right vertical hinge; around a left vertical hinge; or around an upper hinge.

This means the door can be opened towards the size that is easiest. For example, if the vehicle parks beside the right pavement, the door can be opened toward the road, allowing loading from the more approachable and safer side. At the next stop, the reverse may apply.

Ziv-Av has done this by placing handles at the right, left and the lower part of the door. The right handle opens the door around its left vertical hinge; the left handle opens the door around its right vertical hinge; and the lower handle allows opening the door around its upper horizontal hinge.

The secret is that each of the handles is part of a lock/unlock and hinge system. For example, in the vertical sides of the door there is a system that acts as a lock, as a rotating axis around a vertical hinge and as an unlocking mechanism for the topmost hinge. The low handle opens the locks in the lower part of the door and turns it around the upper hinge.



lighter, smaller, **stronger**

The Rochester Institute of Technology car that had such a successful year in 2000

Described by head design judge Carroll Smith as the best Formula SAE car he had ever seen, and as the winner of the Best Engineering Design in both the Formula Student and SAE events last year while also finishing second overall in the inaugural Formula SAE Australasian event, the Rochester Institute of Technology car was a proven success. It was also one of the lightest vehicles to compete.

Part of the weight-saving came from its use of AerMet alloy, an ultra-high strength, high-toughness steel developed by Carpenter Technology Corp of the US. This alloy, originally developed for aerospace applications, is a premium-melted alloy that has offered a unique combination of high-strength and hardness, fracture toughness, exceptional ductility, and resistance to both fatigue and stress corrosion cracking. It reaches an ultimate tensile strength of 2069 MPa (285 ksi) and it has a high fracture toughness.

The RIT student design team used Carpenter's AerMet alloy extensively in the suspension and drivetrain to make major components such as the driveshafts, stubshafts, hubs and spindles both lighter and more durable than previously possible. Initially, the team tried 300M high-strength steel, but found the AerMet alloy was stronger.

By redesigning two new driveshafts, weight was reduced 5.10 lb to 2.38 lb and the shaft diameter was reduced by 30 per cent having used the AerMet alloy. It also meant that the stubshafts that link the differential with the CV joint could be redesigned and strengthened. The team had also upgraded the previous generation of hub assemblies, switching from the 300M high-strength steel to the AerMet alloy. These assemblies were connected to the driveshafts on each rear wheel. While the weight savings in this case were modest, the change to AerMet alloy allowed the team to redesign the hubs completely to optimise their geometry.