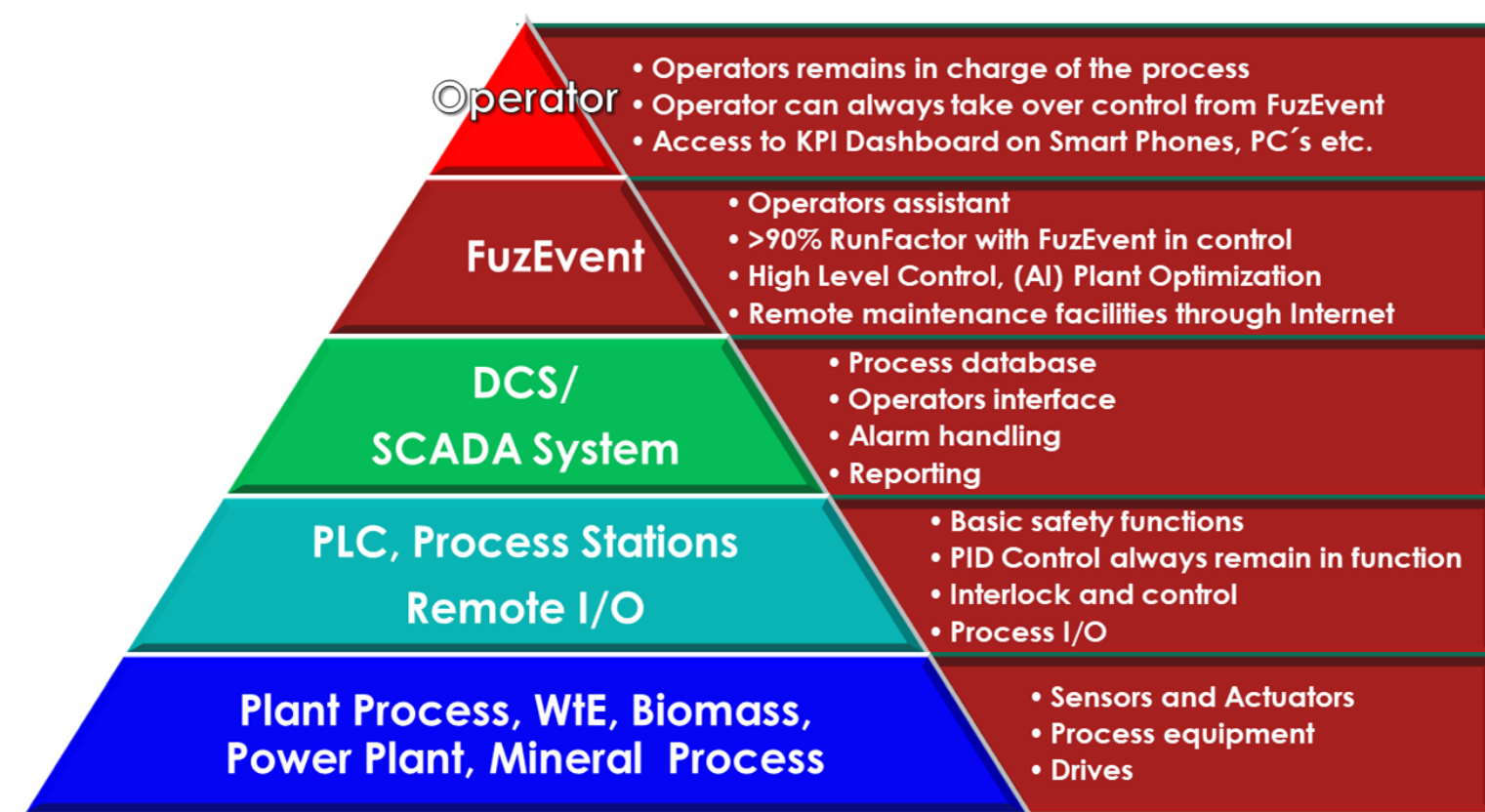


The FuzEvent® System
keeps the operators fully informed
and in charge of the process

