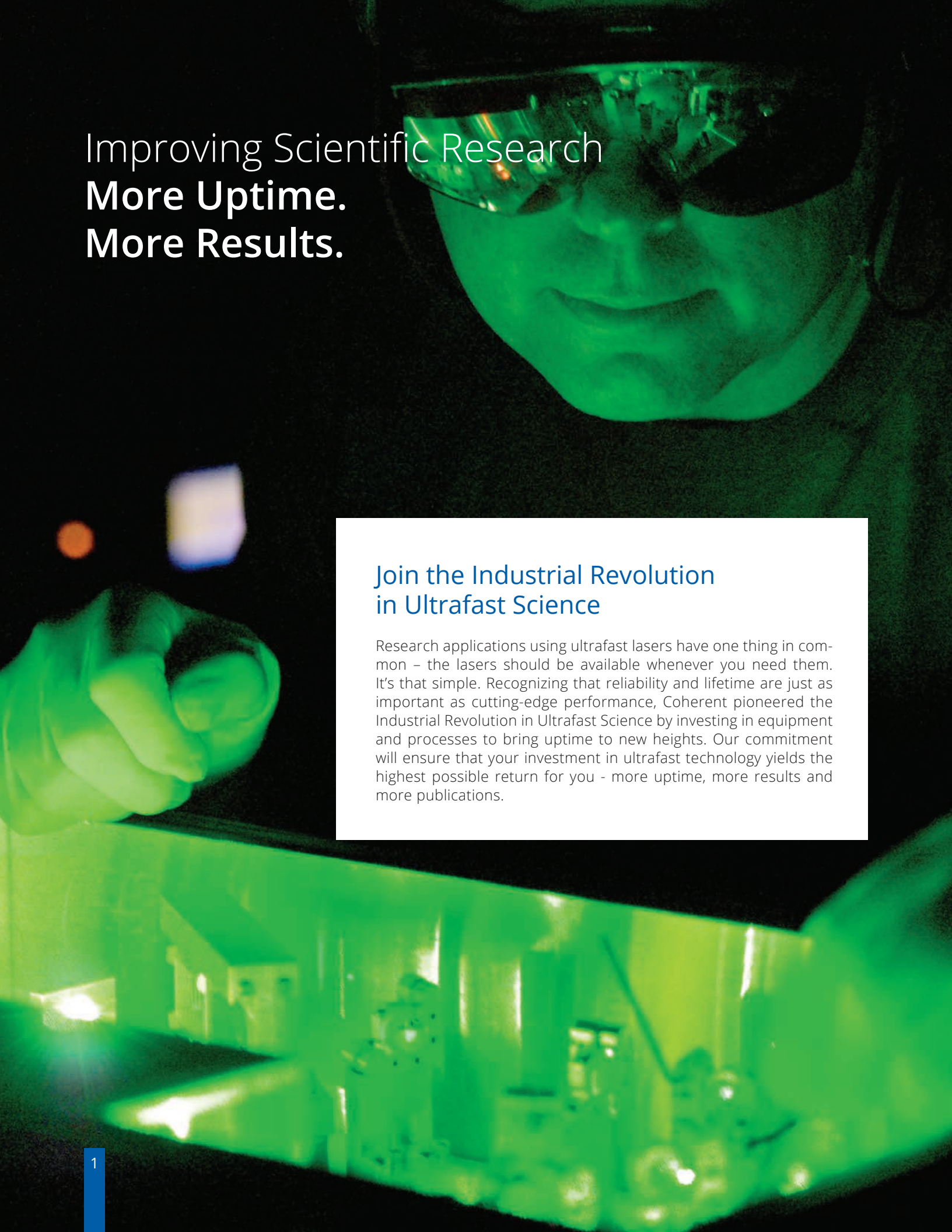




# The Industrial Revolution in Ultrafast Science

More Uptime.  
More Results.



A close-up photograph of a scientist wearing safety glasses and a lab coat, working in a laboratory. The scene is illuminated with a strong green laser light, creating a dramatic and focused atmosphere. The scientist's face is partially visible through the safety glasses, and their hands are seen in the foreground, possibly holding a component of the equipment.

