

BioLogics Auto Vector® Bed Systems with Fluid Immersion Simulation® transforming wound management



The History of “Dolphin” Technology

The Auto Vector surface was developed in response to the need to transport specially trained marine mammals, such as dolphins, over long distances outside of water. Unfortunately, dry transport of these large mammals, and the subsequent exposure to the vertical shearing forces of gravity, caused internal organ trauma and circulatory distress. The challenge was to create a physiologically compatible non-aquatic environment for dry transport that provided the necessary buoyancy to protect these special creatures.

In response to this need, Biologics, Inc., began development of Fluid Immersion Simulation software technology under contract with the United States Navy in 1997. This technology would be incorporated into a transport surface that could mimic the buoyancy of fluid immersion to minimize physical trauma to these mammals, while providing the cost-effectiveness and ease of dry transport. The Auto Vector surface was developed, and the surface proved to minimize the effects of gravity’s shearing forces on the dolphin’s internal organs and physiological processes.

Like our dolphin friends, human bodies can also be injured by harmful vertical shear forces. Thanks to the lessons learned in development of the mattress for safe dry transport of dolphins, Biologics has incorporated this same advanced “Dolphin” Auto Vector technology into products for patients in all healthcare settings. Now, Joerns Healthcare is able to deliver these same therapeutic support surface solutions for hospital beds, operating room tables, stretchers and wheelchairs, as well as, bariatric and pediatric surfaces, to your patients.

Auto Vector® “Dolphin” Support Surface with Fluid Immersion Simulation®

The Auto Vector Bed with Fluid Immersion Simulation (FIS) is the cornerstone of the Dolphin Auto Vector Multi-Surface System. The Auto Vector surface allows caregivers to provide many of the best elements of air-fluidized therapy, including three-dimensional volumetric engagement, elimination of gradient shear forces, and superior outcomes for flaps, grafts, and pressure ulcers, while eliminating some of its shortcomings, such as insensible water loss which can lead to dehydration of the patient, lack of ability to incline head of bed, and the challenges that present when turning patients.

Key Benefits

- Requires no manual data input – automatically adjusts to patient’s body weight and profile
- Continues to monitor the surface every 11 seconds (300 times per hour) for any patient movement
- Reduces gradient shear forces
- Customizable to fit any acute care bed frame, including bariatric frames up to 60" wide
- Able to support up to 1900 lbs.



Auto Vector “Dolphin” Pad with FIS

A comprehensive review of the relevant literature identified a 21.2% incidence of pressure ulcers in surgical patients.¹ Vascular and cardiac procedures are especially risky with prevalence rates well beyond 20%.² O’Connell demonstrated that procedures lasting longer than four hours triple the risk of tissue damage.³ Even the healthiest patient can be at risk for tissue damage if a surgical procedure lasts longer than four hours. Until now there was very little the Operating Room and skin care teams could do.

Many factors contribute to the development of a pressure ulcer during surgery: high acuity patients with multiple co-morbidities, administration of anesthesia that lowers blood pressure and slows down perfusion, long surgical duration, the need for surgical positioning, and a paralyzed patient on a non-compliant surface that does not redistribute pressure very well. This “Perfect Storm” of contributing factors makes these patients particularly vulnerable to pressure ulcer development.

Key Benefits

- Engages patients three-dimensionally and volumetrically to provide proper symmetry and protection during long surgical procedures
- Provides a comfortable, safe surface that greatly reduces the incidence of pressure ulcers in surgical patients
- Includes benefits of FIS technology



Auto Vector “Dolphin” Stretcher Mattress with FIS

Patients can spend long hours in the emergency department awaiting diagnosis and admission. Stretchers with standard mattresses may not provide adequate pressure redistribution to prevent skin breakdown in these patients. Innovative strategies for pressure management are required in the ED to provide optimum prevention. A study by Tarpey, et al. suggests 40% of patients admitted through the emergency department are at risk for pressure ulcer development.⁴

Key Benefits

- Customizable to any stretcher regardless of make or model
- Provides flexibility to retrofit current stretchers or complement new stretchers with Auto Vector technology
- Remains inflated up to eight hours with full operation under its own internal battery supply
- Includes benefits of FIS technology



¹ Stotts, N.A. (1999). Risk of pressure ulcer development in surgical patients: a review of the literature. *Adv in Wound Care*. 12(3): 127-136.

