

# ALUMINUM EXTRUSION

## THE OPPORTUNITY

The production process of aluminum extrusion profiles can be controlled completely using non-contact temperature measurement. The quality of the final product can be improved dramatically by temperature control.

Extrusion is a process in which an aluminum billet is pressed into a die by a ram. The die determines the form of the extruded strand. Using this process tubes, wires, solid or hollow profiles can be extruded.

This process has several critical sections which demand temperature monitoring: After pre-heating of the billet, in the pressing process of the profiles and in the cooling section of the extruded products. After changing a die, the temperature should also be checked.



## OUR SOLUTIONS

### Billet Measurement

To be pressed through the die without any problems, the billet has to be preheated to between 400 and 500°C to be soft enough. The optimal preheating temperature is important because it guarantees a solid production process and improves process speed and throughput.

The surface of the billet oxidizes variably unless unmachined. The IS 12-AI provides temperature measurement of most aluminum billets when care is taken to minimize reflections



Advanced Energy's Impac IS 12-AI pyrometer

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### Extruded Profile Measurement

Exiting the die the extruded aluminum profile has a temperature of around 500°C. The extrusion process heats the billet additionally by the plastic transformation. In general, high temperatures speed up the production process. But if the material gets too hot, it starts to melt and loses its shape and properties. Too cold temperatures eventually could damage or destroy the die.

Using non-contact pyrometry in those critical process areas the production can be monitored extensively and controlled respectively. For the above application, the assessment of the aluminum temperature is also achieved using the IS 12-AI. The surface structure at this point of the production is quite constant and does not require the use of an emissivity enhancer.

The measurement itself should be executed from the top using an opening within the extrusion tool or directly after the profile exits the die. Another possibility is aiming into the press jaw, targeting at the extrusion profile.

For processes of parallel multiple extrusion strands with varying shapes and positions or frequent changing of the die and the respective profile geometries, Advanced Energy offers the Impac IS 12-AI with an integrated scanner. It is not required for the unit to be realigned for each new extrusion shape because the exit is permanently "scanned" to automatically detect the production strands. improves process speed and throughput.

### Aluminum Profile (Quenching Process)

After extrusion, the produced profile is cooled. To guarantee consistent high quality of the final product, the cooling speed has to be controlled.

To monitor the strand temperature, an IGA 140/23 or IPE 140 in combination with an emissivity enhancer is used. Measuring temperatures from 5 and 50°C upwards, these pyrometers are the perfect units for the quenching process.



Advanced Energy's Impac IS 12-AI pyrometer



Advanced Energy's Impac 140 Series

### Measurement of the Die Temperature

Before installing a new die, it should be preheated to the billet temperature. If a preheated billet hits a cold die, the resulting temperature shock will cause problems. When the top of the billet hits the cold die, it will cool, become harder, and jam the extrusion process. Thanks to non-contact temperature measurement, the die temperature can be monitored easily and quickly, which avoids problems from the start.

The die is made of metal—the ideal target for short wavelength standard pyrometers. For fixed installations the IGA 6 Advanced digital pyrometers are recommended. Flexible alternatives are the portable products e.g. IGA 8 plus with through lens sighting or the IGA 15 plus with laser target light.

