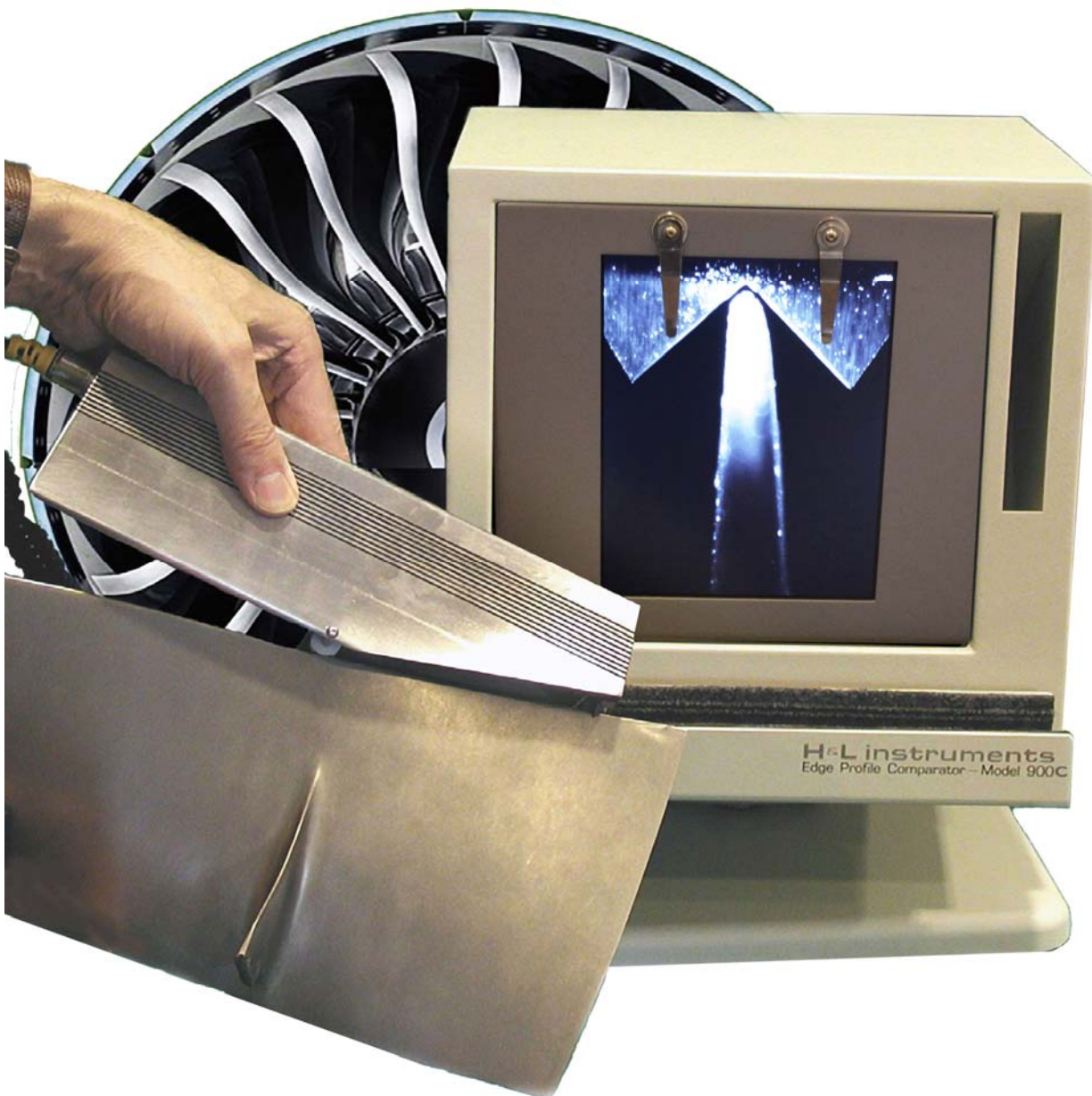




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Model 900C/CE Edge Profile Comparator

The Model 900C/CE Edge Profile Comparator is a compact, self-contained optical instrument for the routine and final inspection of the leading and trailing edges of turbine engine fan blades. The 900C/CE features a rugged, stainless steel encased optical module coupled to a portable, high resolution LED back lit video display.



History and Evolution

In 1985, the United Airlines Engineering Test Center at San Francisco International Airport commissioned H&L Instruments to design a hand-held optical comparator that could improve the engine airfoil and vane inspection process and move it from an inefficient and time consuming inspection process using a floor stand mounted comparator to an inspection process that could be done at the work bench.

