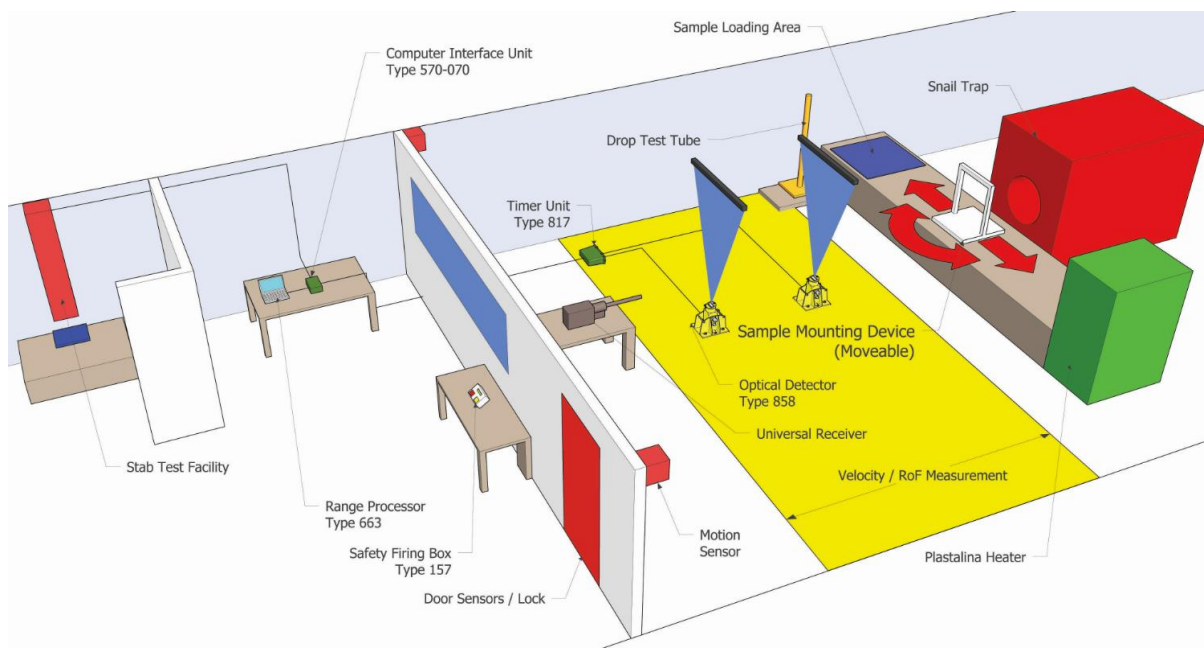# MS INSTRUMENTS LTD
RANGE DESIGN CAPABILITIES

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Content

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1. INTRODUCTION

1.1 INFORMATION ABOUT THIS DOCUMENT

THIS DOCUMENT DESCRIBES THE MS INSTRUMENTS' RANGE DESIGN, COMMISSIONING AND TRAINING CAPABILITIES.

ALL INFORMATION AND INSTRUCTIONS HAVE BEEN MADE WITH DUE CONSIDERATION OF THE NATIONAL AND INTERNATIONAL STANDARDS AND REGULATIONS, THE STATE OF TECHNOLOGY, AS WELL AS OUR LONG-STANDING KNOWLEDGE AND EXPERIENCE.

PRODUCTS AND CORPORATE NAMES APPEARING IN THIS DOCUMENT, THAT ARE REGISTERED TRADEMARKS OR COPYRIGHTS OF THEIR RESPECTIVE COMPANIES, ARE USED FOR IDENTIFICATION OR EXPLANATION PURPOSES ONLY.

NOTE	**THE IMAGES IN THIS DOCUMENT ARE FOR VISUAL AID ONLY. FINAL PRODUCT MAY DIFFER ACCORDING TO CUSTOMER NEEDS.**

NOTE	**PLEASE CONSULT MS INSTRUMENTS PRODUCT BROCHURE FOR A FULL LIST OF EQUIPMENT AND CAPABILITIES.**

2. MS INSTRUMENTS RANGE CAPABILITIES

2.1 OVERVIEW

MS INSTRUMENTS HAVE BEEN SUPPLYING EQUIPMENT TO CONDUCT DIFFERENT TESTS FOR OVER 45 YEARS, AND HAVE BEEN UNDERTAKING SUCH TESTS AT OUR OWN TEST RANGE (WILTSHIRE BALLISTIC SERVICES) FOR OVER 30 YEARS. WE ARE PLEASED TO OFFER THIS EXTENSIVE EXPERIENCE WHEN EQUIPPING RANGES WITH THE MOST PROFESSIONAL AND RELIABLE EQUIPMENT, THAT CAN BE USED TO PERFORM TRIALS TO A VERY WIDE RANGE OF INTERNATIONAL TEST STANDARDS.

IN THE UK, WE WERE RESPONSIBLE FOR ASSISTING THE UK ACCREDITATION SERVICE (UKAS) TO APPLY THE ISO17025 STANDARD TO BALLISTIC TESTING. OUR RANGE AT WILTSHIRE BALLISTIC SERVICES WAS THE FIRST UK RANGE TO BE ACCREDITED TO THIS STANDARD IN 2007. THIS EXPERIENCE MEANS WE CAN PROVIDE A UNIQUE STANDARD OF TRAINING TO THE TRIAL TEAM.

2.2 RANGE INSTRUMENTATION

2.2.1 CONTROL ROOM

THE RANGE PROCESSOR
Type 663 is a high performance computer, which features the latest Windows Pro operating system and the latest dual core technology. The 663 has ample memory and hard disk space for all modern windows applications. Additional hardware is provided to interface with the MS Instruments equipment. The desktop unit is supplied with an LCD monitor to provide a large, clear desktop display, enabling all results to be clearly seen as they are received. The 663n offers a portable solution. The range processor is the ideal machine from which to run range operations smoothly and efficiently.
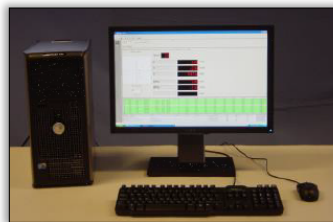
SPECIFICATION - DESKTOP

INTERNAL HARDWARE (min)	
Processor	P-4 Dual core 3.0 GHz
Memory	4 GB
Hard Drive	512 GB
DVD ROM/RW	DVD/CD-RW Combo (8x8x8x24)
EXTERNAL HARDWARE	
Display	21" LCD
Printer	Colour Laserjet
UPS	500 VA
SOFTWARE	
Operating System	Windows 7 Pro
Application	• BallisticsDB Software • MS Office Pro
DIMENSIONS	
L x W x H (Desktop)	460mm x 630mm x 210mm [18.11in x 24.80in x 8.27mm]

Figure 1 - RANGE PROCESSOR

BALLISTICS DB CONTROL SOFTWARE TYPE 950-571

BallisticsDB is the most important control software in the MSI range. This sleek, yet functional interface is the front end of all MSI test range instrumentation, adapting to each system with ease, being customized prior to each shipment.

