



# Research and Development

## › Introduction

Research and development is a necessary component of any major supplier of evaporative equipment. Companies with strong research and development teams are better able to improve the energy efficiency of their evaporative equipment products, increase thermal performance by creating more efficient heat transfer designs, and develop better water distribution systems. These are all innovations that only the brightest minds and strongest research facilities in the evaporative equipment industry can achieve.

As the worldwide leader in heat transfer technology, BAC prides itself on having a world-class research and development facility to complement corporate operations at headquarters in Jessup, MD. The test facility covers 70,000 square feet, representing a spacious area that can handle a large number of projects as BAC continues to bring cutting-edge evaporative equipment to market. The facility houses several labs (including a new state-of-the-art Ammonia Test Lab) designed to test the smallest to the largest evaporative equipment along with the materials used to construct them, such as fill and fans.

## › Unit and Component Testing

The test facility accelerates a thorough process of analyzing and testing full size BAC units. Analyses are performed by detailed computer models that fully describe the performance of units. The research and development team then performs tests on full size units to verify the computer algorithms. Testing full size units is an important process in the research and development of evaporative equipment because it provides BAC with the ability to thoroughly analyze a complete unit. This contributes to understanding how units are likely to perform in the field and equips BAC with deep product knowledge in theory, practice, and application.

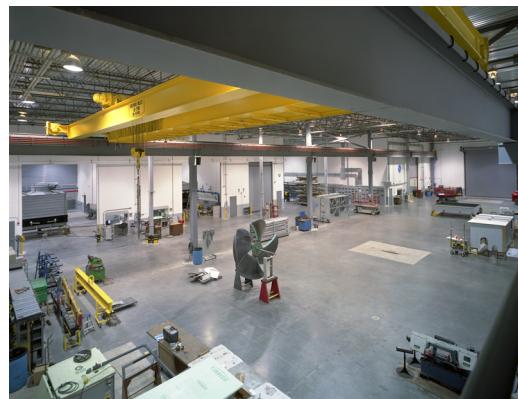


Figure 1. BAC's Research and Development Facility

The research and development facility also tests each component of a unit in order to bring the most efficient, best designed products to market. Component testing includes the research and development of vital evaporative equipment parts such as fans, fill, motors, bearings, and gears. The team puts each part through a rigorous procedure consisting of tensile, shear, and corrosion testing. BAC learns about the best materials to use in its products through its materials testing process, which consists of abrasion, acid, and coating tests.

## › Supporting Independent Certification

Today's industry expects evaporative equipment to achieve independent certification from veritable agencies such as the Cooling Technology Institute (CTI). BAC exceeds certification qualifications by structurally testing its products to meet a high level of mechanical qualification. This in-house process includes strain gauge testing, fatigue testing, and structural analysis. The lab uses the most current practices in the industry, such as using wireless strain gauges to test the strength of fans in motion. Such practices allow BAC to understand how well certain materials can be trusted to perform.

The research and development facility at BAC is well known for its ability to support the independent certification process, even to the point of serving as an independent testing lab for other companies. The CTI, perhaps, institutes the most rigorous certification process in the industry, requiring one evaporative cooling tower of each product line to be certified for thermal performance each year. BAC offers the most extensive product line in the industry, potentially making this a daunting task. However, the well-equipped BAC research and development facility makes the company more than capable of meeting certification requirements for more than 9 products requiring certification. In addition to performing tests to maximize thermal performance, sound testing is performed with regularity in the research and development labs. BAC continues to employ research that promises to bring the lowest sound levels to the industry. Another facet of the design process includes seismic testing. The BAC research team models BAC evaporative equipment to meet the requirements set forth by the International Building Code (IBC). These designs are then verified by a third party via shake table testing; BAC was the first in the industry to implement seismic testing to meet design requirements.

## › Continuously Innovating

The research and development facility continuously innovates and improves the evaporative equipment industry. BAC has developed a variety of specialized rigging techniques that make it easier for customers to install their units in the field. As a result of research on rigging units, BAC has developed single piece and modular rigs. Further, the research and development team develops processes designed to improve the maintenance of evaporative equipment as well. The lab thoroughly tests the durability of product offerings such as the TriArmor® Corrosion Protection System, thermosetting hybrid polymer, and stainless steel. Products with these protection systems are tested in a process that mimics harsh environmental conditions. Using a state of the art corrosion testing process, the research and development facility is capable of analyzing the wear of these systems in days for a process that typically requires years to fully study.

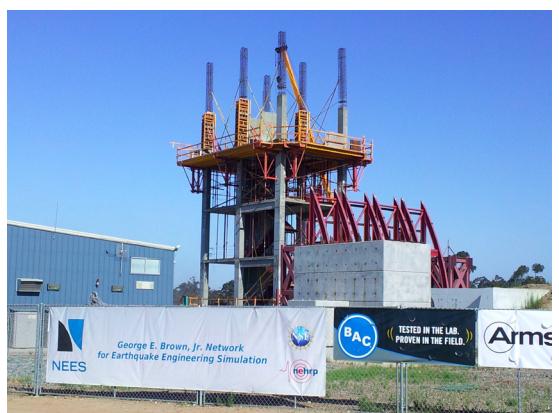


Figure 2. Shake Table Test Facility

The efforts of the research team at BAC have led to the company obtaining hundreds of patents. These patents include the recently re-introduced coil technology for the FXV/CXVB products. This advanced coil technology increased the thermal performance of these product lines up to 50% over the previous generation. BAC offers a patented crossflow fill, BACross®, which increased the performance of its products line 7-10% over the previous generation of products. For ice thermal storage units, BAC's coil spacing patent allows ice coils to prevent bridging and optimize ice building. TriArmor®, developed in the research lab, is one of the most revolutionary and cost effective materials of construction in the market. This material offers the same benefits of stainless steel such as a leak proof basin and nearly identical corrosion protection, amazingly at a lower cost in almost every application.

These patents are but a few achievements that reveal the strength of BAC's research and development facility. Customers are highly encouraged to schedule a visit to BAC's headquarters to explore this cutting edge facility.