

**HAS SERIES**  
Air Suspensions

HAS AIR

SUSPENSIONS

PROVIDE SUPERIOR

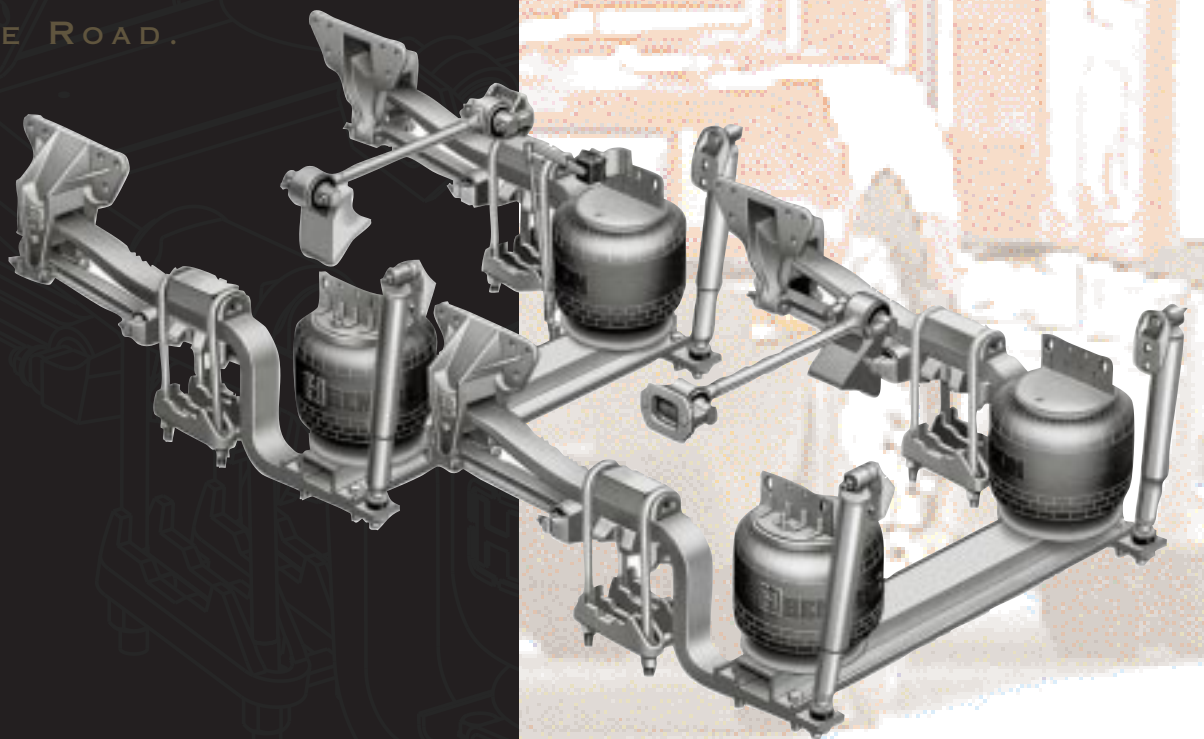
DRIVER COMFORT

AND HELP

MAXIMIZE PAYLOAD.

ON AND OFF

THE ROAD.



*For The Road Ahead™*

**H HENDRICKSON**

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**HAS SERIES: CHOOSE THE RIGHT  
SUSPENSION FOR YOUR APPLICATION.**

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Hendrickson has the air suspension to fit your specific needs. All HAS Air Suspensions provide superior driver comfort, plus optimum cargo and equipment protection. State-of-the-art design and manufacturing technology enable Hendrickson to deliver air suspension systems that are lightweight, yet durable, for on- and on/off-highway applications.



**HAS 40LH.** One of the lightest 40,000-lb capacity air suspensions available, the 40LH helps to maximize payloads in line-haul applications.



**HAS 400.** Designed for on-highway applications that require up to 10 percent off-highway travel, the lightweight HAS 400 Air Suspension is rated at 40,000 lbs.



**HAS 402.** The 40,000-lb. capacity HAS 402 Air Suspension, approved for use with one lift axle, is built to handle both on-highway and up to 25 percent off-highway operation.