The software can be set up and operated with ease, for all in-house sensor systems. It provides statistical analysis and printouts, whilst allowing calibration functions to be applied.

Simple and helpful, the ergonomic design allows effortless operation. BallisticsDB control software is the essential core of all our sensor systems, and brings universal control to the range.
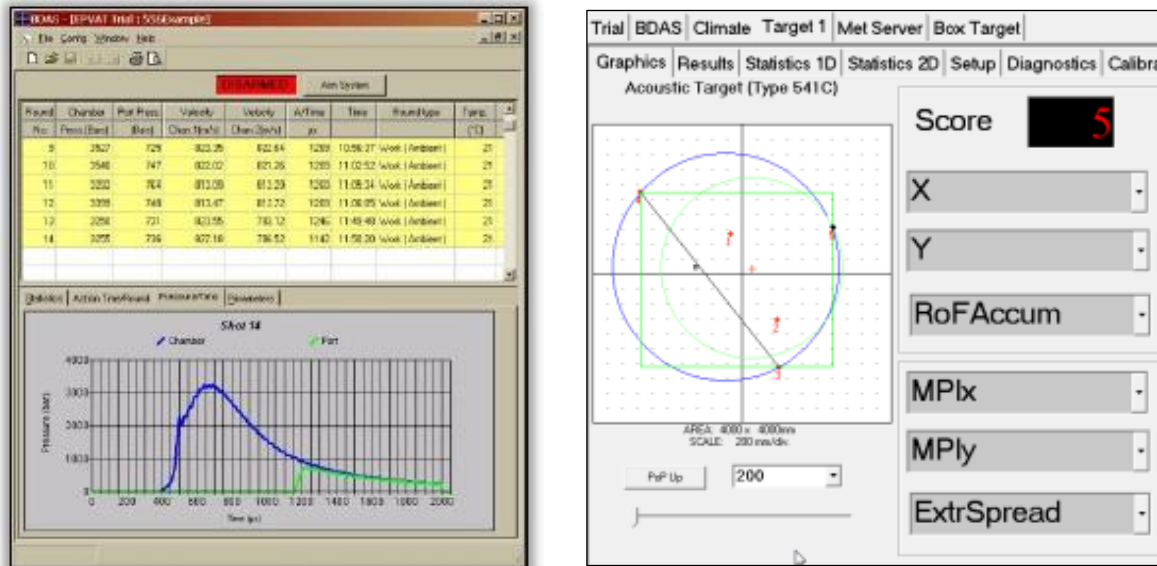
Figure 2 - BALLISTICSDB SOFTWARE

SAFETY FIRING SYSTEM TYPE 157

The safety firing system is an essential part of any successful ballistics range, bringing ease and sophistication to the testing process.

Designed for firing all weapon types, as well as Universal Receivers, the main objective of the system is to enable firing in the safest possible manner. Using a whole host of features, including door locks, sensors, and self-tests, it helps to remove risk to personnel and make the whole firing process smoother, including detection of mis-fire and securing the range for a suitable delay time.

All of this ensures the most secure environment in which to fire.

Figure 3 - Safety Firing System including Remote Trigger Pull

2.3 LIVE FIRING AREA

X-Y MOUNT TYPE 681-1200

The x-y mount type 681-1200 is a strong and durable frame designed to hold the universal weapon rest type 681-600 or universal receiver type 681-1000.

Made for long-lasting use, the mount is easy to set up, and enables firing to be carried out orthogonally, which is vital for ballistic material testing.
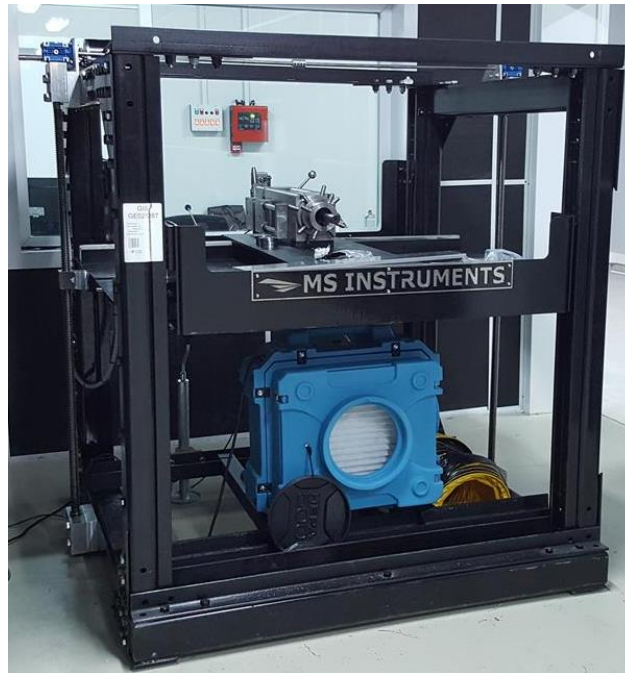
Figure 4 - X-Y MOUNT TYPE 681-1200

UNIVERSAL RECEIVER TYPE 681-1000

The Universal Receiver is a breech/firing assembly that accepts a wide range of barrels. Designed for accuracy, velocity and pressure test barrels, this is a versatile receiver, and can handle calibres up to 30mm. It can be used with a recoil mechanism if required, and may be mounted on an orthogonal x-y firing mount or an azimuth and elevation rest.

Figure 5 - UNIVERSAL RECEIVER TYPE 681-1000

VELOCITY SCREEN TYPE 859

The MSI velocity screen type 859 is an integral component of MS Instruments' range equipment, most commonly used as part of the indoor velocity measurement system (IVMS). The velocity screen can be used with all nature of projectiles including tracer. They are typically fitted to a trolley for ease of use at a sensor separation of 1m, but can be supplied on larger sensor separation, or standalone frames if required. This design has been created to bring a larger detection area and ease of use at a competitive price.

Figure 6 - VELOCITY SCREEN TYPE 859

OPTICAL DETECTOR TYPE 858

The optical detector type 858 is an integral component of MS Instruments' range equipment, most commonly used as part of the projectile velocity measurement system (PVMS). This upgraded design has been meticulously created to yield a rugged and sophisticated system that will operate successfully on both outdoor and indoor ranges, for all users.

Figure 7 - OPTICAL DETECTOR TYPE 858

SOLID-STATE-LIGHT SUPPORT FRAME TYPE 775

The MSI solid-state-light support frame is designed specifically for use with solid-state light source type 788, where ceiling mounting of lights is not a practical option.