Combustion Optimization of **Waste & Biomass** Inciner- ators by FuzEvent®

The FuzEvent® Control System Pyramid

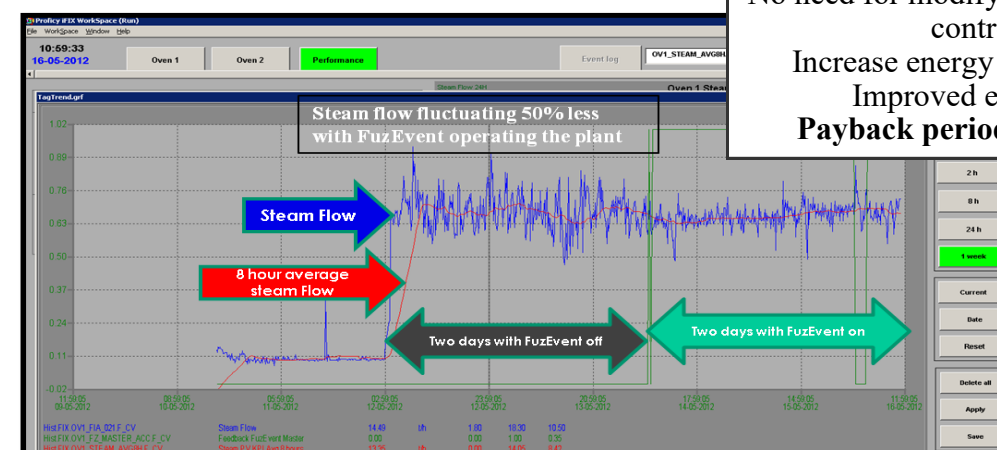


FuzEvent® the High-Level Process Con- trol Tool for Waste & Biomass Incinerators

Run your plant as your best operator
24 hours a day!
Applying Artificial
Intelligence

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DUBLIX
TECHNOLOGY



Fast implementation,
No need for modifying the existing process
control system
Increase energy production by 3-5%
Improved emission control
Payback period in just 3-6 month

DUBLIX
TECHNOLOGY

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Rev. 25.6.2018

FuzEvent[®], the Solution to the Incineration Challenge

FuzEvent[®] optimizes the operation considering the process dynamics of the plant

The FuzEvent[®] Control Strategy, Easy and Fast Implementation

The FuzEvent[®] package is an open system where the user has access to the control strategy through all the control parameters and calculations

The Complexity of Combustion Control

The main control challenges on Waste and Biomass incineration plants are:

- **Uncontrolled variations** in the fuel heating values
- **Long delays** from a control action to full process response
- Operate with **rigorous Emission Limits**
- Combustion control must reflect: **the process dynamics**, the **actual process condition**, the **limits defined for essential process equipment** such as: combustion air fans, combustion bed capacity, flue gas temperature restrictions as well as the capacity of the boiler and the restrictions defined for the flue gas cleaning system etc.

Classical PID controller is not efficient to cope with the above described complex combustion control challenges. Consequently many WtE/Biomass plants operates partly in manual operation mode and **become extremely dependant on the attention of the operator in charge of the combustion.**

Direct benefits from implementing FuzEvent[®] High Level Process Control

- Improvement of the **combustion stability** by > 30%
- Lower flue gas emissions: 50-80% **less CO**, 20% **less NO_x**
- Increase of the **Plant Treatment Capacity** by > 3-5%
- Increase of **Energy Production** by > 3-5%
- **Better Burnout** of the Waste/Biomass

Overall results of a FuzEvent[®] High Level Process Control

- FuzEvent[®] ensures a **consistent control strategy 24 hours a day** while operating the plant like the most experienced operator
- Payback period **3-6 months**
- Operator intervention in the process **reduced by 80-95%**
- **Easy to implement**, test and validate new optimization ideas created by; operators, specialists and others
- **Reduced plant equipment maintenance cost** due to less thermal stress caused by a more stable plant operation

**FuzEvent[®] in service of your combustion process
makes the work done by your operators 5-10% more efficient**

The Dublix Technology Solution

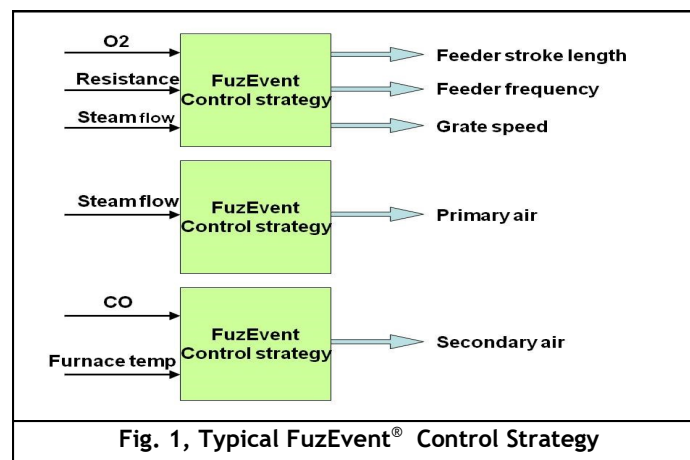
Based on over 20 years of practical work with control of incinerators, Dublix has developed the unique FuzEvent[®] High Level Process Control scheme, **The FuzEvent[®] system apply the operators experience into a multi dimensional control concept (AI):**

- **Correct reactions in due time**, without overreacting, reducing the influence from fluctuations in fuel composition and reducing plant capacity loss
- **Efficient handling of long process response time** following a control action and allowing the process to react fully before deciding the next correction to the process control
- **Applying asymmetric control strategies** i.e. different control strategies when the process is above versus below Set Point
- **Multiple process inputs** applied in single control strategies
- **Reduce the need for operator interference** in the control, i.e. operators to act only if the process is outside the **Operational Window** defined as the FuzEvent[®] control range

The FuzEvent[®] High Level Process Control applies an **Open Box Concept**. (no black box elements) Plant operators is an essential player in creating new ideas and improvements, result in **maximum operator acceptance of the implemented control strategy.**

Best Available Technique (BAT)

