SoundSolutions

*Retail, Acoustic & Commercial Interior Contractors*

## Case Study

Scuderia Toro Rosso | Wind Tunnel Acoustic Separation Works

**Client**
Scuderia Toro Rosso

**Industry Sector**
Formula 1 Racing

**Location**
Aerodynamic Wind Tunnel HQ

**Project Type**
Bespoke Acoustic Separation Walls & Steel Acoustic Door Sets, 3No Working Areas, New Steel Mezzanine

**Capacity**
Principal Design & Build Contractor
& CDM Co-ordinator

**Timescale**
2-3 Weeks

**Contract Value**
Under £140k

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## Background

After STR's acquisition of a wind tunnel facility to further their aerodynamic research and development, modifications were necessary in order to utilise significant areas around the wind tunnel more efficiently. However, with the wind tunnel in operation, noise levels in surrounding areas were too high for any space to be used as a working environment. Sound Solutions were asked to provide a turnkey solution that would create a workable environment in two areas, one at each end of the wind tunnel test area including section of mezzanine and partitioning below to provide much needed storage space above and new working areas below.

## Challenges

The main structure of the building is a steel frame warehouse approx 6.5m internal height. A bespoke solution was required in order to keep noise levels down. The wind tunnel itself with its considerable size made it clear that any separating wall would need to be constructed from one side only in order to maximise the useable space. High level acoustic dampers were also necessary that could perform to the wall construction criteria whilst allowing air movement between areas due to significant air pressure changes once the wind tunnel is in operation. Forklift truck access to other surrounding areas and maintaining access to wind tunnel access hatches were needed in order to not hinder current operation and maintenance programs. With noise levels topping 93dB with the wind tunnel in operation and 69dB when not in operation a significant reduction was required to make the space a comfortable working environment. Space is always at a premium especially with a growing Formula One team and great care had to be taken at wall specification stage to not only reduce sound levels significantly but keep the overall separation wall thicknesses to a minimum. The proposed work area also contained extremely sensitive electronics used to control the wind tunnel turbine and related operations. This meant a construction method which minimised any dust creation.

## Solutions

With our previous acoustic, turnkey project management and design experience we were able to produce working drawings prior to quotation. We designed a bespoke British Gypsum wall detail by combining two different tried and tested wall construction methods (ShaftWall & AudioWall) into one bespoke design which met the clients brief. With no conclusive pre-recorded acoustic test data from British Gypsum on the wall design proposed we employed certified acoustic engineers in order to predict resultant noise levels. They used acoustic software to verify our design and record the performance of the space before and after construction. In order to maintain access requirements without compromising on acoustic performance our specialist acoustic door supplier designed bespoke acoustic doors to suit our wall design. Prior to construction our design was predicted to reduce noise levels within the new work area to no more than 65dB when the wind tunnel was in operation which falls into the good design range of BS8233: 1999 'Sound insulation and noise reduction for buildings – Code of practice'.

To solve the dust issue around sensitive electronics we employed two methods to help with this. A temporary structure was built around the electronics to provide a physical dust barrier and aluminium cover trims used instead of taping and jointing or wet trade plastering.

## Results

The project was completed on time, to budget and exceeded our design brief to create a comfortable working environment in areas previously unusable. The resultant noise levels in the new work area were recorded at 63dB with the wind tunnel in operation and 57dB when not in operation therefore exceeding requirements for good design range of BS8233: 1999 'Sound insulation and noise reduction for buildings – Code of practice'.

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## Summary of Acoustic Results (See graphical representations on following pages):

**Area 1:**

| CONDITION: | Sound Levels in Area 1 **BEFORE** SSL WORKS: | Sound Levels in Area 1 **AFTER** SSL WORKS: |
|---|---|---|
| Wind Tunnel In Operation | 93dB | 63dB |
| Wind Tunnel Not In Operation | 69dB | 57dB |

**Area 2:**

| CONDITION: | Sound Levels in Area 2 **BEFORE** SSL WORKS: | Sound Levels in Area 2 **AFTER** SSL WORKS: |
|---|---|---|
| Wind Tunnel In Operation | 86dB | 64dB |
| Wind Tunnel Not In Operation | 65dB | 57dB |

The level of finish was in keeping with a 'Formula One standard' and our client very happy with the entire project from design and quotation through works on site to handover.