The support frame suspends solid-state lights above the type 858 optical detectors when indoor use is required. This setup is constructed of rugged material and provides stability and optimum lighting during operation, ensuring accurate results in a variety of firing applications.
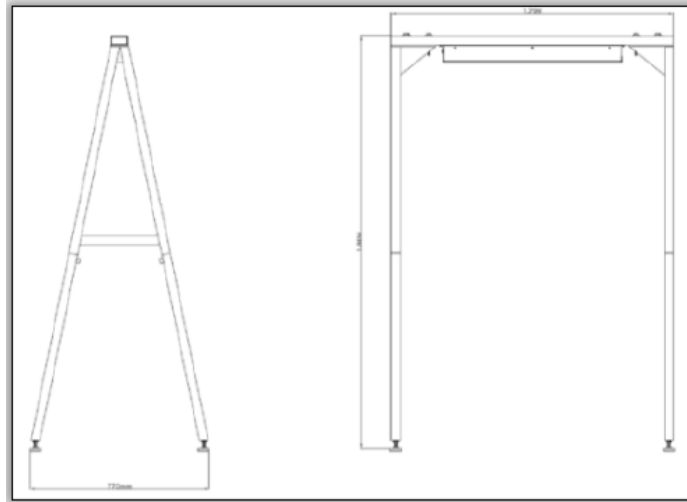

Figure 8 – Solid State Light Support Frame type 775

INTELLIGENT INFRARED LIGHT SOURCE TYPE 788

Whenever there is insufficient natural light, for example in an indoor range, these infrared lights are an essential piece of equipment. The units are of rugged construction and, as of February 2011, they have the facility for computer control. With the computer control, comes a whole host of advantages that help save energy, costs, and time.

Designed for use with MS Instruments' Projectile Velocity Measurement System (PVMS), these sleek lights are useful in many circumstances, helping improve the functionality of the range.

Figure 9 - INTELLIGENT INFRARED LIGHT SOURCE TYPE 788

SMALL ARMS BULLET TRAP (≤12.7mm) TYPE 688 001AS

This unit is designed to safely catch and stop projectiles that have passed through ballistic samples during testing and trials work. The unit is designed to minimise peripheral damage to the surrounding equipment and range.

Larger versions, capable of stopping 14.5mm and higher calibres are available.

Figure 10 - SMALL ARMS BULLET TRAP (≤12.7mm) TYPE 688 001AS

NOTE	**PLEASE CONSULT MS INSTRUMENTS PRODUCT BROCHURE FOR A FULL LIST OF EQUIPMENT AND CAPABILITIES.**

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2.4 RELOADING ROOM

MS Instruments, working closely with Wiltshire Ballistic Services's range, are capable of providing a fully populated and working reloading room.

Wiltshire Ballistics range have the facilities to provide the necessary training with regards to the equipment required, and the correct, efficent and safe way to conduct ballistics tests.

Figure 11 - EXAMPLE OF RELOADING ROOM

2.5 CONDITIONING ROOM

BACKING MATERIAL OVEN (NIJ 0101.06)

The backing material oven has been developed to meet the National Institute of Justice (NIJ) standard 0101.06. This ensures the backing material is the correct temperature when conducting the tests.

SUBMERSION EQUIPMENT FOR ARMOUR PANEL (NIJ 0101.06)

The submersion equipment has been developed to meet the national institute of justice (NIJ) standard 0101.06** armour submersion.

NIJ standard 0101.06 states: "all new flexible vests and jackets shall be submersed and tested wet. Each armour panel shall be hung vertically in a water bath. All testing of the panel shall be completed within 40 min of when the panel is removed from the water."

CONDITIONING CHAMBER SHOWING TUMBLER (NIJ 0101.06)

DROP RIG TYPE 160 001AS (NIJ 0101.06)

The NIJ standard 0101.06 states: "the tumbling apparatus should be placed in a chamber capable of generating temperature and humidity during the conditioning protocol. The tumbler must maintain tolerances of temperature, humidity, and revolutions per minute. Verify the apparatus maintains conditions within the tolerances specified at periodic intervals throughout each cycle of the conditioning protocol. The tumbler and chamber must be arranged such that if the chamber goes out of the tolerance conditions, the tumbler rotation will cease until the chamber returns to its in-tolerance condition."

The type 160 001AS – magnetic drop rig has been developed to meet the national institute of justice (NIJ) standard 0101.06** drop-test validation of the backing material (i.e. Plastilina material).

NIJ standard 0101.06 states: "drop-test validation of the backing material shall be accomplished before every six shot P-BFS test sequence and before each 12 shot BL test sequence. Failure to meet drop-test depth requirements will result in the invalidation of all shot series since the last drop-test with acceptable depths of indentation, and will require that a new conditioned and drop test validated backing material fixture be used."

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ARMOUR DROP TEST (NIJ 0101.06)

NIJ standard 0101.06 states: "a flat hardened concrete surface and a mass much greater than that expected from the weighted plate must be available for mechanical durability testing".
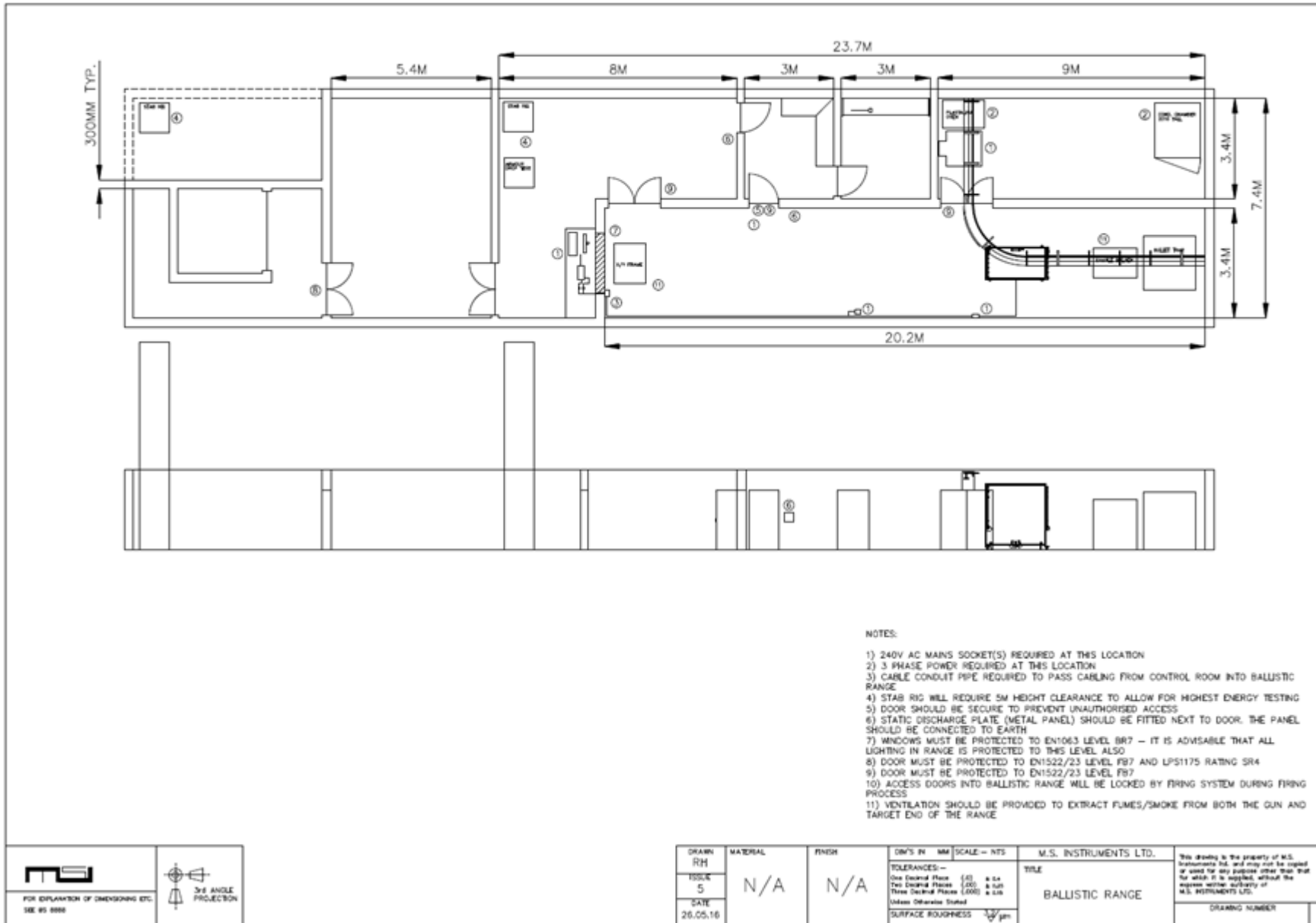
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3. EXAMPLE OF EXISTING RANGE FIRING AND CONDITIONING AREA

