HIGH TEMPERATURE CAMERA IDENTIFICATION SOFTWARE

Part of ES 4.0 and a key component towards Industry 4.0

GLASS SERVICE
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• GS Camera
• Furnace Measurement
• Tin Bath Measurement
• ES IV
• Date Acquisition Software
• Browser
Divisions of Glass Service Inc.:  
- R&D  
- GFM Furnace & Forehearth Simulation  
- Glass Forming Simulation (GS ACT)  
- Physical Modelling  
- **Advance Furnace Control ESIII**  
- Glass Defects Analysis  
- Furnace data analysis & Inspections  
- **Furnace Engineering** (spec. furnaces)  
- Raw Materials Deliveries  
- Burners (FlammaTec)  
- Electric heating systems (F.I.C., UK)
WE OPTIMIZE YOUR INDIVIDUAL PRODUCTION CONDITIONS.
Advanced solutions for Glass Melting, Conditioning, Forming

more than 50'000 defects analyses
more than 650 furnace optimizations
more than 160 expert systems

ASSESSMENT

SIMULATIONS
3D advanced CFD simulation of the complete high temp. glass melting process for regenerator, melter, forehearth and forming,
more

LAB SERVICES
Quick identification of glass defects and their origin to support quality improvements and operating parameter optimization.
more

AUDITS & DATA ANALYSES
Analyzing production, observing critical conditions and identifying optimization potential.
more

PROCESS CONTROL

EXPERT SYSTEM ES III™
Full automatic process control resulting in stable operations, improved yield, reduced production costs and emissions.
more

PRODUCTS

ENGINEERING
Turn-key design and supply of specialized furnaces with high quality demands (for lenses, LCD or crystal).
more

RAW MATERIALS
Provide glass producers with Commodities, Specialties, Rare Earth Oxides and Polishing Compounds.
more
Why GS Camera turns ESIII into ES 4.0

- Present Trend of Industry 4.0 is motivating glass production for further automation of the glass melting process
- Part of the glass melting process such as the batch blanket spread in most furnaces and Glass Ribbon in Tin Float baths relies on operator visual regular inspection and his personal interpretation, followed by some decision making
- Even your TOP management understands that this cannot continue like this in the near future
• IP camera – enhanced, high resolution and clear images
• Standard solution with retraction system for glass furnaces
• Standard solution for tin bath
• Motivation to our own camera software years ago
• Updated cam with electronic retraction system

Picture 1a: GS New Furnace camera system
- Monitoring
- Input to the ES IV

Picture 2: Camera in furnace process control
ES III™ CAMERA - OVERVIEW

Correspondence between the real world and the images

Measured data, statistics, analysis

Image processing

Projection
Analyzing via picture archive easy long term video
- Bubblers position and size detection
- Batch flow direction and velocity

Picture 5: Bubblers measurement

Picture 6: Batch flow measurement
• Batch coverage / Batch periphery = Batch fragmentation
Analyzing via picture archive (easy) long term video
New GS Augmented-Sens camera provides 2 video streams: regular vision information plus calibrated temperatures using Infrared parallel.
CAMERAS IN TIN BATH PROCESS CONTROL

- Monitoring
- Input to the ES IV

Picture 8: Cameras in tin bath process control
• Ribbon edge detection
• Recreate Ribbon Top overview
Automatic Spread detection (and control)
• Using IR camera for spread detection, improved detection
High temperature camera identification software integration into ES IV
- Separated TCP/IP server application
- Multiple camera inputs
- Collecting and storing pictures and videos
- Intelligent data archive manager
- Automatic flame identification

![Data acquisition software](Image)
• TCP/IP client integrated in ES IV
• Might be used separately also
• Viewing and history browsing pictures and videos
• Fast playing forward and backward possibility
• Multiple monitors and screens can be defined
THANK YOU FOR ATTENTION!