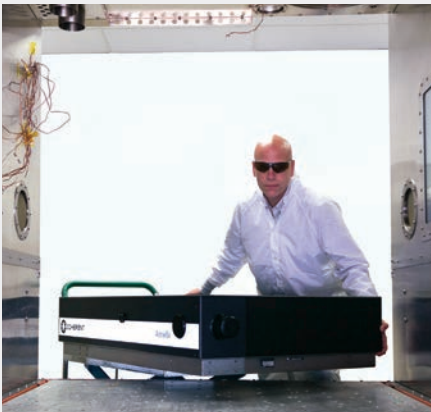
Improving Scientific Research  
**More Uptime.**  
**More Results.**

## Join the Industrial Revolution in Ultrafast Science

Research applications using ultrafast lasers have one thing in common – the lasers should be available whenever you need them. It's that simple. Recognizing that reliability and lifetime are just as important as cutting-edge performance, Coherent pioneered the Industrial Revolution in Ultrafast Science by investing in equipment and processes to bring uptime to new heights. Our commitment will ensure that your investment in ultrafast technology yields the highest possible return for you - more uptime, more results and more publications.



# The Industrial Revolution in Ultrafast Science The Coherent Solution



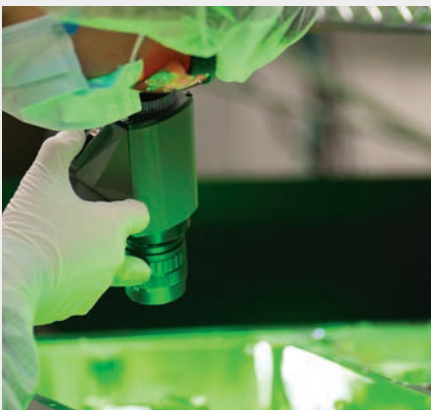
## Rigorous HALT/HASS Stress Testing

Coherent was the first laser manufacturer to invest in HALT/HASS testing equipment and utilize rigorous screening protocols. We stress and test our lasers over and over to ensure you get the superior performance and reliability your research need. HALT (Highly Accelerated Lifetime Testing) is critical during the development phase of our products while HASS (Highly Accelerated Stress Screening) is used throughout the manufacturing process. The “HASS Verified” emblem on our lasers is the visible assurance that each product meets our HASS reliability testing requirements.



## Vertical Integration

We design and make all the critical components and sub-systems in-house for our ultrafast lasers, and we only use materials that we have qualified in our facilities. This gives us full control over quality of all critical components and subsystems. The result is superior performance and reliability.



## Industrial Laser Experience

Coherent is the world's leading manufacturers of industrial lasers for both heavy industrial applications and precision microelectronic manufacturing, where 24/7 reliability is mandatory. We draw on that experience to bring you the performance and reliability you deserve.

# HALT/HASS Investment and Immersion

## When There's No Chance for a Second Chance

Coherent did not invent HALT/HASS, but we were the first to bring it to the world of scientific lasers. The acronyms were coined in the 1980's and born out of work performed for both the US space program and the military. Those programs demanded more cost-effective ways to ensure reliability in products where you only had one chance to get it right. Today, HALT/HASS is widely used in automotive, medical and consumer products, and now lasers as well.

### HALT:

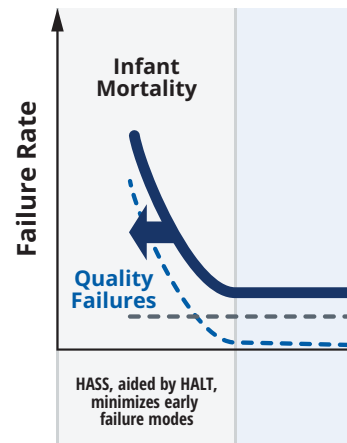
#### Highly Accelerated Life Testing

- Used extensively during the product design phase
- Pushes systems to extreme environmental conditions
- Purposely accelerates and triggers failure mechanisms
- Identifies hidden design weaknesses

### HASS:

#### Highly Accelerated Stress Testing

- Used in production testing
- Stresses to parameters defined by HALT testing
- Screens materials for anomalies or manufacturing defects before lasers are shipped



