

D-BOX

OPTIMAL MOTION-CUEING TECHNOLOGY FOR INNOVATIVE FLIGHT SIMULATORS

Affordable and easy to integrate, D-BOX technology creates true-to-life, immersive motion cueing when paired with high-fidelity simulation engines. This sophisticated D-BOX Motion System improves training transfer and user experience in any flight simulator.

As a mature and powerful industry, the flight simulation community is constantly reinventing itself to meet current needs.

Only 10 years ago, an affordable motion-enabled flight simulator was almost unimaginable. But today it's almost impossible to picture a simulator without motion. Over the years, D-BOX has proven that efficient and reliable movement for flight simulators doesn't have to be heavy, hard to deploy or expensive.

D-BOX develops motion technology for training and simulation applications. The system is used in military and civil aircraft simulators, for both fixed and rotary wings.



FLIGHT TRAINING FOR THE PILOTS OF TODAY - AND TOMORROW

MEETING THE DEMANDS OF AN INDUSTRY ON THE RISE

The aviation industry is growing – and trainers need to keep up. By 2032, the International Air Transport Association says the demand for air travel will double. This means that more pilots will need to be trained. But how?

The community needs a cost-effective way to train more people safely. It has to be accessible and easily set up to deliver large-scale curricula. But most importantly, it must provide users with the best preparedness for real-life scenarios, by giving them the highest caliber of education.

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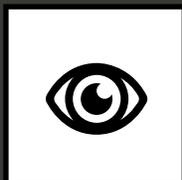
Reasonable distractions like turbulence, engine vibration and parasitic drag are important elements for flight training. D-BOX motion adds to the richness of the training experience. We integrate D-BOX in every opportunity.

– **Mike Altman**
CEO, Precision Flight Controls

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**EFFICIENT
TRAINING
SIMULATOR**

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Visualization

+



Sound

+



Instructions

+



Motion

EVOLUTION OF SIMULATION

For decades, flight trainers have used simulation – from desktop trainers to full flight simulators (FFS) – to prepare pilots for the real thing.

While desktop trainers have traditionally been low-priced, they have not been as effective at transferring the training curriculum from trainer to trainee.

To do this, a system needs to use a complete set of modalities: visualization, sound, instructions and motion. Without motion, desktop trainers use only three of the four necessary elements.

At the opposite end of the spectrum, FFS replicates every sense trainees use in flight, to a near-perfect degree of reality. But their higher cost has limited their use.

To address today's need to train large numbers of pilots, the world's main flight regulators (including ICAO, FAA and EASA) are opening the door to new types of training devices.

High quality stimulation of all senses is known to be brought by innovative technologies such as new projectors, HMD solutions, immersive sound systems etc. The missing piece of equipment was a cost-efficient way to stimulate kinesthetic senses.

With its sophisticated motion-cueing system, D-BOX provides a proven solution for developing kinesthetic reflexes and muscle memory to any flight simulator.



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Kinesthetic cues enable helicopter pilots to know how their aircraft is behaving, to better understand the state it is in. This prevents pilots from relying on instruments in the control panel to confirm information. Learning how to rely on physical sensations while training on a helicopter simulator is essential to piloting in real conditions, particularly during critical flight phases such as take-off, landing, patrolling at low altitudes, or for tactical and complex landing situations.

— Julien Leclair
Helicopter Pilot and Instructor

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INNOVATIVE - AFFORDABLE - TRUE-TO-LIFE

Hardware

D-BOX motion hardware can be integrated into a seat, platform or other surface to simulate a range of textures and scalable axes of movement. Our Motion Systems are evolutive and scalable. We can help you select the best arrangement of actuators for your application, ensuring you deliver on budget and on time.

Engaging

Optimal simulation training removes users' psychological barriers to learning, developing psychomotor reflexes that respond to real-life situations. D-BOX immerses pilots, trainees and testers in the simulation by replicating the platform's movement, while using rich motion cueing to replicate vibrations, as well as all vehicle movements.

Easy to Deploy

Because operational requirements and situations can quickly develop and change, you need simulation systems that can be rapidly deployed anywhere, at anytime. An interoperable, Commercial-Off-The-Shelf (COTS) solution, D-BOX technology is a game changer, thanks to its ease of installation, low electrical power requirements, low shipment weight and reduced deployment time.

Software

D-BOX interactive software uses motion algorithms to respond to user commands. Motion signals are sent to our motion controller, which decrypts the signal and sends the queue to our motion actuators. D-BOX motion specialists support your integration to replicate all vehicle movements from your simulator. These include vehicle position, acceleration, suspension, engine vibrations and movement of articulated parts.

Affordable

Traditional training simulators are not necessarily cost-effective. D-BOX Motion Systems deliver state-of-the-art simulation at a fraction of the price. What's more, our interoperability and simple deployment further reduce the overall cost of managing a simulation training and testing program.

Commercial Off-the-Shelf

As a COTS system, the D-BOX solution is affordable and reliable. Our technology is supported and documented, and therefore easy to integrate and manage. Users can access all our expertise, including motion code, behavioral subtlety and vibrations.



