

### Reducing fuel burn Improving engine performance Increasing component life

## The heart of Engine Optimisation Strategies

As Gas Turbine manufacturers strive to balance issues of greater thrust requirements with cleaner exhausts, increased operating temperatures, longer component life and red line running with overall engine performance, here at Auxitrol Weston we're redefining what "partnership" means. We provide our Customers with a seamless extension to their New Product Development functions that is geared to helping them overcome such challenges ahead of time.

Experience shows that earlier and closer involvements are key to shared learning, time and economic efficiencies, and more robust, if not truly advanced, sensor solutions. So, we've adopted an "open access" policy which actively encourages Customer collaboration with our exceptional Engineering resource and our extensive Testing facilities at their disposal.

We appreciate that next generation engines are potentially well optimised but we are also aware that 1%, or even a 0.5% improvement in efficiency and or performance can make a huge difference to operating costs and it's these kinds of facts which drive our innovation.

Our sensors are at the heart of most of the world's leading engines and we're an intrinsic part of many current engine development programmes. Auxitrol Weston are contributing to improved levels of optimisation control data to enable qualified decision-making around reducing fuel burning, improving engine performance and extending component life.

#### Expert Resource

You have access to more than 100 Engineers at Auxitrol Weston. Experts in Design, Environmental Testing, Pressure, Speed, Quality, Simulation, Temperature and Research and Development, who are driven by the ambitions of Customers, just like you.

So, as the world's OEMs rapidly take technological advancement to a new level, they're now speaking a different language. We call it "Engenuity", the application of ingenious Engineering minds. And, we speak it fluently!

#### Testing & Qualification Laboratories

Because we're committed to a greener, leaner, more reliable world, we're investing heavily in the futures of our company and our Customers, by building quite unique capabilities in all areas of Product Testing and Qualification.

We want our Customers to want to come and use our resources. To tap into over one hundred years of Aviation and Industrial Engineering know-how. To feel our passion and see the results for themselves, so that their next hundred years can be as assured as our first.

Flying higher, running hotter, greener, quieter

Auxitrol Weston products can be found in many of the critical areas of most modern turbine power units, measuring, monitoring and providing levels of data efficacy which are invaluable to operators, in maximising their fuel consumption, reducing their CO<sup>2</sup> emissions and prolonging the life of their engines.

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**Fuel Efficiency**

- Densitometer - Pre and in-flight fuel load monitoring, where every tonne of fuel saved or unused relates to a reduction in CO2 emissions of 3 tonnes
- Thermocouples and Speed sensors Engine Health Monitoring in the Combustion and exhaust chambers - a 1% improvement in Fuel burn management could achieve a fuel saving of around 69,000 litres per aircraft year on average
- Pressure - Optimising flight levels and fuel usage
- Indicators – monitoring “Angle of Attack” to reduce drag and reduce fuel wastage
- Pressure - Airspeed measurement – monitoring the maintenance of Mach numbers

**Turbine Efficiency**

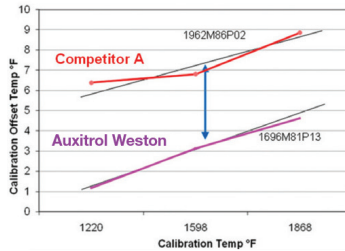
- Turbine red line running – sing speed and temperature sensors to safely optimise the engine operating margin and therefore maximise engine performance and output
- Turbine Tip clearance – measuring and minimising the leak path between blade and casing

**To make the point!**

Energy Generation Industry – A leading European Energy Generating company, using the GE LM6000 power unit, were experiencing recurring thermocouple failures using a competitor product. Auxitrol Weston provided an alternative solution in our T4.8 thermocouple probe which provided improved sensor accuracy plus two key performance options

1. Run at constant speed and longer with confidence
2. Run safely at higher speeds with increased output

Our Customer decided upon the Auxitrol Weston solution, opting for the second option where a 0.1% improvement in accuracy resulted in an increase of ½ Megawatt of output.



Average difference between Auxitrol Weston and our Competitor is about 4°F. Accuracy of Auxitrol Weston: 0.4%, accuracy Competitor: 0.5% at Reference Temperatures 1220°F, 1598°F and 1868°F.

But the situation is changing. Today, due to higher operating temperatures, we have moved forwards to ensure that we have solutions to new customer requirements. Auxitrol Weston has been developing the way to maintain our world leading system accuracies at higher temperatures by reducing accuracy drift whilst ensuring that oxidation effects do not compromise component life. Within our range of solutions are:

- Optimised thermocouple material matching to better than class 1 industry standard
- Engineering know-how in the balancing of DC resistance in the parallel circuits of thermocouple systems

**Research & Development**

In a world where Pedigree, is considered more important than invention, it would be too easy to perpetuate Industry norms, by settling for incremental change. But, we work in a world that is rapidly changing, where we, like many of our Customers, are looking beyond the horizon, exploring areas where Sensors and Engineering technologies are yet to go.

Driven by our Customers’ technology road-mapping, we are constantly looking to extend the value of our ongoing generic Research & Development works, by helping our Customers to produce the highest performing products. And, also to meet their Industry agreed environmental targets.

To do this, we have built a strong group of collaborative partners who work with us to maintain our market leading position. While others tend to operate within NASA defined Technology Readiness Levels (TRLs) 6 - 9, at Auxitrol Weston we routinely work between TRLs 2 – 9, resulting in ground breaking products with worldwide patents.

We are currently engaged in a series of initiatives across Europe and the USA, working with leading Academic Institutions, Technology Start-Up companies, Industry Laboratories, the French National Centre for Scientific Research (CNRS), numerous Strategic OEM Partners and Government bodies.

Together, we’re pushing the boundaries of existing Sensor understanding, to bring new products to market which are contributing to a greener, leaner, cleaner, more efficient and reliable future.

It’s an inspiring process, designed to thrill our own people as much as our Customers. And, it’s further evidence of our commitment to maintaining our Customers reputations, our world leading position and our promise of unswerving reliability.

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