**HAS 460.** The 46,000-lb. capacity HAS 460 Air Suspension is built to



operate under off-highway conditions up to 25 percent of the time, and is approved for use with one lift axle.

**HAS 210/230.** For single drive axle tractors and trucks, the HAS 210 and 230 Air Suspensions offer superior ride and durability in 21,000-lb. and 23,000-lb. capacities.



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# HAS DELIVERS THE PERFORMANCE YOU NEED IN AN AIR SUSPENSION.

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HAS Air Suspensions have proven themselves time and again to meet the performance requirements the industry demands. Hendrickson's advanced engineering produces air suspensions that are smooth riding and lightweight, yet remarkably durable and stable. Take a look at the benefits:

## SUPERIOR RIDING FOR DRIVER COMFORT AND EQUIPMENT PROTECTION.

Top-mount, trailing arm air suspensions, such as the HAS Series, offer superior ride by design. But Hendrickson has gone even further by using air springs and shock absorbers that are tuned to provide the smoothest ride available – fully loaded or empty. HAS Suspensions use large volume air springs because they produce a lower frequency spring rate for superior ride. The “rolling lobe” design enables the air springs to constantly adjust to changing road conditions, resulting in outstanding driver comfort, and money-saving cargo and equipment protection.



## LIGHTWEIGHT FOR INCREASED PAYLOAD.



Every pound of vehicle weight saved is a pound of cargo capacity added. So all HAS Air Suspensions are designed to conform to Hendrickson's rigid standards for light weight and durability. For example, the main support members at the heart of all HAS Suspensions are designed using advanced metallurgy and finite element analysis to significantly reduce weight without affecting tensile strength or fatigue life. Frame hangers have also been redesigned to help reduce system weight.

## DURABILITY MEANS LESS DOWNTIME.

HAS Air Suspensions are engineered to deliver all the durability the industry demands. Precision manufacturing processes produce fine grain steel main support members with high tensile strength and superior fatigue life. Optional HI-TORQUE™ shocks with a large, 1-3/4-inch bore, have a greater seal area and hold more oil than standard shocks, for better heat dissipation and longer life. Frame hangers feature an integral slipper pad for quieter operation and improved reliability. In extensive component, system and vehicle fleet testing, Hendrickson Air Suspensions demonstrate their durability. All of this means HAS Air Suspensions deliver outstanding toughness under rugged conditions, resulting in less downtime and lower operating costs.



## STABILITY IS BUILT IN.



HAS Air Suspensions deliver the stability drivers demand, for the utmost confidence in their trucks. The higher-capacity HAS suspensions have added stability engineered in, with increased main support member thicknesses and heavy-duty longitudinal torque rods. Transverse rods ensure maximum lateral suspension stability, while wide air spring centers provide outstanding roll stability. Wide 5-inch axle seats distribute forces over a greater area, providing a secure connection of the main support member to the axle.

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**LIGHTWEIGHT FOR LINE-HAUL, RUGGED DURABILITY  
FOR ON/OFF-HIGHWAY APPLICATIONS.**

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**FRAME HANGERS.**

Lightweight, low-mount hanger design eliminates fifth wheel notching. Redesigned slipper pad, integral to hanger cam, provides a durable, low-friction surface for quiet main support member horizontal travel. Enlarged rebound roller limits vertical travel of main support member for enhanced control during braking.

**EASY ALIGNMENT.**

Drop-in shims make axle alignment fast and easy for increased tire life.

**TORQUE RODS.**

Longitudinal torque rods are engineered to optimize stability during acceleration and braking.

**AXLE CONNECTION.**

Wide seats provide a secure axle connection and axle integrity.

**TRANSVERSE RODS.**

Transverse rods ensure maximum lateral stability.

**RIDE HEIGHT CONTROL VALVE.**

Zero delay operation with minimum dead band maintains constant ride height. Integral dump valve eliminates separate valve and plumbing.

**HAS 40LH**

**MAIN SUPPORT MEMBERS.**

Designed and manufactured by Hendrickson. Advanced materials and process technology results in substantial reductions in spring weight and increased strength.