3.1 INITIAL RANGE DESIGN LAYOUT

NOTES:

1) 240V AC MAINS SOCKET(S) REQUIRED AT THIS LOCATION
2) 3 PHASE POWER REQUIRED AT THIS LOCATION
3) CABLE CONDUIT PIPE REQUIRED TO PASS CABLING FROM CONTROL ROOM INTO BALLISTIC RANGE
4) STAB RIG WILL REQUIRE 5M HEIGHT CLEARANCE TO ALLOW FOR HIGHEST ENERGY TESTING
5) DOOR SHOULD BE SECURE TO PREVENT UNAUTHORISED ACCESS
6) STATIC DISCHARGE PLATE (METAL PANEL) SHOULD BE FITTED NEXT TO DOOR. THE PANEL SHOULD BE CONNECTED TO EARTH
7) WINDOWS MUST BE PROTECTED TO EN1063 LEVEL BR7 — IT IS ADVISABLE THAT ALL LIGHTING IN RANGE IS PROTECTED TO THIS LEVEL ALSO
8) DOOR MUST BE PROTECTED TO EN1522/23 LEVEL FB7 AND LPS1175 RATING SR4
9) DOOR MUST BE PROTECTED TO EN1522/23 LEVEL FB7
10) ACCESS DOORS INTO BALLISTIC RANGE WILL BE LOCKED BY FIRING SYSTEM DURING FIRING PROCESS
11) VENTILATION SHOULD BE PROVIDED TO EXTRACT FUMES/SMOKE FROM BOTH THE GUN AND TARGET END OF THE RANGE

3.2 3D RANGE DESIGN PHASE

USING THE LATEST TECHNOLOGY AVAILABLE IN 3D DESIGNING, MS INSTRUMENTS IS ABLE TO GIVE A 3D VIEW IDEA TO THE CUSTOMER OF THE FINAL RANGE. WITH THIS TECHNOLOGY, MS INSTRUMENTS IS ABLE TO "WALK" THE CUSTOMER THROUGH THE RANGE SO THEY CAN ENVISAGE HOW IT MIGHT APPEAR AND ADJUST THE DESIGN ACCORDINGLY.
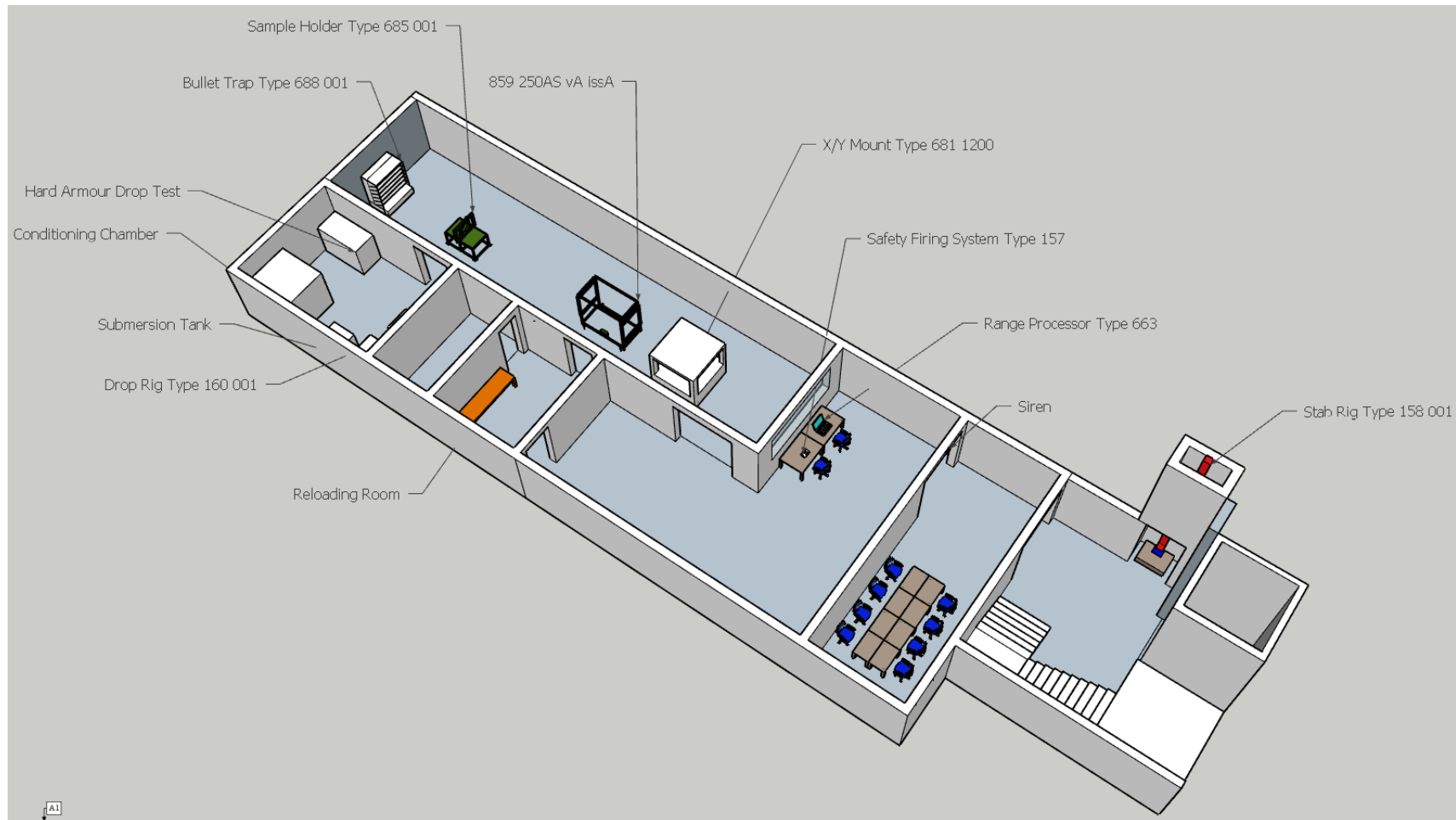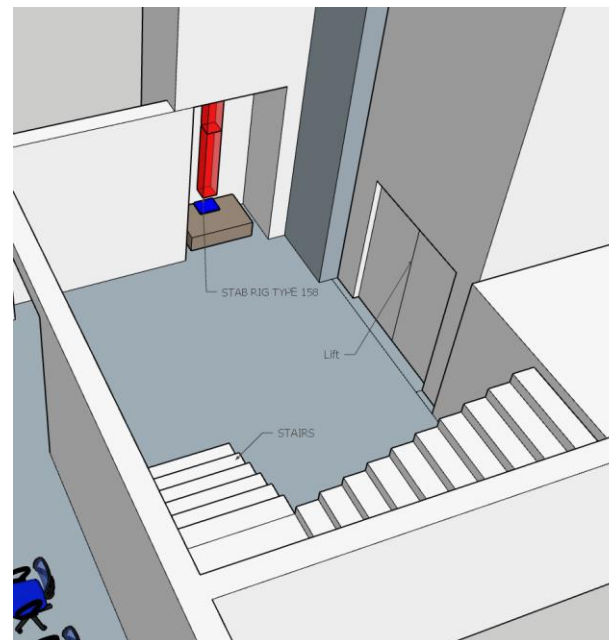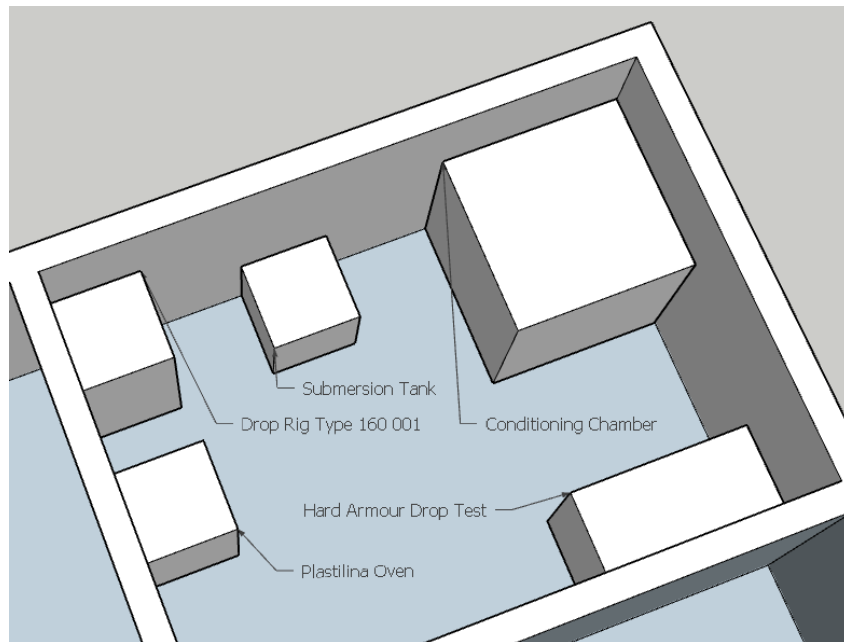

