



# FLIR

## APPLICATION STORY



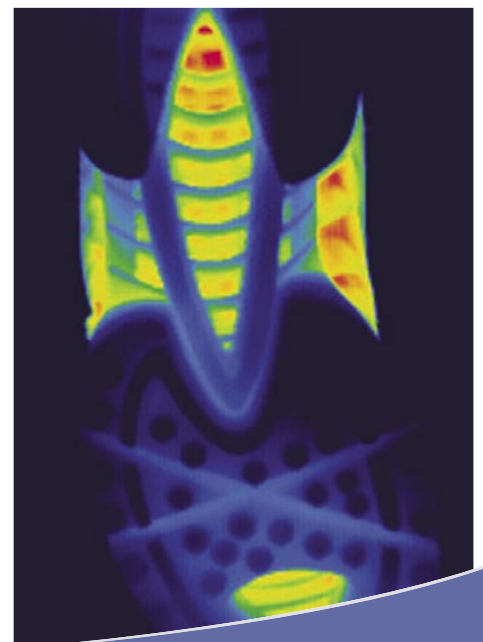
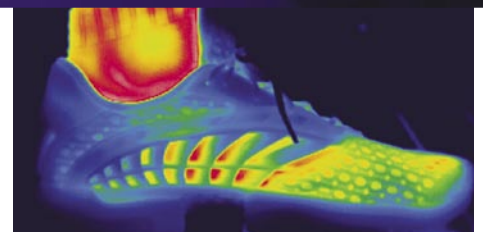
## Adidas, improving the comfort of athletes worldwide with the help of infrared thermography.

*Satisfying professional athletes is not an easy job. They demand the best quality equipment available on the market in order to perform at their best. But also the recreational sportsmen and woman insist on having excellent material. Adidas, world-wide known as one of the leading manufacturers of sports shoes, apparel, track suits, balls, ... is therefore constantly seeking for new materials and designs to satisfy the most demanding athletes. A FLIR Systems infrared camera, the ThermaCAM™ SC 3000, helps them to achieve this goal.*

The success story of adidas starts in 1920 when Adi Dassler produces his first hand-made training shoe in his mother's wash-room. A few years later, he founds the "Dassler Brothers Sports Shoe Company" together with his brother Rudolf. The company grows fast and in 1936 at the Berlin Olympics, the legendary Jesse Owens wins four gold medals with adidas shoes at his feet. In 1948 both brothers decide that they will go their own way. While Rudolf leaves the company and founds "Puma",

Adi renames his company adidas. It is in the same year that he registers the now world famous "three stripes", which were originally designed as an innovation to stabilize the athletes midfoot, as the company trademark.

In 1978, when the founder of the company passes away, adidas is already producing 45 million pairs of sports shoes a year. And the success story continues. Today, no other brand is so closely associated with so many athletes in so



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many sports over so many years like adidas. Celebrated sportsmen like Abebe Bikila, Dick Fosbury, Bob Beamon, Mohammed Ali, David Beckham, Zinedine Zidane and many others have achieved their greatest successes with adidas sport shoes on their feet.

**INNOVATIONS TO ENSURE LEADING MARKET POSITION**

To stay the preferred choice of so many athletes, adidas is constantly developing and marketing new and better products. New materials and designs, to satisfy the most demanding athletes in the most extreme conditions, are constantly developed.

"Here in Scheinfeld, Germany is the adidas Test Center.", explains Karsten Westphal, Lab Manager Research & Testing. "Before new models are put into the market they need to be thoroughly tested to make sure that they meet the high quality standards where adidas is renowned for. To do this we have the most



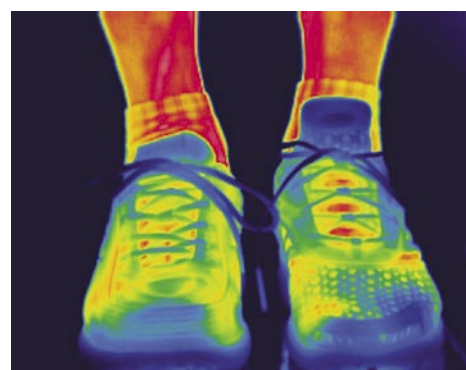
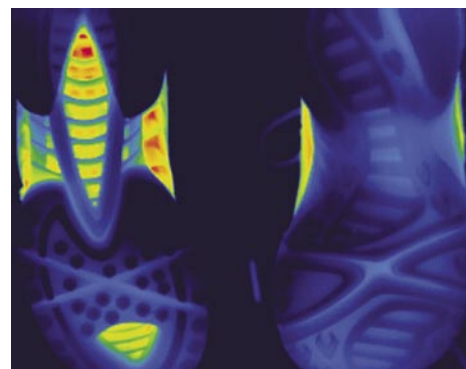
The adidas Test Center

advanced equipment. Also an infrared camera, a FLIR Systems ThermoCAM™ SC 3000 is part of our equipment."