HAS 40LH: 1.75" thick, HAS 400: 1.875" thick,  
HAS 402: 2" thick, HAS 460: 2" thick

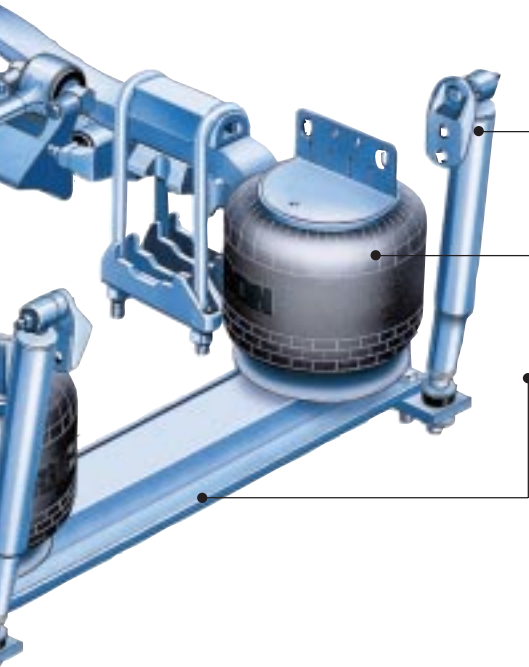


If you're in the line-haul business, the HAS 40LH is the right suspension for you. Its lightweight design and superior ride mean you get maximum payload capacity, cargo and equipment protection, plus the highest level of driver comfort available for on-highway applications. The HAS 400 is designed specifically for truck or tractor applications that require up to 10 percent off-highway travel. Thicker main support members and steel cross channels provide maximum durability to complement the suspension's superior cargo protection.

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If your business requires some off-highway travel, you need HAS 402 or HAS 460 heavy-duty air suspensions. Engineered for up to 25 percent off-highway use, both models have the added durability built in, including main support members, torque rods and axle connections to handle rough off-highway conditions. Each gives you outstanding driver comfort and equipment protection, and are approved for use with an auxiliary lift axle. And if you want the same durability and ride quality for single drive axle tractors and trucks, the HAS 210 and HAS 230 will meet your needs in a wide variety of applications.



- **EXCEPTIONAL RIDE QUALITY.**

Air springs and shock absorbers are tuned to optimize ride quality.

- **HI-TORQUE™ SHOCK ABSORBERS.**

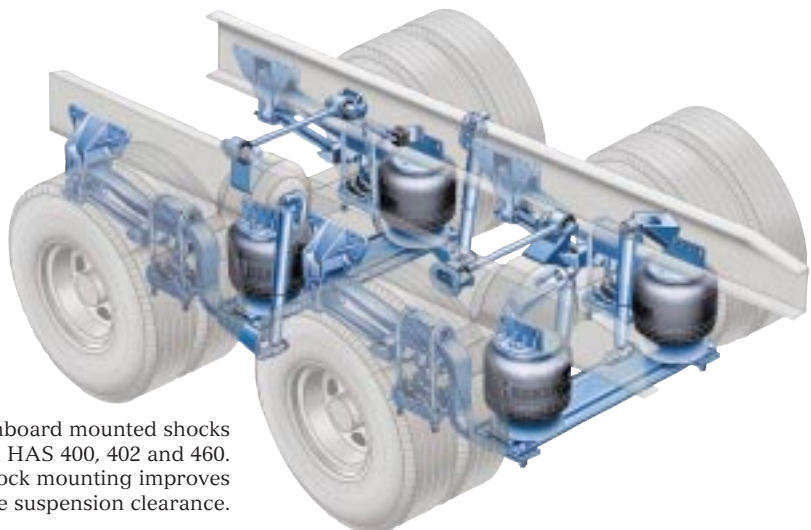
Available heavy-duty 1-3/4" shocks incorporate rebound spring that limits rapid shock extension during acceleration, controlling torque induced frame rise and reducing driveline vibration.

- **AIR SPRINGS.**

Large volume air springs with rolling lobe design constantly adjust to changing road conditions to deliver superior ride quality.

- **CROSS CHANNEL.**

HAS 400, 402, 460: cross channels are formed from stamped steel; HAS 40LH: extruded aluminum alloy reduces weight while maintaining strength.