² Papantonio, C.T., Wallop, J.M. and Kolodner, K.B. (1994). Sacral ulcers following cardiac surgery: incidence and risks. *Adv in Wound Care*. 7(2): 24-36.

³ O’Connell, M.P. (2006). Positioning impact on the surgical patient. *Nurs Clin North Am*. 41(2):173-192.

⁴ Tarpey A, Gould D, Fox C, Davies P, and Cocking M. (2000). Evaluating support services for patients in transit through the accident and emergency department. *J Clin Nurs*. 9(2):189-198.



The Science Behind the Product

Unique, Innovative Technology Provides Optimal Clinical Outcomes

What is Fluid Immersion Simulation (FIS)?

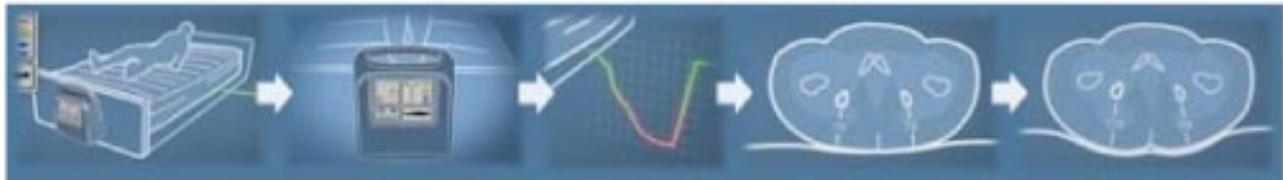
The short answer: A technology that simulates the effects of a body “floating” in a fluid, thus alleviating vertical shear forces which deform soft tissue.

Fluid Immersion Simulation is a state of the art pressure redistribution technology. It incorporates concepts from physics like Boyle’s Law (Air Viscosity) and the Archimedes Principal (buoyancy) into algorithms that simulate immersion in a fluid. By using a microprocessor and sophisticated dynamic pressure waveform analysis software, the system is able to analyze in a three-dimensional volumetric format the anthropometric characteristics (shape) of a patient engaged on the mattress.



By providing active feedback, detection and correction for the support surface based on the mass and area in contact with the surface, the system is able to approximate immersion in a fluid medium. Consequently, the supported object is truly floating, cradled in a simulated fluid environment without experiencing soft tissue strain. CT and PET scans verify the system’s ability to maintain normal tissue symmetry. FIS has been further validated by perfusion studies that demonstrate the system’s ability to maintain micro-circulation to peripheral tissue which is critical when trying to prevent or heal deep tissue injury.

Below you will find a quick glance into how our Auto Vector surfaces work. Our products relieve pressure points found in traditional hospital/surgical bed surfaces by applying our Fluid Immersion Simulation software algorithms and precisely adjusting the density of the surface to accommodate the unique anatomical features of the patient. The patient is suspended in a near neutrally buoyant state, minimizing or totally eliminating soft tissue deformation. Traditionally, this could only be accomplished in the center of an air-fluidized bed.



Patient lays down on our Auto Vector support surface

The Auto-Vector system automatically calculates the exact settings needed to safely provide relief from the pressure of the patient's body in contact with the surface

Vascular Occlusion (measurement of the amount of blood blocked) is minimized as the surface dynamically reacts to patient's movements instantaneously and in real-time

How this unique technology works:

- The technology utilizes the unique Archimedes linker algorithm which measures a patient’s weight and body contour and automatically imprints the data into a computerized control unit. The system examines the data and automatically adjusts the mattress to create a neutrally buoyant, three-dimensional support surface environment.
- The system continues to monitor the surface every 11 seconds or 300 times per hour for any patient movement.
- The surface maintains gluteal symmetry and fold with minimal distortion to the body, while maintaining a normal orientation of bone, muscle, and subcutaneous tissue, resulting in reduced risk for pressure ulcer formation.
- Clinically tested to manage advanced wounds, flaps, and skin grafts. The Auto Vector surface technology offers a continuum of care for hospitals in the Operating Room, Post Anesthesia Care Unit (PACU), Coronary Care Unit (CCU), Intensive Care Unit (ICU) and Emergency Departments.

