



Company background information:

Jacobs Vehicle Systems: The innovative market leader in engine braking technologies, working exclusively with diesel engine manufacturers globally

Jacobs Vehicle Systems® (JVS) is the world leader in engine retarding and valve actuation technologies, developing integrated engineering solutions that improve performance on the world's best trucks. JVS technologies can be found in every country across the globe, on medium and heavy duty commercial vehicles.

Jacobs is the only engine retarding company that partners with leading diesel engine manufacturers in development, testing and after sales support. This alliance of capabilities uniquely brings together engine manufacturers as the combustion experts and Jacobs as the retarding and valve actuation experts. JVS works with diesel engine manufacturers by integrating the retarding function into the engine design.

The Jacobs Engine Brake, widely known as the Jake Brake®, uses the engine to assist in slowing and controlling a heavy vehicle by altering the operation of the exhaust valves so that the engine works as a power-absorbing air compressor. This provides a slowing action to the vehicle's drive wheels - a supplement to the friction brakes that results in greater vehicle controllability, improved braking performance and safety, reduced service brake maintenance, shorter trip times, and in a lower total cost of ownership.

Since the Jacobs' Engine Brake was introduced in 1961, engine retarding technologies have become ever-more sophisticated and effective, with JVS at the forefront of innovation and development. Today JVS manufactures three types of retardation systems: exhaust, bleeder, and compression release brakes. JVS also markets a Rocker-Stop Device (RSD) to improve the smoothness of engine start-up and shutdown, hydraulic lash adjuster compatible engine brake, variable valve actuation system and a high power density (HPD) brake.

Historically, engine-braking systems were designed as a separate component and bolted on top of the engine valve train, but today engine and brake can be combined in a single unit. This reduces weight, height and cost, while further improving braking performance and fuel economy. JVS starts its involvement in the OEM design process at the earliest possible stage, long before new models of buses or trucks are ready for market. Engines from major engine producers around the globe are tested by JVS at its headquarters in Bloomfield, CT, USA.

JVS's global presence and technical partnerships

In addition to its 260,000 square foot design, testing and manufacturing facility in Bloomfield, JVS also has engineering and manufacturing facilities in Suzhou, China, and sales and support offices in North America, Europe, Japan, Korea, China, and India.

Across Europe, JVS engineers work closely with engine manufacturers including Daimler, Renault, DAF, Deutz and Volvo. In North America, JVS works with Cummins, Detroit, Navistar, and PACCAR, to name just a few. Across China, Jacobs Vehicle Systems has developed best-in-class engine braking technology for clients including DFCV, FAW, Hualing, Weichai, Yuchai, SDEC. In Japan, JVS is collaborating with Hino, Mitsubishi/Fuso Truck and Bus and others. In Korea, JVS works in partnerships with market leaders such as Hyundai and Doosan Infracore.

How a near-death experience inspired the Jake Brake's inventor

The first compression release engine brake was designed and patented by Clessie L. Cummins (1888-1968), who in 1919 had founded the Cummins Engine Co, now Cummins Inc., the worldwide builder of diesel engines.

In 1955, when Cummins retired from the role of Chairman and left the company he'd created, his thoughts returned to a terrifying experience he'd had in the summer of 1931, when he and two colleagues had driven a Cummins diesel powered Indiana truck from New York to Los Angeles in an attempt to set a new truck speed record across the continent.

At dusk on the fifth day of the record attempt, with Cummins at the wheel, they reached the top of Cajon Pass, 3,777 feet above sea level on a stretch of historic Route 66 just west of Barstow in Southern California, and began the steep descent towards the San Bernardino Valley below. On a gravel road that plunged downwards for 35 miles, criss-crossed by a busy railway line, the frequent slowing for twists and turns overheated the truck's brakes. Cummins tried to restrain the runaway vehicle with engine compression but, with so much momentum and road speed, was unable to engage a lower gear than third. Cummins realised in horror he "would just have to ride it out" - and when he saw a freight train cutting across their path a short distance ahead, he was sure the game was over.

Cummins later recounted how the truck passed the back of the train with inches to spare - and how he had vowed that someday, somehow, he would make his engine work just as well going downhill as it did uphill. Almost a quarter-of-a-century passed before Cummins found the time to do this, taking the opportunity when he retired in 1955 to study what might be done to turn his engine into an effective brake. By 1957 he'd had the idea that would revolutionise engine braking: he could take advantage of perfectly timed motion already built into Cummins and Detroit Diesel engines, which have a third cam on the main camshaft that activates the fuel injector of each cylinder, by transferring this motion to open the exhaust valve with a simple retrofit mechanism.

Although the principal of engine braking wasn't new, the details of Cummins' new technical approach made it novel enough to be granted patent protection.

By believing in engine braking, Jacobs set out on a 55-year path of innovation

Clessie Cummins was contractually obliged to offer his invention first to Cummins Engine Co, but it was rejected on the grounds of commercial risk. Cummins received a more positive response when he explained his idea to a Vice President of Jacobs Manufacturing Company, whose founder Arthur Irving Jacobs had developed the first drill chuck with a toothed sleeve and key and went on to build the market-leading manufacturer of drill chucks. Jacobs agreed to test Cummins' new idea by building brake assemblies for ten engines as

quickly as possible. Suitably encouraged by the trials and still moving quickly, by April 1960 Jacobs Mfg. Company made the decision to establish its new Clessie L. Cummins Division (now named Jacobs Vehicles Systems) for the manufacturer of the engine brake, and to this day, JVS continues to develop retarding technology solutions across the globe.

Images



Clessie L. Cummins, founder of the Cummins Engine Co., who in his retirement designed and patented the first compression release engine brake. This would become famous as the Jake Brake®.

About Jacobs Vehicle Systems:

Jacobs Vehicle Systems is headquartered in Bloomfield, Conn., where it has a 260,000 square foot design, testing and manufacturing facility, with support sites in Europe, Japan and China. Jake Brake® products are used by North American heavy-duty diesel engine manufacturers as well as Hino, Hyundai and Mitsubishi in Asia and DAF and Daimler in Europe. Registered to the ISO 14001 and TS16949 standards, Jacobs Vehicle Systems is the world's leading producer of vehicle retarding and valve actuation technologies and can be found at www.jacobsvehiclesystems.com or www.jvsengineering.com.