### YOUR BENEFITS

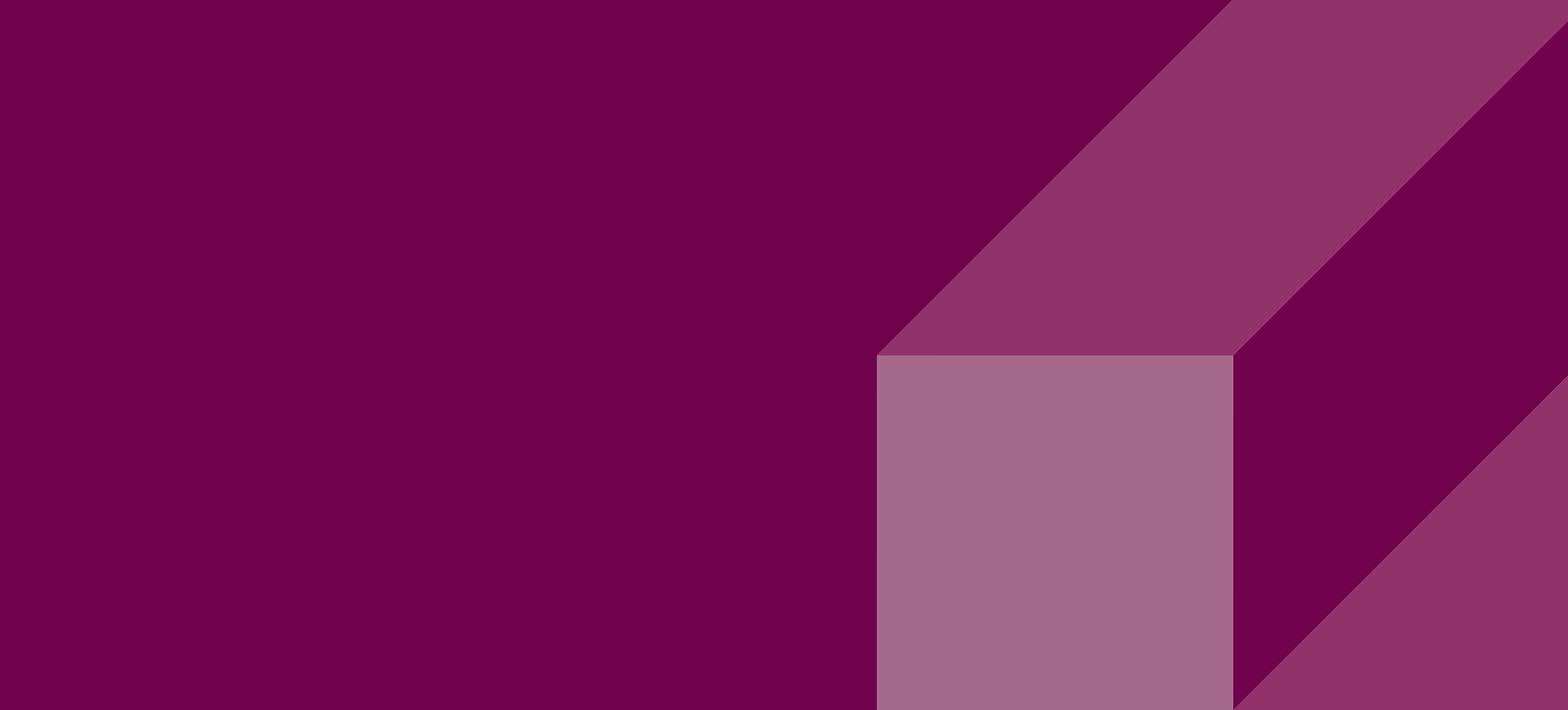
- Highest quality standards
- Analysis of rapid processes
- Measurement of moving objects
- Ease of use
- Full digital signal conditioning
- Open software protocol UPP (integration into your equipment)



Advanced Energy's Impac IGA 6



Advanced Energy's Impac IGA 8 plus



## **ABOUT ADVANCED ENERGY**

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

AE's power solutions enable customer innovation in complex semiconductor and industrial thin film plasma manufacturing processes, demanding high and low voltage applications, and temperature-critical thermal processes.

With deep applications know-how and responsive service and support across the globe, AE builds collaborative partnerships to meet rapid technological developments, propel growth for its customers and power the future of technology.

**PRECISION | POWER | PERFORMANCE**

For international contact information, visit [advancedenergy.com](http://advancedenergy.com).

[sales.support@aei.com](mailto:sales.support@aei.com)  
+1 970 221 0108

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