BioLogics Auto Vector® Bed Systems with Fluid Immersion Simulation®

Clinical Studies and Research

Effectiveness of the BioLogics® Dolphin Bed as a Tool to Improve Tissue Perfusion in Points of Compression
Division of Plastic Surgery, UC San Diego and VA La Jolla Medical Center, San Diego, California
Sam Eshomoudeh, MD; Andrew Brethaupt, MD; Anur Bondaschuk, MD; Dhruv Bhowani, MD; Lars Ewert, MD; Kevin Brodie, MD; Mervin Gobke, MD; Richard Rodas, MD

Background

- Pressure ulcers plague bed-bound patients.
- High incidences of pressure ulcers, 23% of long-term care facility residents.
- Expensive: \$1.2 million to settle annually.
- Air-Fluid mattresses, Air-Fluidized beds and active turning beds have improved care.
- Is there a place for an even better "smart computerized, adaptable mattress"?

Objective

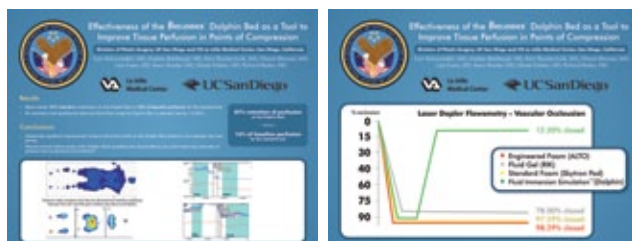
Evaluate improvement of tissue perfusion by the "Dolphin Bed" versus standard OR bed/mattress.

Materials/Methods

- Dolphin Bed (manufactured by BioLogics)
- Ten (10) volunteers
- Personalized ultrasonic blood sensor system for pressure and perfusion assessment
- Transcutaneous oxygen sensor
- Laser Flow Doppler
- Measurements on distal aspects of volunteers
- Measurements on 10 (volunteer) locations
- Healthy control
- Setting up system (necessary to new location)
- Pressure reduction from baseline calculated
- Mean values compared by Wilcoxon and paired t-test

Clinical Studies with Compelling Outcomes

- Division of Plastic Surgery, University of California San Diego (UCSD) and VA La Jolla Medical Center: Effectiveness of the BioLogic Dolphin Bed as a Tool to Improve Tissue Perfusion in Points of Compression.
- Nursing Executive Center: The Advisory Board Practice Assessment: Recommended hospitals invest in leading-edge fluid immersion simulation surfaces for spinal cord injury patients; they determined that the Auto Vector surface simulates a fluid environment to maximize tissue perfusion and prevent pressure ulcer progression
- Memphis VA Medical Center reduced incidence of pressure ulcers in Spinal Cord Injury units from 11% to zero; decreased rental costs associated with air-fluidized therapy rentals



Technical Specifications

Clinical Indications for Use

Pressure Redistribution: Stage I – IV Pressure Ulcers; Surgical Wounds; Flaps and Grafts

Control Unit

Dimensions: 15" (W) x 7.5" (H) x 5.5" (D)
Weight: 10 lbs.

Mattress

Dimensions: Multiple product models available, dimensions vary by model
Mattress Weight Capacity: 1900 lbs.

Electrical Specifications

Power: 115VAC, 60Hz or 240 VAC 50 Hz
UPS Power: 12 VDC, sealed, rechargeable battery
Battery Power: Internal 12 volt DC reserve

Environmental

5 Deg. C to 40 Deg. C., <95%R.H., non-condensing
Storage Temperature: -10 Deg. C to 55 Deg

Agency Approvals

UL Classified: UL 60601-1 CAN/CSA C22.2
No. 60601-1

Rental and Ordering Information

Joerns Healthcare has customer service representatives available 24 hours a day, 7 days a week, to assist you with your needs, simply call us at 1.800.966.6662. Please send all faxed orders to 800.232.9796.

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