"We extensively used the ThermoCAM SC 3000 during the development of the ClimaCool™ technology. The basic idea for the ClimaCool™ technology is fairly simple. When athletes start to run they start to sweat. This not only gives them an uncomfortable feeling, but when the feet start to sweat and get hot and wet, there is the possibility to get blisters. We wanted to develop a shoe that gives the athlete the possibility to perform at his best."

"The next step was to see which part of the foot is getting the hottest. Once this was determined we started to develop the ClimaCool™ shoe with the goal to drain as much heat as possible from these areas".

Tests comparing the ClimaCool2™ running shoe, the original ClimaCool™, running shoe and a standard running shoe were conducted at the adidas Test Center in Scheinfeld, Germany. The tests featured



Shoe with ClimaCool technology compared to a normal shoe. The ClimaCool drains the heat from the foot. Therefore higher temperatures are measured at the outside of this shoe.

a "Climatester", a machine using sensors connected to the athlete, transmitting data directly into a computer to measure the athlete's temperature and moisture level during sporting activity. An infrared camera was used to identify the areas of the foot that were most affected by changes in temperature levels and heat build up.

**INFRARED SEES IT ALL**

"Initially we measured the temperature at just a few well-determined spots of the shoe with temperature sensors. Although this gave us an idea of the heat being drained we realized that we needed to see the full picture. Using an infrared camera was the only solution.", Karsten Westphal continues.

"After careful evaluation we chose for the FLIR Systems ThermoCAM™ SC 3000. The camera has a thermal sensitivity of 0.02°C which allowed us to see the smallest of temperature differences.

The high resolution image of 320 x 240 pixels gives us the opportunity to measure the temperature at 76.800 individual measurement points. The systems produces images at a rate of 50 Hz with very short integration times allowing to see blur-free images and to measure the slightest



of changes in real-time when the athlete is running at full speed. This made it possible to see immediately how the shoe was reacting to the temperature differences in the foot over a period of time.

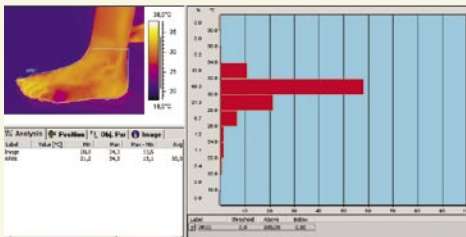
The ThermoCAM™ Researcher™ software made it possible to do extensive thermal analysis on the obtained results."

**CLIMACOO2™: A SUCCESS THANKS TO INFRARED**

"We could not have designed the ClimaCool™ without the help of the FLIR Systems ThermoCAM™ SC 3000.", Karsten continues. "The images produced by the camera provided us with information that was impossible to capture using sensors only."

"Thanks to the SC 3000 we have had one of the most successful product launches ever. Infrared has definitely proven itself within adidas and we definitely will use it in future projects. We do not only produce shoes but also apparel. Seeing how heat can be removed as rapidly and efficiently as possible is very important for the athletes. Certainly when they have to perform in extremely hot climates."

"It goes without saying that we decided to by the FLIR Systems ThermoCAM™ to help us develop the ClimaCool™. But the camera delivers us also very nice looking images, which we can use for marketing purposes.", Karsten concludes.



Detailed analysis of the heat dissipation when an athlete is running barefoot with the help of the ThermoCAM Researcher software.

**WHAT IS CLIMACOO2™ ?**

ClimaCool™, featuring adidas ventilated ClimaCool™ technology, is set to cool down athletes around the world.

ClimaCool™ technology is a complete ventilation and cooling system that uses angled vents to force air through the shoe, with the air flow increasing in proportion to the intensity of the sporting activity. This evolution was accomplished through extensive testing and analysis of the foot in motion. The results led to a shoe that provides the athlete with a larger area of cooling vents leading into and out of the shoe. These vents are shaped so that air channels directly into the shoe based on the speed and energy exerted by the athlete's foot.

ClimaCool™, was born and developed within the adidas innovation team (a.i.t.).

In 1999, a.i.t. set out to develop a functional footwear product that featured a 360° ventilation system. ClimaCool2™ started with the idea to create a product that channeled an athlete's power into direct performance benefit. The angled vents are positioned in locations and at angles that maximize the airflow in and out of the shoe, dependent on the speed of the athlete's movement. Therefore, when an athlete is giving 100%, ClimaCool2™ offers up to 32% more cooling to the foot than traditional running footwear and a further 12% increase in cooling over the first ClimaCool™.

ClimaCool™ gives the athletes cooler and dryer feet, which reduces the likelihood of blisters, while also providing additional comfort.



Karsten Westphal, Lab Manager Research & Testing in the Adidas Test Center in Scheinfeld



The "Climatester" used for the development of the ClimaCool™.



The ThermoCAM SC 3000 finds the hot-spots on the ClimaCool™.

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