The FuzEvent[®] Control System handles the parameters and interventions recommended in the EU Reference Document on the **Best Available Techniques (BAT) for Waste Incineration (August 2006).**



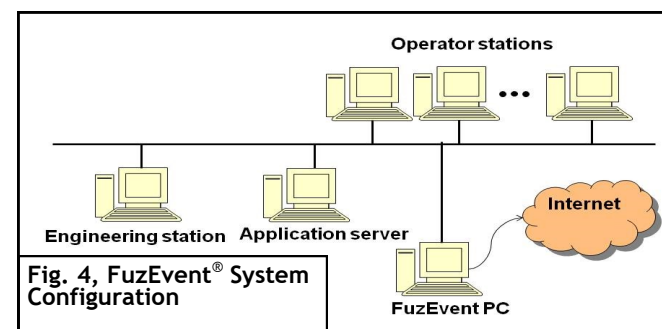
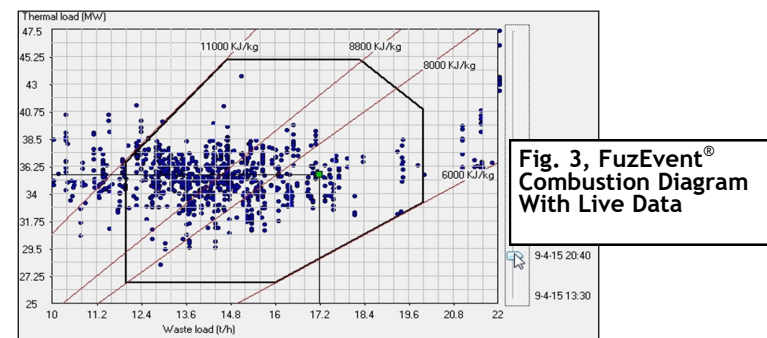
FuzEvent[®] Integration

FuzEvent[®] is installed on a separate PC with an industry standardized communication link connecting it to the basic control system, ref. to the figure below. All data exchanges with the process is handled through the normal DCS/SCADA control system.

The FuzEvent[®] applies **typical available plant process data** such as: furnace temperatures, O₂ levels, emission levels, steam flow, pressure and temperatures, flue gas temperatures etc.,. The FuzEvent[®] system take care of all critical required process adjustments: fuel feeder speed, grate speed, primary air, secondary air etc.

The FuzEvent[®] package includes:

- The FuzEvent[®] software licence (Fuel Language)
- **Waste-to-Energy/Biomass Control Algorithms (DWCA library)**
- **Graphical display system**, user-friendly operator interface screen
- Performance monitoring facilities (KPI's)
- **Combustion Diagram with live data**
- **External monitoring facility** for remote Internet service support.



References

The FuzEvent[®] Control System is installed at >30 combustion lines in Europe and China
Please contact us for detailed reference list with achieved results or check www.dublix.com.

Fast Implementation

A FuzEvent[®] implementation project is normally completed within 3 months.

When implementing FuzEvent[®] optimization systems the normal DCS/PLC/SCADA control system structure remains unchanged, no needs for plant stop (no production loss) to make adjustments to the control system.

The FuzEvent[®] System applies the Control library, with pre-defined control strategies.

During **design meetings** with the plant specialists and operators the FuzEvent[®] control strategies is be adjusted in order to reflect the specific plant control requirements.

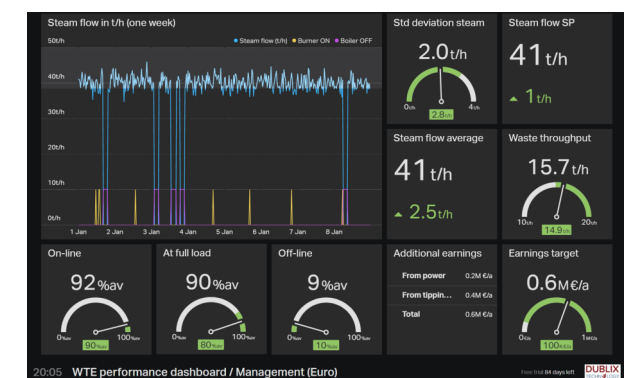
The control strategies will be fine-tuned with the FuzEvent[®] in online operation.

The FuzEvent[®] implementation combines the experience from the plant operators into a multi dimensional system approach also called Artificial Intelligence with the system being predictable in its control (Open BOX concept).

Performance monitoring

Key Performance Indicators (KPI's) below continuously record the overall plant efficiency, production levels and the stability of the combustion process.

The indicated **“on line and load full load”** shows the fraction of time where the plant has been in partial and at full production.



Efficient Service

Dublix Technology offers a complete FuzEvent[®] Service Support Package in order to **provide long term max. plant performance.**

The service includes assistance by combustion specialists capable in combustion control, plant process equipment/problems, operator training and overall plant operation.

Dublix will regularly through safe internet access or directly by site visits assist in upgrading the control strategy to reflect the latest development in the plant process conditions and implement new optimization ideas from plant operators and specialists.