By combining HeliSIM with D-BOX, the simulated vibration is accurate. You have the right frequency and amplitude. To my knowledge, D-BOX is the only small simulation motion solution that can provide the accuracy and frequency to mimic the movement of a helicopter up to 100 Hz of vibration.

— **Stéphane Roy**
President, RAAS



THE D-BOX SOLUTION: TRUE-TO-LIFE MOTION CUEING

Simply connect a motion-cueing system to your favourite simulation engine to bring kinesthetic cues to any simulator, instantly improving trainee engagement and training transfer.

A PRE-INTEGRATED MOTION SOLUTION - READY TO CONNECT

Along with an ease of integration that's based on our adoption of standards and the open API available with D-BOX motion solutions, we deliver out-of-the-box integrations with many of the most commonly used engines:

- ▶ X-Plane
- ▶ Prepar3D
- ▶ Lockheed Martin ESP
- ▶ Presagis HeliSIM
- ▶ Rockwell Collins CORE Sim
- ▶ RT Dynamics Rotor/FixedWingLib

Still looking for a way to affordably integrate motion into your simulation application?

Ask your software provider about existing integrations with D-BOX.

OPTIMAL TECHNOLOGY THAT SIMULATES REAL-LIFE MOVEMENT

D-BOX motion-cueing systems let you create reliable flight-training simulators that feature the entire spectrum of motion cues in your curriculum.

These include:

- ▶ Runway effects (ground speed, oleo deflection, runway roughness)
- ▶ Ground handling (touchdown and take-off cues, ground impact)
- ▶ Turbulences (wind effects, malfunction cues for unpredictable mechanism failures, engine burst)
- ▶ In-the-air buffet caused by flap and gear extension
- ▶ Thrust buffet
- ▶ Tail strike during take off



D-BOX: A PROVEN SIMULATION TECHNOLOGY PARTNER

Lehigh Valley Flight & Racing Simulations, Pennsylvania

As a former commercial airline pilot, Jayson Baron wants to take flight training to the next level with his new flight school, Lehigh Valley Flight & Racing Simulations.

“I fell in love with D-BOX’s simulators,” he says, adding that the other motion systems “paled in comparison.” Right away, Baron saw how D-BOX’s top-tier motion-cueing system could integrate with his simulator to trigger cognitive reactions to touch and balance. In fact, he credits his love of PFC simulators with their use of D-BOX’s actuators. The combination provides airline-level, scenario-based training so that users can navigate through multiple failures during flights.

With D-BOX’s high-fidelity Motion System added to the PFC simulator, Baron can also simulate 42 different airplanes – from small Cessnas to Citation jets and turboprops – at the touch of a button.

“I love the fact I can put pilots in different types of airplanes and let them fly (in many cases) a higher level of equipment than they’re ever going to get to fly, and do higher-level training.”

So far, 150 airline pilots have test driven the simulator Baron developed. “They say it feels like a Level C or D simulator and that the fidelity motion-cueing feels amazing,” he says. “We all feel like we’re in a real airplane.”

“We know what our customers want and what it takes to train pilots, and D-BOX has become an integral simulation component significantly enhancing our flight simulation product line.”

Precision Flight Controls, Inc., California

Mike Altman, CEO of Precision Flight Controls, Inc. discovered D-BOX at a trade show in San José, CA in 2007. At the time, he wasn't looking for a motion solution, but he was intrigued by D-BOX. Today, almost every cockpit simulator built by Precision Flight comes equipped with D-BOX.

“D-BOX has always provided us with great service. They've got great people. We'd never go anywhere else.” Mike says.

Not all flight simulators require motion to meet industry standards. In fact, the majority of simulators Precision Flight builds would be up-to-code without them. But as an experienced flyer, Mike knows the value of motion simulation in training.

“Reasonable distractions like turbulence, engine vibration, and parasitic drag are important elements for flight training,” he explains. “D-BOX motion adds to the richness of the training experience. We integrate D-BOX in every opportunity.”

D-BOX's system lets pilots feel motion cues associated with engine failure or heavy winds through simulated changes in pitch and yaw. This prompts the trainee to perform an instrument scan to better understand the situation - an instinct that will be crucial when they leave the simulator for a real cockpit.



Image courtesy of Precision Flight Controls

RC Simulations, U.K.

When Robert Sidwick, co-director of RC Simulations, set out to build “the most advanced trainer” for the Royal Air Force (RAF), he went straight to D-BOX.

“D-BOX generates good texture in terms of what is going on. It's got the best price and functionality,” Sidwick says.

RC's flight simulator will let users feel what it's like behind the controls of the Squirrel HT1 helicopter, a single Ariel 1D1 gas-turbine engine. Sidwick knew he could count on D-BOX technology to match the engine vibration of this aircraft, and mimic all the movements and vibrations of the Squirrel.

D-BOX: MOTION CUEING SYSTEMS FOR PILOT TRAINING

D-BOX Technologies Inc. designs, manufactures and commercializes cutting-edge motion systems intended for the entertainment and training simulation market.

D-BOX offers the most optimized, interoperable, engaging and easy-to-deploy motion system on the market today.

Get in touch. D-BOX can help you deliver safe, effective, true-to-life virtual training and analysis solutions.

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