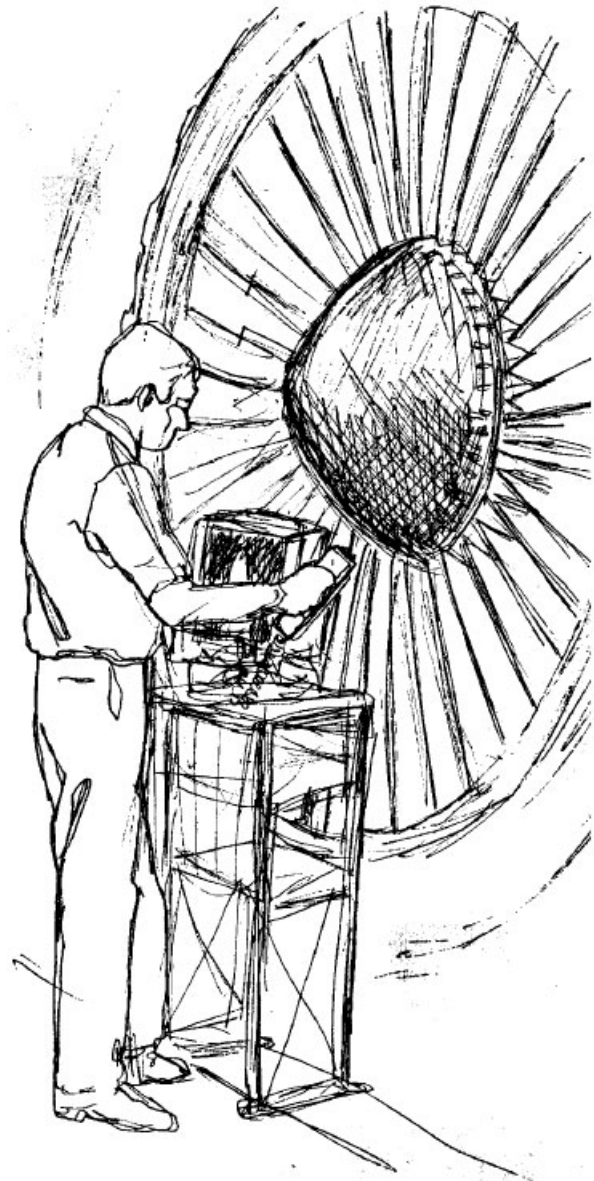
The Model 900 Edge Profile Comparator was developed and delivered in 1986, and after several years of 24 hour per day use at UAL, the Model 900 was refined and tuned. General Electric's Aircraft Engineering group purchased several units for evaluation.

As a result of UAL's continued daily use, their mechanic's feedback, and GE's evaluation reports, the Model 900 evolved to the 900A/AE, the 900B/BE, and then the 900C/CE. The Model 900 Edge Profile Comparator is the de-facto standard for turbine engine airfoil and vane inspection and is listed in the GE shop manual as recommended equipment for rework of the GE CFM-56 engine.

Engines Serviced by the Model 900

The H&L Instruments Model 900 Edge Profile Comparator is in current use for inspecting engines that include:

- **General Electric:**
CF6-6, CF6-50, CF6-80, CF34-8C,
CFM-56, GE90, J79, TF39 (USAF C5-A)
Small Engines
CF700, CT7, CFE738
- **Pratt & Whitney:**
PW4000, PW4056, PW4060, PW4084,
JT3D, JT8D-200, JT9D and J52 series
Small Engines
100, PT6A
- **Rolls Royce Trent:**
800, RB211, TF41
- **International Aero Engines:**
V2500



Rolls-Royce

Delta

SR Technics 



PRAXAIR



KLM



American Airlines

Operational Features

The hand-held optical module follows the edge contour, while the magnified edge profile is displayed as a bright, sharply defined image against a black background. The display screen holds user-generated transparencies for direct profile comparisons.

The optical module contains a rugged solid-state (CCD) video camera and four solid-state infrared light emitting diode (LED) light sources. Normal ambient shop lighting does not interfere with the inspection process. The blade edge is magnified 20 or 40 times actual size, dependent on which magnification is purchased.

Process Improvement

The Model 900C/CE is designed for use by both inspector and craftsman alike. The overall inspection process and blade rework is significantly enhanced, and productivity is improved due to immediate visual feedback at the bench during inspection and the blending process.

The Model 900C/CE hand-held optical module is ideal for large blades clamped in a fixture at the workbench. However, this instrument is designed to be used at both the workbench and at the engine. The 900C/CE eliminates the need for old methods that required carrying heavy blades to a stand-mounted comparator for inspection, clamped, and then moved again to the bench for rework.