## Client Testimonial

*Sound Solutions have completed several successful projects for us over the last two years.*

*We have found them to be very responsive and their professional attitude, workmanship and final finish exceeds the quality we expect from our suppliers.*

*We will certainly be considering them on our future interior office and acoustic requirements.*

**Phil Suckling**
**Scuderia Toro Rosso**
**Head of Purchasing/Facilities**

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# Scuderia Toro Rosso | Area 1 | Wind Tunnel Separation Wall Results

| Environment | Sound Pressure Level (dB) | Reasonable and Good Sound Level Design for Interior Spaces as per BS8233:1999 'Sound Insulation and Noise Reduction for Buildings' | |
|---|---|---|---|
| | | **Reasonable Design** | **Good Design** |
| Jet Aircraft at 50m | 140 | | |
| | 130 | | |
| Threshold of Pain | 120 | | |
| | 110 | | |
| Music Concert | 100 | | |
| Heavy Truck | 90 | **93dB - Prior to SSL Works** | |
| Street Traffic | 80 | 80 - Heavy Engineering | |
| | 70 | 75 - Light Engineering/Warehouse | 70 - Heavy Engineering |
| Normal Speech | 60 | **63dB - After SSL Works** | 65 - Light Engineering/Warehouse |
| Open Plan Office | 50 | 55 - Retail/Kitchen/Toilet/Corridor<br>50 - Library/Mueseum | 50 - Retail/Kitchen |
| Living Room | 40 | 45 - Staff Room<br>40 - Meeting Rm/Classroom/Living Room | 45 - Toilet/Corridor<br>40 - Library/Museum |
| Bedroom at Night | 30 | 35 - Lecture Hall/Cinema/Bedroom<br>30 - Concert Hall/Theatre | 35 - Staff Rm/Meeting Rm/Classroom<br>30 - Lecture Hall/Cinema/Living Rm/Bed |
| Recording Studio | 20 | 25 - Recording Studio | 25 - Concert Hall/Theatre<br>20 - Recording Studio |
| Rustling Leaves | 10 | | |
| Threshold of Hearing | 0 | | |

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# Scuderia Toro Rosso | Area 2 | Wind Tunnel Separation Wall Results

| Environment | Sound Pressure Level (dB) | Reasonable and Good Sound Level Design for Interior Spaces as per BS8233:1999 'Sound Insulation and Noise Reduction for Buildings' | |
|---|---|---|---|
| | | **Reasonable Design** | **Good Design** |
| Jet Aircraft at 50m | 140 | | |
| | 130 | | |
| Threshold of Pain | 120 | | |
| | 110 | | |
| Music Concert | 100 | | |
| Heavy Truck | 90 | | |
| | | **86dB - Prior to SSL Works** | |
| Street Traffic | 80 | 80 - Heavy Engineering | |
| | 70 | 75 - Light Engineering/Warehouse | 70 - Heavy Engineering |
| | | **64dB - After SSL Works** | 65 - Light Engineering/Warehouse |
| Normal Speech | 60 | | |
| Open Plan Office | 50 | 55 - Retail/Kitchen/Toilet/Corridor<br>50 - Library/Mueseum | 50 - Retail/Kitchen |
| Living Room | 40 | 45 - Staff Room<br>40 - Meeting Rm/Classroom/Living Room | 45 - Toilet/Corridor<br>40 - Library/Museum |
| Bedroom at Night | 30 | 35 - Lecture Hall/Cinema/Bedroom<br>30 - Concert Hall/Theatre | 35 - Staff Rm/Meeting Rm/Classroom<br>30 - Lecture Hall/Cinema/Living Rm/Bed |
| Recording Studio | 20 | 25 - Recording Studio | 25 - Concert Hall/Theatre<br>20 - Recording Studio |
| Rustling Leaves | 10 | | |
| Threshold of Hearing | 0 | | |