M. HOLLAND®
THE GOLD STANDARD IN PLASTICS

Your Company Needs
+ M. Holland Resources
= **Solutions**

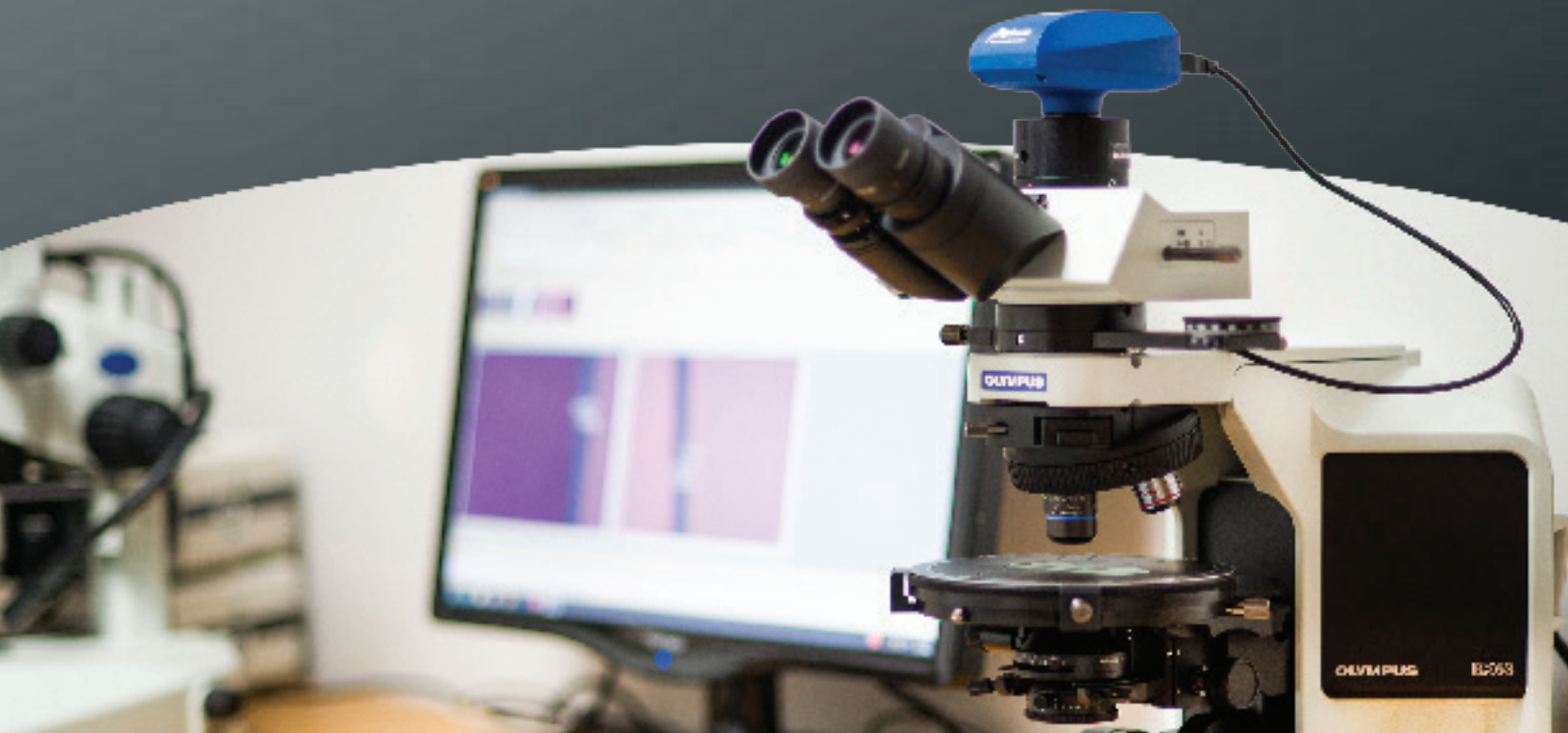
Technical Support Services

M. Holland Company offers Technical Services for **Solutions** that our customers have come to rely upon. Whatever your needs may be, the M. Holland Technical Service Team will help you deliver **solutions** that support the bottom line of your business.

With our in-house testing laboratory, M. Holland provides most of its own test results at faster than industry average turnaround times. Our testing includes polymer characterization, identifcation of unknown resin types, and basic physical properties. M. Holland testing services can also assist with part failure analysis to resolve quality and performance problems.