Figure 12 - 3D RANGE LAYOUT

MS Instruments LTD

Bullet Trap Type 688 001
Sample Holder Type 685 001
859 250AS vA issA
UNIVERSAL RECEIVER
XY Mounts

Submersion Tank
Drop Rig Type 160 001
Conditioning Chamber
Hard Armour Drop Test
Plastilina Oven

STAB RIG TYPE 158
Lift
STAIRS
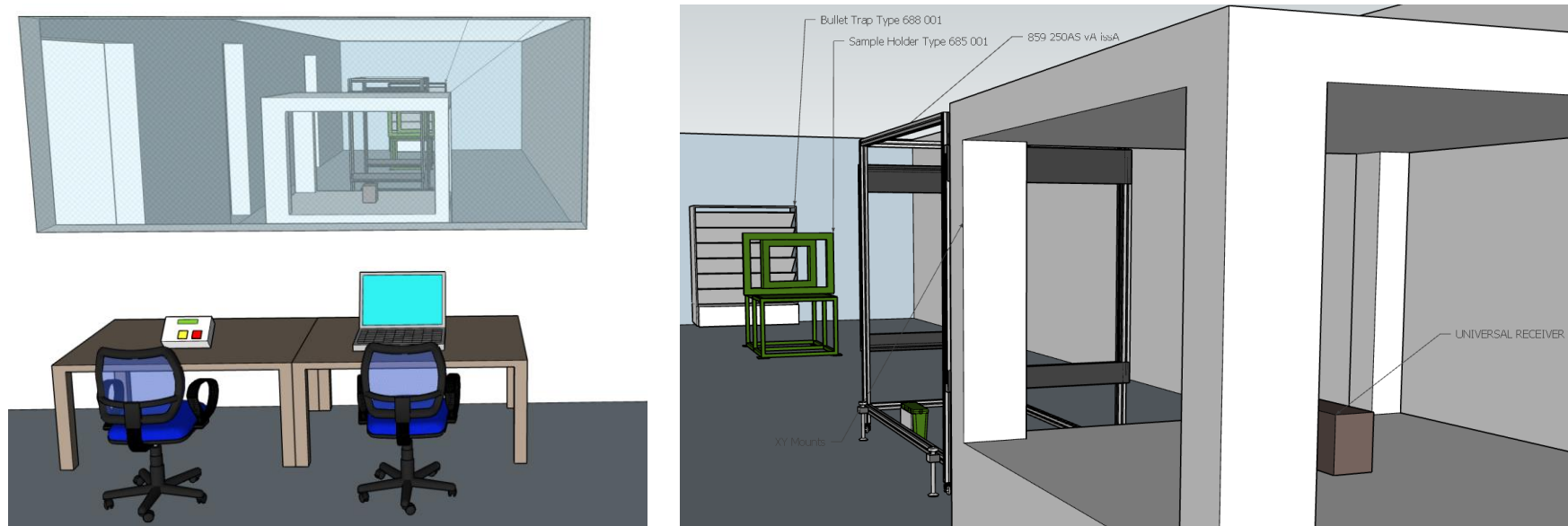
Figure 13 – "WALKING" THROUGH THE 3D RANGE