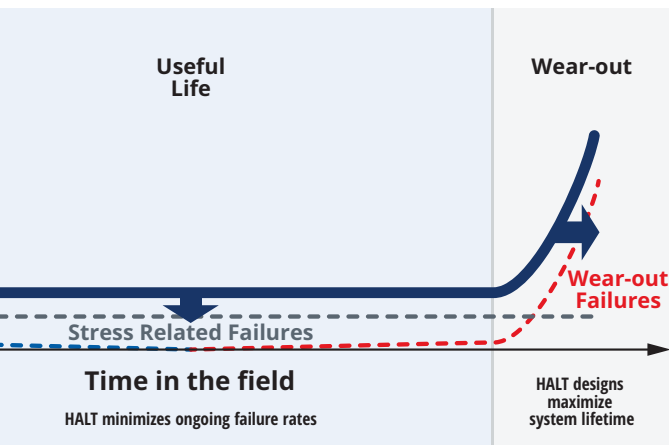


# HALT/HASS Complete Immersion

## In-House Investment is Critical

HALT/HASS only works well when it is completely immersive. Test equipment must be continuously available during all phases of development and production. Occasional outsourced “shake and bake” tests are simply not adequate to support a program of continuous improvement in reliability. Coherent is unique in the photonics industry. We have committed substantial capital investment to HALT/HASS and several of these large, extreme environmental test chambers are located in the company’s global testing facilities.

### Positive Impact of HALT and HASS on Failure Rate



# HALT/HASS

## A Superior Way to Design and Build Ultrafast Lasers

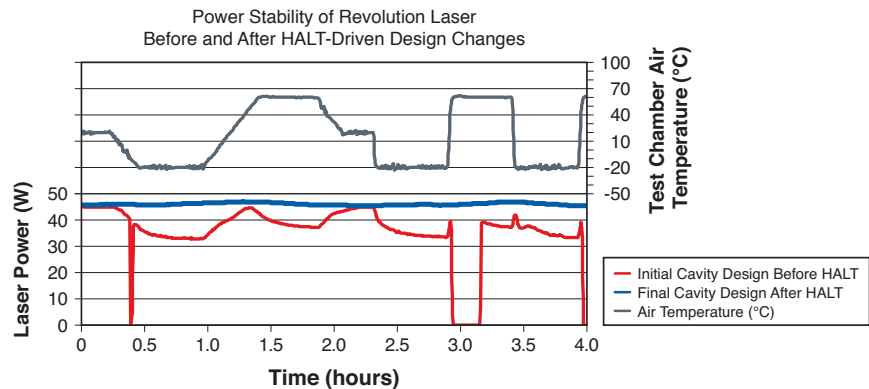
Scientific research is highly demanding and competitive. Obtaining reproducible results is the fastest way to advance your research. A high performance laser with exceptional reliability reduces your cost of data and accelerates your career. With Coherent industrial-grade scientific lasers you can focus on results, publication, and funding.



### HALT/HASS: Laser Uptime Improvement



### HALT: Design Improvement Example





# Vertical Integration

## Complete Control of Quality

- Coherent is the most vertically integrated company in the laser industry
- Both active and passive mission-critical components are designed and manufactured by Coherent. These include dispersion controlled-mirrors, active and non-linear crystals, laser diodes and optically pumped semiconductors
- In-house supply chain results in more uniform quality and performance, high reliability proven in the overall laser design and undisrupted supply chain
- Better components make better lasers



# Industrial Laser Know-How

## Decades of Experience

- As one of the world's largest manufacturer's of industrial laser systems, Coherent has developed extensive engineering and manufacturing processes focused on repeatability and reliability
- Coherent scientific lasers benefit from all of these engineering practices bringing performance and reliability to cutting-edge research systems
  - As an example, Ultrafast IR lasers can experience the same photo-chemical contamination, through multi-photon processes, as UV lasers experience via single photon interactions. Proprietary cleaning and material management techniques developed by Coherent for our industrial UV lasers have been implemented on our scientific ultrafast systems.



# More Uptime. More Results.



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