Gold Standard Performance

- Regional TSEs ensure a high level of service and responsiveness
- Consultative approach to materials and processing
- Cycle time and cost reduction
- Prompt response time and communications
- Professional reporting of results
- Training in polymers and processes

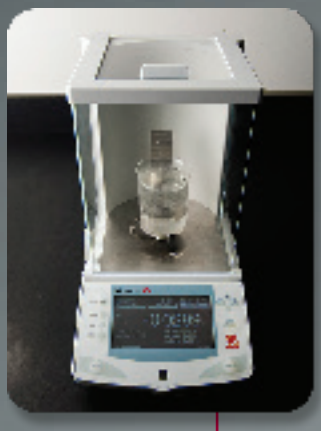


Technical Equipment

Density
ASTM D792

Sample Needed
0.5 to 1 pound of resin
or part to be tested

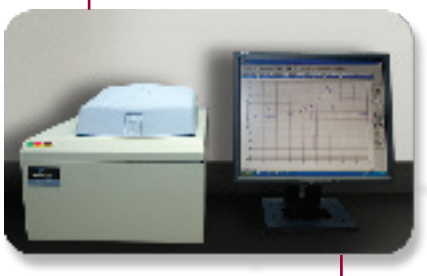
Determines
Mass per volume



Melt Flow
ASTM D1238

Sample Needed
0.5 to 1 pound of resin
or part to be tested

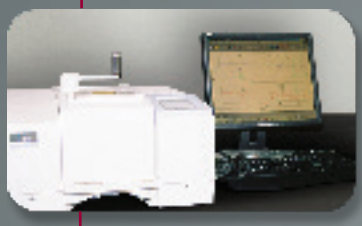
Determines
Viscosity of materials at
low shear rate; indication
of molecular weight



DSC

Sample Needed
50 grams of resin
or part to be tested

Determines
Melting and crystallization behavior;
used to identify polymer type and
percent in blends; also, stabilizer
efficiency by OIT



FTIR

Sample Needed
50 grams of resin
or part to be tested

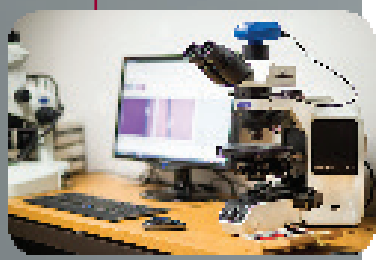
Determines
Chemical structure
of polymer types and
additives

Microscopy

Olympus stereo and
polarized light microscopes
with hot stage

Sample Needed
Parts or resin to be examined

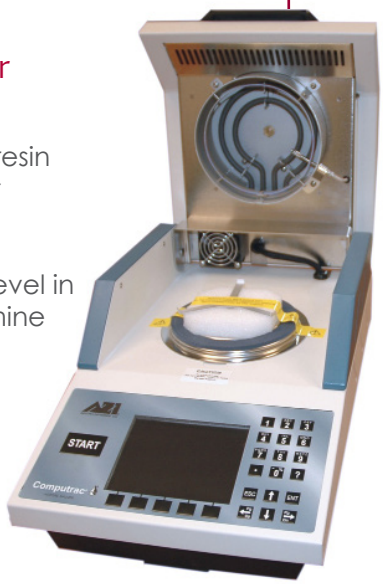
Determines
Identity of inclusions and
contamination through
careful sample sectioning
and observation techniques



Moisture Analyzer

Sample Needed
50 to 100 grams of resin
in a sealed glass jar

Determines
The total moisture level in
a sample to determine
dryness and dryer
effectiveness



Falling Dart Impact
ASTM D1709

Sample Needed
20 lineal feet of film
(full lay flat)

Determines
The impact strength in gram force of thin films

Elmendorf Tear
ASTM D1922

Sample Needed
20 lineal feet of film
(full lay flat)

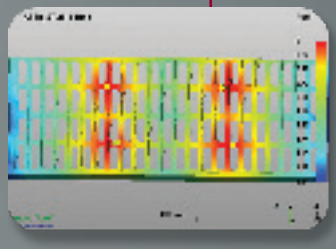
Determines
The force to propagate tearing a thin film after the tear has been started

Spiral Flow
ASTM D3123

Sample Needed
5 pounds of resin

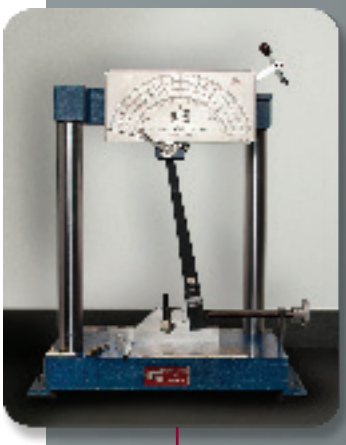
Determines
The flow length under different molding conditions; can indicate the shear sensitivity and moldability of material

Mold Filling Simulation



Sample Needed
Solid Works file, .stp, or .iges file format

Determines
Fill confidence, temperature, sink marks, etc.