3.3 INITIAL IMPLEMENTATION PHASE

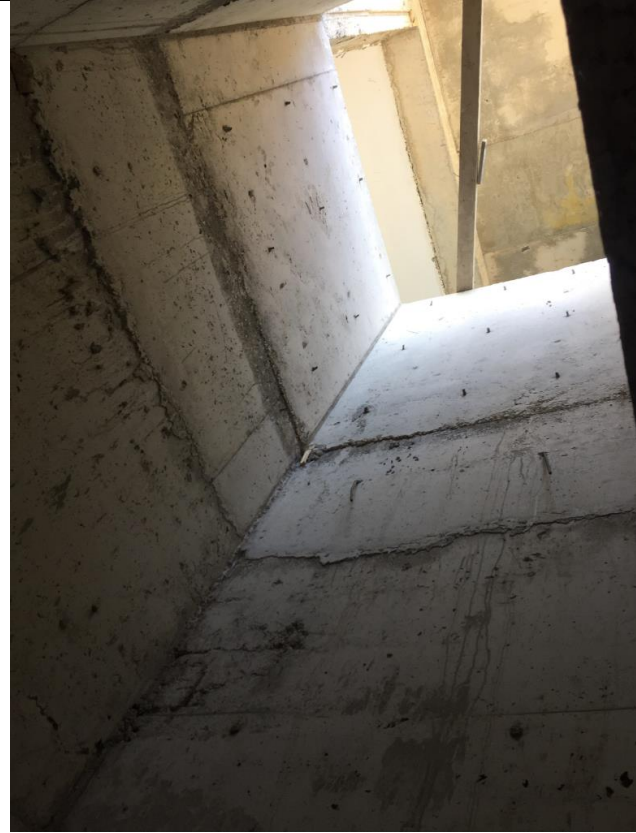| **UNDERGROUND RANGE CONSTRUCTION** | **LIFT SHAFT CONSTRUCTION** |
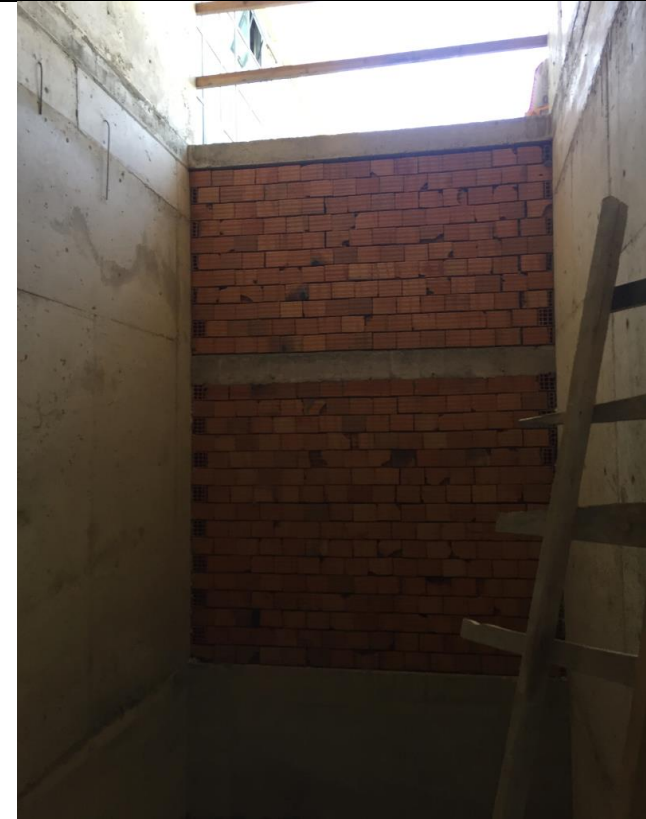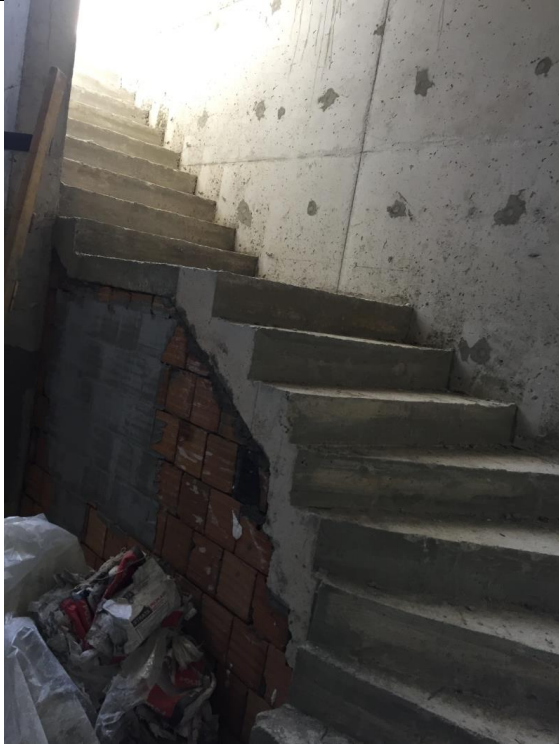
STAIRS LEADING TO RANGE UNDERGROUND

MEETING ROOM.
THIS IS THE ENTRANCE TO RANGE

CONTROL ROOM

FIRING RANGE ROOM

STAB RIG ROOM

3.3.1 INSTALLED RANGE INSTRUMENTATION

Ammunition loading and preparation room

Submersion equipment for armour panel (NIJ)

Drop test rig (NIJ)

Stab Test rig (NIJ)

Control room view of range
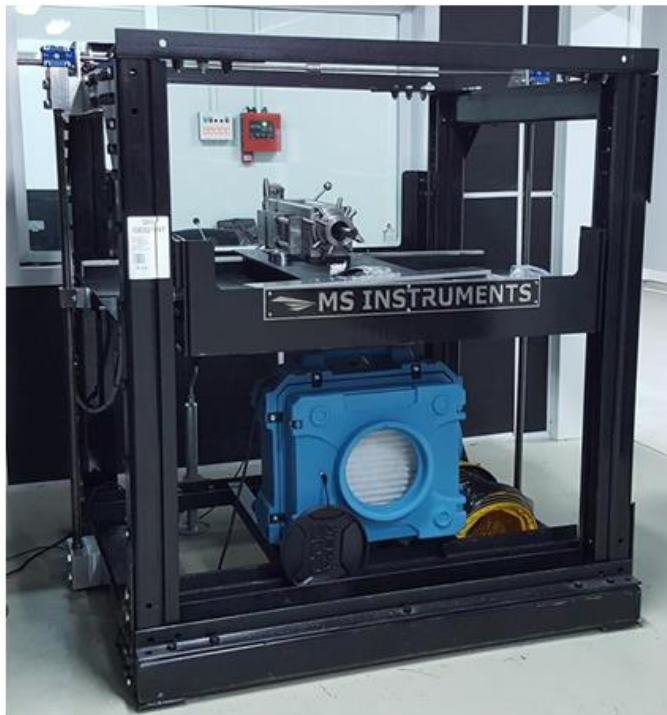

Sample Conditioning chamber and Armour drop test (NIJ)

