

## Complex Certification Exam Transformed Into Pioneering 3D Serious Game

Interplay Energy, in partnership with RESNET, used innovative 3D gaming technology to transform complex combustion safety certification into an immersive training environment.

By using Caspian Learning's Thinking Worlds 3D visual authoring technology; Interplay Energy was able to develop a more efficient, cost-effective and scalable combustion safety certification solution.

### The Problem

Home energy efficiency is a relatively new industry. This means that many of the standards and guidelines that organisations who operate in the industry are following are still relatively new too.

Energy efficiency certification requires an understanding of a complex safety issue, Combustion Analysis, which is challenging to teach and test because of the wide number of variables that could affect an outcome in each scenario. To try and 'simulate' this amount of complexity with real field training is vastly expensive and prohibitive; but the training is essential and must be carried out. As the industry moves to scale, this skill set will become the cornerstone of safety standards and a longer term solution is vital.

Though a written test for combustion safety is fairly standard to administer, the field test is challenging for a number of reasons. It is expensive due to the fact that an experienced field proctor must administer the test in a 'volunteer' home. The field proctor usually charges approximately \$100/hour and the test can take up to 2-3 hours. In addition, the volunteer home is often logistically difficult to manage and some of the training companies that offer the testing have resorted to buying homes and setting them up as test homes.



As you can imagine, the number of scenarios becomes limited with such prohibitive costs and the consistency of field testing standards is inadequate across different training companies that exist in different states and regions in the US.

Clearly, this is not a cost-effective, sustainable or scalable solution if the industry wants to move forward.

### Wanted: Cost-Effective, Rapid Solutions

A solution needed to be identified that would ensure training costs remained low, certification standards remained high and consistent, and the safety of home owners would never be compromised.

Interplay Energy, in partnership with the Residential Energy Services Network (RESNET) decided to investigate what other options were available that could deliver the same high level of training for Combustion Analysis that 'test homes' could deliver.

After researching the idea of elearning, virtual worlds, serious games and simulations, it was

decided that the best fit for the problem would be to try and create a simulation that could be setup by an administrator to portray any amount of possible combustion analysis scenarios.

Interplay Energy/RESNET saw that a simulation could mimic the goal of applied knowledge and understanding at the heart of the field test, whilst also ensuring consistency and testing control across the numerous training/testing companies.

Additionally, a simulation would substantially reduce costs because an expensive field proctor would no longer be required.



## Caspian Learning's Thinking Worlds

After some comprehensive research into 3D authoring tools and serious games designers, Interplay decided to use the award-winning Thinking Worlds as their development tool of choice and commissioned Caspian Learning to help design the complex simulation.



Thinking Worlds is a powerful 3D simulation and serious games engine with many built-in features to help designers create immersive scenarios but applying the amount of different, complex combustion analysis variables to the simulation and giving an administrator the ability to dynamically set the test conditions via an administration backend would be something that

had never been done before with Thinking Worlds.

1 Joint or Independent	Vented	0	Configuration
2 Combustion Appliance Location	Configuration	0	Configuration
3 Furnace	Configuration2	0	Configuration
4 Basement Furnace	configuration3	0	Configuration
5 Ambient CO level	AmbientCO	0	Ambient CO
6 Outdoor Temperature	Temp	75	Temp
7 Base Press Main, DS	iPbase	1	Pressure Generator
8 Range Hood amplitude	IAei[0]	2	Pressure Generator
9 Bath Fan amplitude, DS	IAei[1]	8	Pressure Generator
10 Dryer amplitude	IAei[3]	7	Pressure Generator
11 Return amplitude	IAei[4]	18	Pressure Generator
12 Bath Fan amplitude, US	IAei[5]	2	Pressure Generator
13 Master Bath Fan amplitude	IAei[7]	2	Pressure Generator
14 Supply amplitude, main body	IAei[0]	2	Pressure Generator
15 Supply amplitude, laundry	IAei[4]	2	Pressure Generator
16 Leakage, main body	FIi[0]	5	Pressure Generator
17 Leakage, laundry	FIi[3]	2	Pressure Generator
18 Leakage, garage	FIi[4]	8	Pressure Generator
19 Leakage, basement	FIi[5]	2	Pressure Generator
20 Oven CO	iCAOvenCoLevel	130	Appliance test
21 WH Spillage, WC	iCADemSpillWC	1	Appliance test
22 WH Draft, WC	iCADemDraftWC	1.8	Appliance test
23 WH CO, WC	iCADemCoLevelWC	40	Appliance test
24 Furnace Spillage, WC	iCAFurSpillWC	0	Appliance test
25 Furnace Draft, WC	iCAFurDraftWC	-2.0	Appliance test
26 Gas Line Leak	iFurLeak	1.0	Appliance test

In total, the simulation needed to be able to handle 45 x 32 different sets of complex variables and measurements – and be easy for the administration team to set at the beginning of the test.

## Specific Learning Objectives of Simulation

Caspian Learning designed the simulation so that it would take approximately 1 hour to complete and would take place in a 2 story home. The test conditions were linked into an administrative control panel and could be set differently prior to each test to keep test takers actively engaged.

Within this framework for learning, it was a requirement that a number of key sub-topics or objectives were included:

1. Gas line leak detection
2. Ambient CO testing
3. Unvented appliance testing (ovens and stove top burners primarily)
4. Proper equipment usage
5. Appliance identification
6. Combustion appliance Zone (CAZ) understanding
7. Worst Case Depressurization
8. Vented Appliance (furnace, boilers, water heaters) tests: spillage, CO, draft

Each of these sub-topics was transformed into small short 'lessons' within the simulation that would be used for training purposes before students applied to take the final RESNET test simulation.

## Standardisation and Deployment

Due to the disparate locations of test centres and companies in the US running the certification tests, there was a vital need to bring a consistent, standardised certification test to all states across the US in the most accessible manner possible. Several deployment methods were made available;

1. The finished simulation was downloadable and able to be played on standalone, individual PCs
2. The finished simulation could also be deployed as a web-based simulation that could be played from any PC with an internet connection.

For both methods, results were able to be recorded centrally.



Having this level of standardisation and consistency in combustion safety analysis certification tests will introduce a positive, disruptive new approach for home energy efficiency companies to interact with and train students.

For more information about Interplay Energy's solutions, visit <http://www.interplayenergy.com>.

The pioneering simulation is a change that will benefit everyone involved, from companies looking to train staff in the very latest techniques available with up to date information, to the millions of homeowners who will benefit from a standard, consistent and comprehensive approach to combustion safety analysis.



## Delivery Timeframe

On top of the complex variable requirements, the simulation required a relatively quick turnaround time and with Caspian Learning's help, not including preliminaries and revisions, the simulation took one dedicated game designer only 12 weeks to complete.

In the end, the high-impact, web-deliverable immersive 3D certification test for Interplay Energy took no longer than it would have done for a traditional piece of 2D elearning.

For more information about Thinking Worlds visit <http://www.thinkingworlds.com>.