



The TFS-1000 is a computer-controlled hot-roll fusing apparatus designed for use in toner, media, and fusing system development and quality control. The system closely simulates the operating environment of a printer but places the process parameters under user control. With the TFS-1000, the user can perform fusing experiments quickly, under precisely controlled conditions, and use the results to quantify the effects of each process variable on the degree and quality of fusing. With this system, users can readily determine the fusing latitude for a given toner or the range of a process variable within which fusing quality is acceptable for a particular application. The TFS-1000 is a critical tool for studying system interactions, including interactions between roller design, toner, media, and roller lubrication under the full range of process conditions.

Overview

The TFS-1000 is suitable for testing a wide variety of toners and substrates, including black and color toners and papers of different basis weights and surface coatings, as well as transparencies and films. It accommodates a wide range of fuser roller types and sizes. Changing rollers requires minimum time and effort. The TFS-1000 is designed for flexibility, precision, and ease of use.

In a typical session, the user loads unfused images (typically generated by a printer with its fusing system disabled) into the paper cassette and sets the process parameters, including paper feed rate, roller temperature, pressure, and lubrication. The fusing cycle is launched with the easy-to-use Microsoft Windows®-based software. The system fuses the images under the conditions specified, computes minimum, maximum, and mean temperature statistics for each fused page, and delivers the fused images to an output tray.

The TFS-1000 can be used in conjunction with other measurement tools, such as QEA's IAS-1000 Automated Image Analysis System for quantitative print quality evaluation, for the highest level of toner fusing quantification.

User-Selectable Test Parameters

- Paper feed rate
- Roller speed
- Roller temperature
- Nip width
- Nip pressure
- Roller lubrication

Typical Applications

- Toner research, development and quality control
- Determination of fusing latitude
- Media research and development
- Fusing system design and development



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System Hardware

- Instrumentation; data acquisition and control hardware
- All necessary interface electronics, cables, and connectors

Roller Dimensions and Types

- Accommodates roller diameters from 30 mm to 60 mm with minimal modification
- Ø50 x 300 mm, standard
- Adapters for other roller sizes available
- Accommodates rollers made with a wide variety of materials, surface finishes, and hardnesses

Temperature Control

- Single non-contact infrared temperature feedback with PID controller, standard; other options (e.g., multiple sensors) available

Roller Temperature

- Room temperature to 230° C, controlled to $\pm 1^\circ$ C

Roller/Paper Speed

- Top and bottom rollers are positively driven
- Paper speed adjustable from 0.5 to 30 cm/s (approximately 1 to 60 ppm for letter-size), standard; other ranges available as options
- Paper feeder and roller speed can be synchronized or independently adjusted

Paper Cassette

- 40-page capacity for letter or A4, standard; other cassette sizes available

Heating Element

- Tungsten-halogen quartz lamp for top roller, standard; optional bottom roller lamp available.
- Maximum power 1kW, standard; higher output power available

Contact Force

- Up to 320 kgf (700 lbf)
- Typical contact pressure up to 30 kPa (145 psi) using standard rollers
- User must supply compressed air at 100-200 psi (700-1400 kPa). Regulator fitting requires air line with 1/4"-NPT external threads.

Lubrication

- Soft roller metering system
- Oil applied to top roller only
- Application rate adjustable
- User may choose no lubrication

Output Tray

- Collects fused pages

Printer (customer-supplied)

- Printer with fusing system disabled required for producing unfused images

Control Software

- Control software provides all measurement, data acquisition, and data analysis functions, including basic statistical functions (minimum, maximum, and mean temperature and standard deviation for each fused page)

Computer Configuration (customer-supplied)

- Pentium PC
- Three ISA slots for interface cards
- Two free slots for connector brackets (adjacent to ISA slots)
- Microsoft Windows® 95 or 98
- Printer, copier, or other equipment for producing unfused images

Electrical Requirements

- 110 VAC $\pm 10\%$ @ 50/60 Hz or 230 VAC $\pm 10\%$ @ 50 Hz

Maintenance and Operating Environment

- Requires good maintenance practices typical for laboratory equipment
- Temperature
 - Operating: 10° to 32° C (50° to 90° F)
 - Storage: 0° to 35° C (32° to 95° F)
- Relative humidity
 - Operating: 20% to 80%
 - Storage: 10% to 95% (non-condensing)

Dimensions and Shipping Weight

- Packaged dimensions: 1.5 m x 1.5 m x 1.8 m (5' x 5' x 6')
- Approximate shipping weight: 205 kg (450 lb)

Documentation

- User's Guide