Sample Holder with vest

Conditioning Chamber showing tumbler
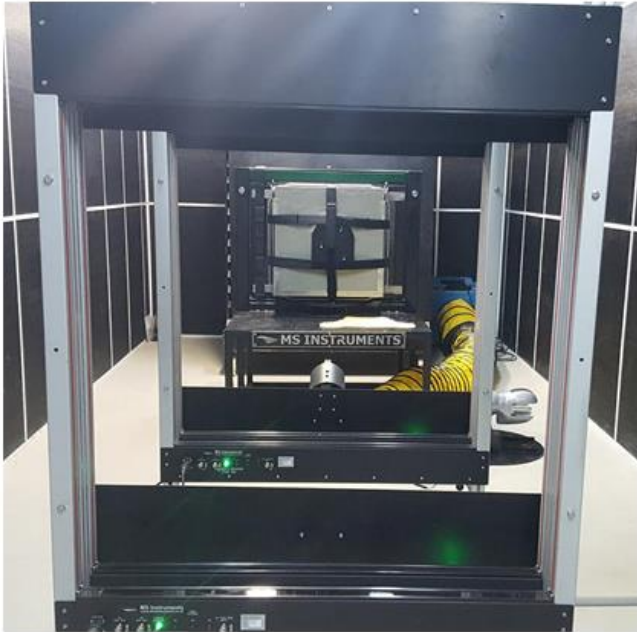
Velocity measurement system

Motorised X-Y mount for orthogonal firing
(with HEPA filter unit)

Velocity system rear view
(showing target CCTV camera)
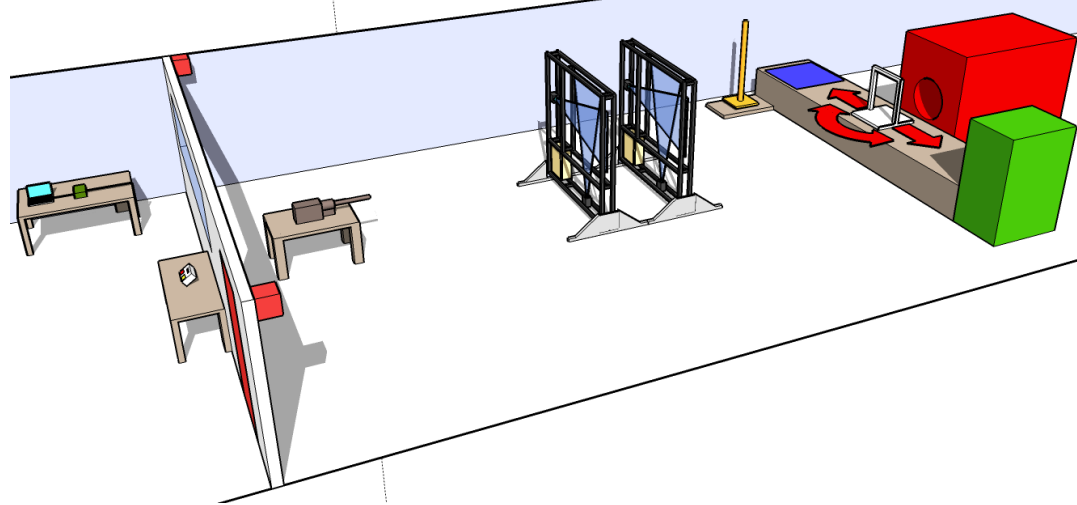
4. OTHER EXAMPLES OF MS INSTRUMENTS' RANGE DESIGNS
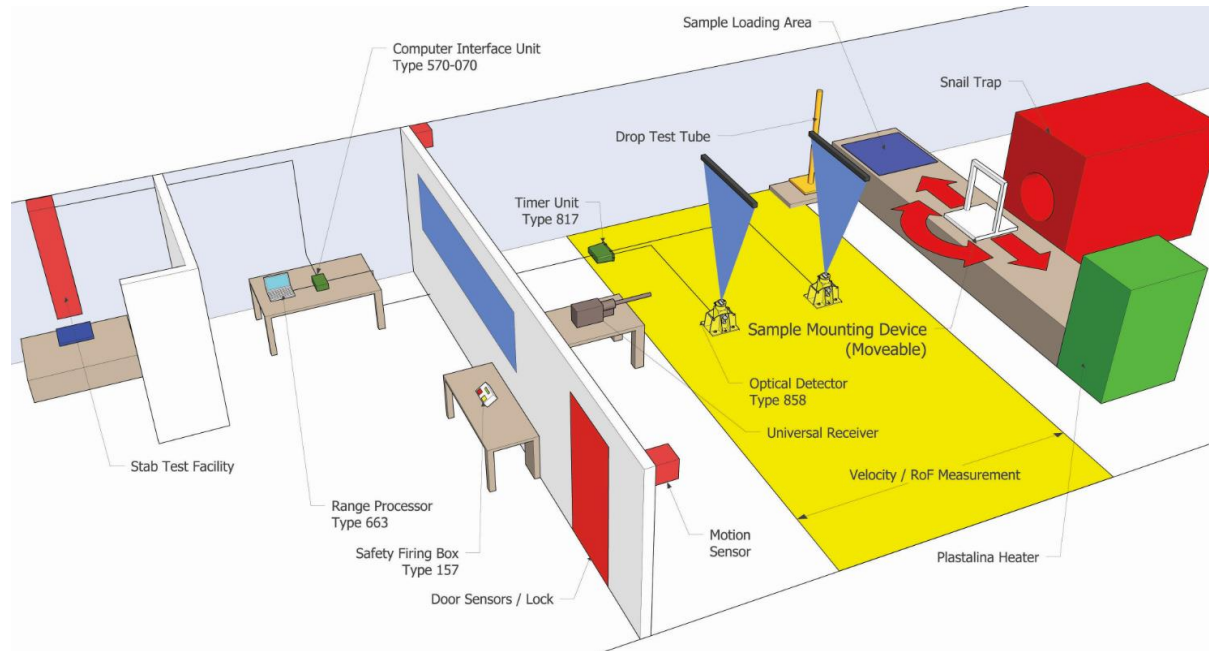