Optional inboard mounted shocks available on HAS 400, 402 and 460. Inboard shock mounting improves rear axle suspension clearance.

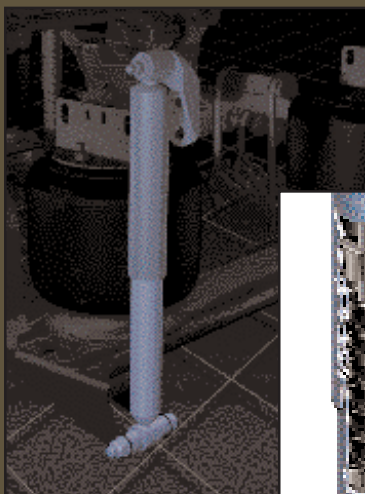
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## REDUCE SUSPENSION RELATED DRIVELINE VIBRATION WITH THE EDGE.

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You probably know that driveline vibration can contribute to premature wear of u-joints, splines and other driveline components. There are many possible causes of driveline vibration. Suspension related vibration can result from improper vehicle ride height, frame slope and frame rise. These factors can cause u-joint and axle pinion angles to become excessive, and result in driveline vibration.

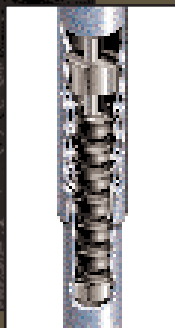
Now Hendrickson offers you a way to reduce suspension related driveline vibration with the EDGE—an integrated system designed to promote Efficient Driveline Geometry. By maintaining constant vehicle ride height, controlling frame rise and defining optimum vehicle set-up parameters, the EDGE maintains proper driveline angles and u-joint cancellation, thereby reducing potentially harmful driveline vibration. The EDGE System is an option on HAS Air Suspensions, and should be specified according to the application guidelines below. It consists of three elements.



HI-TORQUE™ SHOCKS  
WITH INTERNAL REBOUND SPRING

### HI-TORQUE™ Shocks.

Heavy-duty 1-3/4" shocks incorporate a composite rebound spring that limits rapid shock extension during acceleration, controlling torque induced frame rise. This promotes consistent ride height and proper u-joint cancellation, for reduced driveline vibration. The large bore HI-TORQUE shocks are heavy duty for increased carrying capacity and longer life, and they function as traditional shock absorbers to deliver a smooth, high quality ride.





HEIGHT CONTROL VALVE

### Height Control Valve.

A zero delay minimum dead band height control valve offers consistent, repeatable operation for precise ride height control. The valve reacts quickly to changes in suspension ride height due to load changes and uneven road surfaces, maintaining proper driveline angles. 3/8" air lines provide maximum air flow and volume at the valve, allowing the air springs to react quickly. A tight tolerance linkage between the frame and axle offers more precise control over ride height. An integral dump valve eliminates external valve and plumbing. The forward drive axle valve location is less affected by frame slope. This position also discourages driver adjustments that could contribute to improper ride height settings.



PROPER VEHICLE RIDE HEIGHT AND LEVEL FRAME

### Precise Vehicle Setup Parameters.

EDGE requires adherence to vehicle setup parameters to ensure correct ride height, frame slope and driveline angles. These are consistent with The Maintenance Council specifications: a maximum u-joint operating angle of 6° with less than 2° cancellation; a properly installed ride height control system with ride height setting at 4-1/4" ± 1/8".

### HAS EDGE application guidelines:

The HAS EDGE is required on tandem-axle vehicles that have 1550 ft/lb engine peak torque or greater, or a drive axle ratio of 4.11 up to and including 4.6. Axle ratios greater than 4.6 require Hendrickson application review and approval. For HAS 210/230 single axle tractor applications, the Hi-TORQUE shock absorbers are required on vehicles that have 1100 ft/lb engine peak torque or greater.

### Choose the air suspension that's best for the long haul.

Hendrickson offers the widest range of air suspension models available, each tailored to a range of applications. That means you can select the suspension with the optimum capacity and performance characteristics for your application. Whether you're running strictly line-haul or up to 25 percent off-highway, you can count on HAS Series Air Suspensions for superior performance over the long haul. For more information about HAS Air Suspensions, call 1-800-973-0360.