Izod Impact
ASTM D256

Sample Needed
5 pounds of resin for molding

Determines
Impact resistance and notch sensitivity of material

Gardner Impact
ASTM D5420

Sample Needed
4" disks or 5 pounds of resin for molding

Determines
Ranks materials according to the energy to crack or break a flat specimen when impacted by falling weight

Surface Hardness
ASTM D2240

Sample Needed
Parts to be tested or 5 pounds of resin if molding is required

Determines
Hardness of the surface; can indicate the scratch resistance or amount of plasticizer

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Support Services

Material Identification for Competitive Articles or Unknowns

- FTIR
- Melt flow
- Ash
- DSC
- Density

Physical Properties

- Tensile*/Elongation*/Flex*
- Izod and Gardner impact
- Film dart impact
- Film tear

Processing and Sample Prep

- Injection molding
- Cast film
- Blown film
- Moisture analysis

Failure Analysis

- Microscopy
- FTIR
- DSC
- OIT

*Indicates outside lab service

Professional Technical Staff

- Dedicated market focus
- Experienced professionals, averaging 30+ years
- Seminars
- De-coupled injection molding

Physical & Analytical Testing Lab

- Polymer characterization and identification
- Sample performance testing
- Failure analysis
- Quality investigations
- Sample preparation for injection molding and film articles
- Mold filling simulation

Technical Support Services

- Resin selection and evaluation
- Polymer and process training
- Process optimization
- Applications development
- On-location problem solving and troubleshooting
- Design assistance
- Quality assurance support services
  - Laboratory
  - Regulatory documentation
  - Certifications

M. Holland Company lab results are to be used for informational purposes only. Lead times for testing vary and can be influenced by the number of tests required, laboratory backlog, and sample preparation.

Typical time required for completion of a Laboratory Request (LR) is two weeks. Additional tests are available using outside testing service providers.

Contact your local Technical Service Engineer for a Laboratory Request submission

Northeast	Jeff Rondeau - jrondeau@mholland.com
Southeast	Tom Petrochko - tpetrochko@mholland.com
Ohio Valley	Bill Fierens - bfierens@mholland.com
Midwest	Bob Burton - bburton@mholland.com
Central	Rob Stang - rstang@mholland.com
West	Brian Santillo - bsantillo@mholland.com
Roto	Steve Emminger - semminger@mholland.com
Film (US)	Rudy Bourgeois - jbourgeois@mholland.com
Film (Int.)	Steve Emminger - semminger@mholland.com

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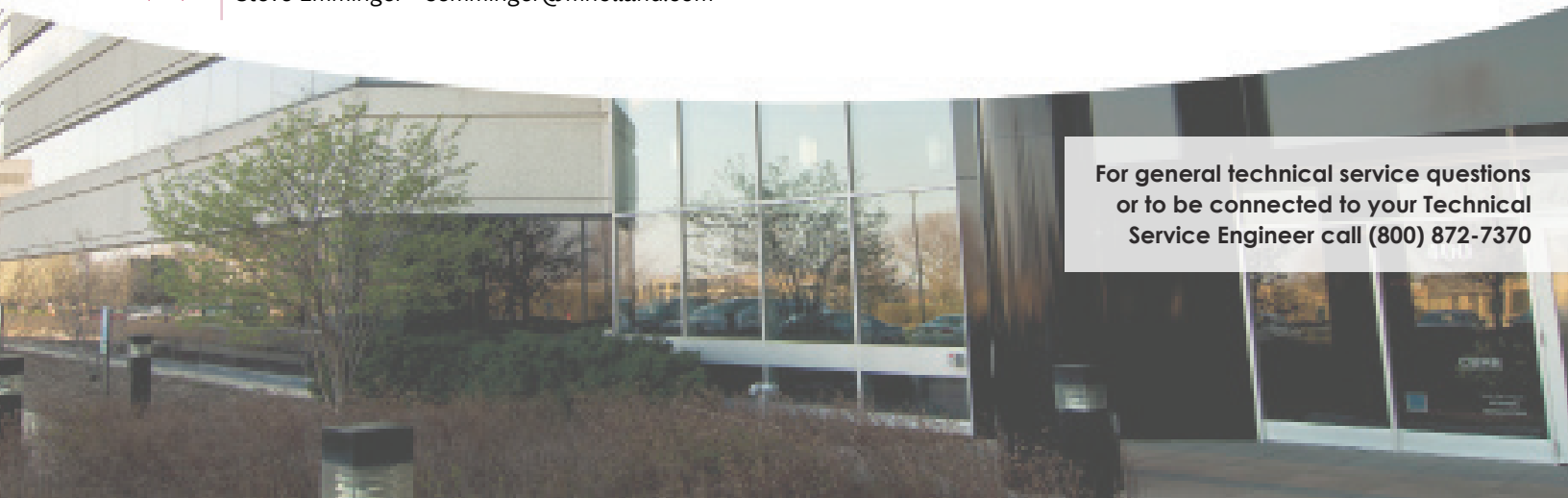

For general technical service questions or to be connected to your Technical Service Engineer call (800) 872-7370