Figure 14 - BALLISTIC MATERIAL TESTING RANGE

Figure 15 BALLISTIC MATERIAL TESTING RANGE DESIGN 2

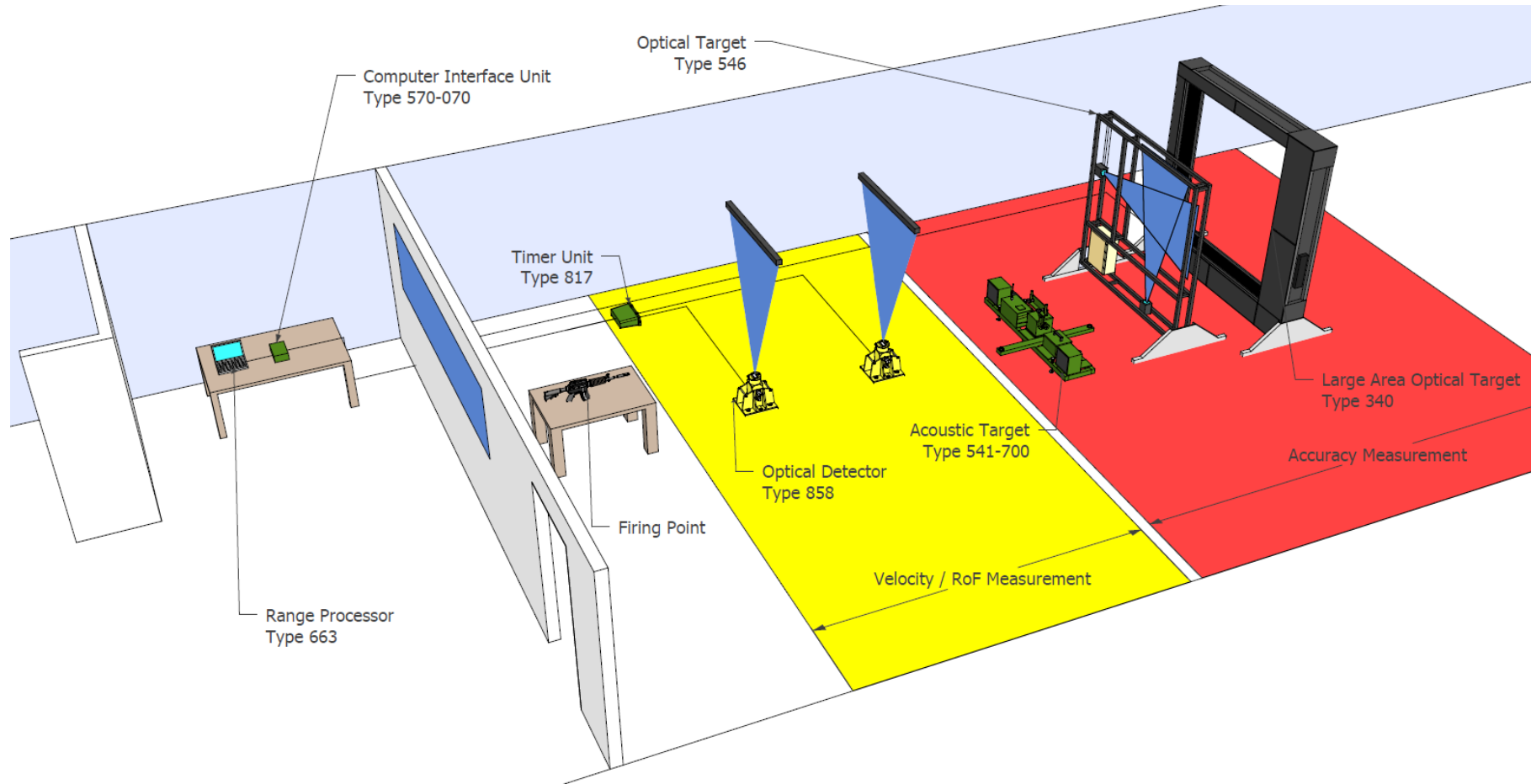**Figure 16 - Weapons Test Range Design**

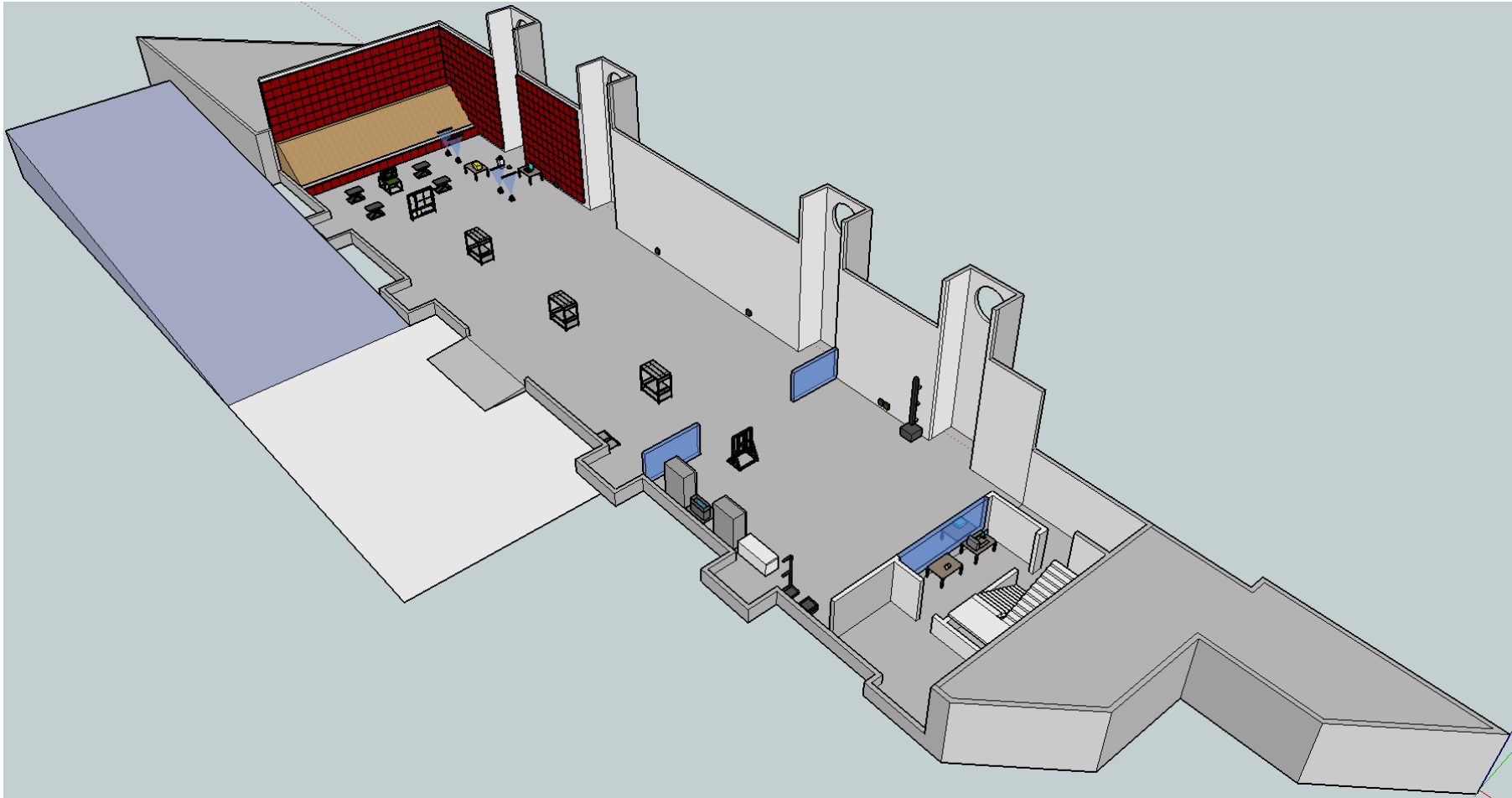**Figure 17 - Ballistic Testing / Gel Analysis Range Design**

PART C – CONTACT DETAILS

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