Time and Cost Efficiencies

The Model 900C/CE is a core tool that provides a significantly more economical and time-efficient inspection and rework process. The instrument is uniquely suitable for inspection of blades while still assembled in the engine, which avoids unnecessary engine teardowns. Minor recontouring is done on the wing, and aircraft can be quickly returned to service.

Errors are caught before they become irreversible and before they are reversible only by costly and time consuming welding that reduces the life of the blade.

Customers inform us that blade rework time has been reduced by as much as 50% through the use of this instrument, and they inform us that staff morale and productivity are improved because they are more active participants in the QC process. The overall results are fewer rejected parts by inspectors.

Bottom Line Benefits

A simple cost/benefit analysis easily justifies adoption of the Model 900C/CE when you consider labor and material savings, reduced or eliminated engine teardowns, and the ability to quickly return aircraft to service with improved engine efficiencies.



Specifications

- Bench top compact form
- Heavy duty tilt and swivel stand
- Hand module stowage tray
- Stainless steel optical module housing
- Insensitive to ambient light
- Wear-resistant steel vee contact guides with tungsten carbide as an option
- Screen overlay retainers
- Overlay stowage compartment
- Lockable Air Transport Case:
21"L x 19"W x 17"H (533 x 483 x 432 mm,
Weight: 22 lbs (10kg)
- User replaceable 6 ft (1.8 m) maximum extension retractile coil cord
- 8.4" (213.36 mm) diagonal 525 x 625 line monochrome LED back lit video monitor
- High resolution, rugged CCD solid-state camera
- 20x magnification model for viewing medium to large fan and compressor blades
- 40x magnification model for viewing very small blades such as those used in regional/commuter APU and helicopter engines
- Mains power: 120 Vac/50-60 Hz (options for 230 Vac or 100 Vac)
- Temperature:
Storage at -20°C to 65°C
Operating at +10°C to 45°C
- Humidity: 20% to 80% relative, non-condensing
- Altitude: 10,000 feet (3 km)
- Hand Module: 10"L x 1.5"W x 3"H (394 x 305 x 368 mm), Weight: 3 lbs (1.4 kg)
- Display Cabinet: 15.5"H x 12"W x 14.5"L (394 x 305 x 368 mm), Weight: 35 lbs (16 kg)
- Built In Video Frame Grabber with USB output.
- Optional Maintenance Kit: Includes three vee contact guides, 3 rollers, 1 retractile cord
- Optional External Video Frame Grabber model (900-38) can be used with all 900 models.

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Our Customers Include

Advanced Turbine Components
Air Canada Acts
Airfoil management company
Airfoil Textron
All Nippon Airways (Japan)
American Airlines, Inc.
Aviation Product Support
Braathens Safe Airtransport
Chem-tronics
Chengdu Engine Group
China Airlines (Taiwan)
Chromalloy Ssrael
Delta Air Lines
Doncasters
EDM of Texas (Chromalloy)
EGAT (Taiwan)
EVA Air Corporation/Taiwan
Finnair
Forgesde Bologne
GC Micro Japan (Boeing)
GE Aircraft Engines Group/Ohio
GE Aviation Service Operations/California
GE Aviation Service Operations, Pte, Ltd./Singapore
GE Kansas
GE Canada, Inc.
GE Gas Turbine/Greenville, SC
GE Malaysia
GE Power Generation
GE Varig
GKN Aerospace
Hanjung America (Korea)
Ihi (Japan)
Inco
Jet Die Barnes Group, Inc.
Klune Italy (Boeing)
KLM Royal Dutch Airlines/Netherlands(F255D)
Liaoning HHITC (China)
MTU Motoren- Und Turbinen-Union/Germany
Murakami
Nuovo Pignone
PAS Technology
PCC Airfoils, Inc.
Pratt & Whitney
Praxair (Japan/Singapore/USA)
Rolls-Royce
Sermatech Repair Services/UK
Sneema (France)
SR Technics (Switzerland)
Tect
Thai Airways
Toshiba Moritani
Tricienne (Italy)
Turbine Overhaul (Singapore)
Turbine Support Europa/Netherlands
Turbine Support (Thailand) Ltd.
Turbine Textron
Turbocombuster Technology
Turbo Products
Turkish Air
UNC Airworks
Union Carbide Corporation
United Airlines
United States Air Force
Utica Corp
Wuxi (China)
Wyman-Gordon Investment Castings, Inc