## HAS SERIES: AIR SUSPENSIONS

SPECIFICATIONS	HAS 210/230	HAS 40LH	HAS 400	HAS 402	HAS 460
Suspension Capacity	21,000/23,000 lbs.	40,000 lbs.	40,000 lbs.	40,000 lbs.	46,000 lbs.
GCW (Tractor)	60,000/100,000 lbs.	80,000 lbs.	120,000 lbs.	138,000 lbs.	150,000 lbs.
GVW (Truck)	33,000/35,000 lbs.	N/A	55,000 lbs.	66,000 lbs.	76,000 lbs.
Service: On/Off-Highway	On/Off	On	On/Off	On/Off	On/Off
Tractor	Yes <sup>d</sup>	Yes <sup>a,d</sup>	Yes <sup>d</sup>	Yes <sup>d</sup>	Yes <sup>d</sup>
Truck	Yes	No	Yes <sup>a</sup>	Yes <sup>b</sup>	Yes <sup>b</sup>
Suspension Weight*	454/470 lbs.	797 lbs.	905 lbs.	920 lbs.	937 lbs.

APPROVED APPLICATIONS	HAS 210/230	HAS 40LH	HAS 400	HAS 402	HAS 460
General Freight (Van or Flatbed)	Yes	Yes	Yes	Yes	Yes
Refrigerated (No Swinging Meat)	Yes	Yes	Yes	Yes	Yes
Refrigerated (Swinging Meat)	Yes	No	Yes	Yes	Yes
Car Carrier	Yes	Yes	Yes	Yes	Yes
Chip Hauler	Yes	No	Yes	Yes	Yes
Bulk Hauler (Liquid or Dry)	Yes	Yes	Yes	Yes	Yes
Concrete Pumper	No	No	No	Yes <sup>c</sup>	Yes
Block Hauler	No	No	Yes	Yes	Yes
Wrecker	Yes	No	Yes	Yes	Yes
Dump	No	No	Yes	Yes	Yes
Logger	No	No	Yes	Yes <sup>c</sup>	Yes
Oil Field	No	No	No	Yes	Yes
Refuse (Transfer and Recycler)	Yes	No	No	Yes <sup>c</sup>	Yes
Heavy Equipment Hauler	No	No	No	Yes	Yes <sup>c</sup>
Mixer	No	No	No	Yes <sup>c</sup>	Yes <sup>c</sup>
Beverage	Yes	Yes	Yes	Yes	Yes
Doubles/Triples	Yes	No	Yes	Yes	Yes

a = No add-on lift axles.

b = One lift axle. Maximum 50,000-lb. load on suspension for site travel.

c = Not approved for straight truck applications.

d = Not approved with trailer belly lift axles.

NOTE: All suspension capacities rated at ground.

\* Includes complete suspension, torque rods, axle and frame brackets, and all hardware.

Contact Hendrickson if you have questions regarding an air suspension application not listed.

## HAS SERIES: SUSPENSION COMPONENT SPECIFICATIONS

HAS 40LH	HAS 400/210	HAS 402	HAS 460/230
	Cast Longitudinal Torque Rod		Heavy-Duty, Longitudinal Torque Rod
Cross Channel Aluminum	Cross Channel 1/4" Steel		
Lower Shock Bracket, Not Required	Lower Shock Bracket, Stamped		
Standard 1-3/8" Shock Eye/Stem Mount 1-3/4" HI-TORQUE™ Optional	Standard 1-3/8" Shock Eye/Eye Mount/1-3/4" HI-TORQUE™ Optional (Optional inboard shocks available)		
Lightweight Top Pad	Solid Top Pad		
Main Support Member Thickness 1.75"	Main Support Member Thickness 1.875"	Main Support Member Thickness 2.00"	
3/4" U-Bolt	7/8" U-Bolt		
Approved* Axle Housing Wall Thickness 3/8"	Approved* Axle Housing Wall Thickness 7/16"	Approved* Axle Housing Wall Thickness 1/2"	

\* Dana, Eaton, Rockwell axles.



A Boler Company