RUAG Defence

Capability Booklet Virtual Training

Together ahead. RUAG

Contents

As realistic as it gets: Virtual simulation for individual and crew training

RUAG's virtual training systems are turnkey solutions for your training goals. Our training systems are tailored to encompass individual, crew and combined tactical training for land based scenarios. We provide world-class training systems that support customers to improve skill performance by lower costs, reduced risks and add value through our holistic training approach.

You have demanding training requirements, we have the right solutions

Individual solutions
Customised solutions tailored to your requirements

Top performance
From application development to life-cycle management

Technology for tomorrow
Innovative long-term solutions for the future needs of our clients

Maximum training success with virtual simulation

Our high-performance training systems ensure that training is effective and cost-efficient

Gunner Training Simulator

Driver Training Simulator

Crew Training Simulator

Role Player Station

SITTAL Shooting Simulator

SOTA Forward Observer Simulator

Customised solutions for every level of training

Integrated Logistical Support (ILS)

Combined Tactical Training
Combat Group level

Increases combat readiness and therefore the skill of completing a mission successfully.

Unit Training
Company/Platoon level

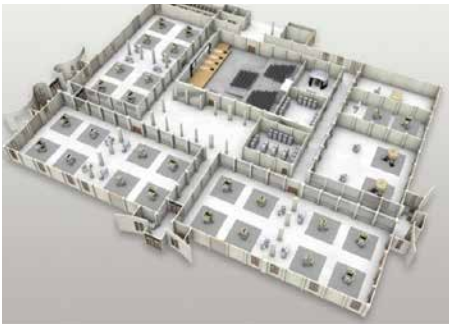
Professional skill training for operator and superior teams.

Individual training
Soldier/team level

Task-specific training on basic and individual skills.

Full Service Support

From a single simulator to an entire training centre



A unique combination of benefits

Experienced
Competence centre of the Swiss Army

Reliable
We work according to the highest Swiss quality standards

Cost-efficient
Our solutions reduce training costs

Competent
Our specialists develop the optimal solution

Sustainable
Our training methods minimise the environmental burden

RUAG Defence Virtual Arena

Simulation Network

The key components

Display System

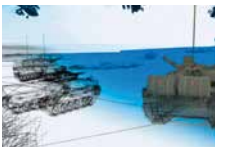
Modelling & Simulation

Voice / Data Com System

Instructor Applications

Artificial Intelligence, Computer Generated Forces (AI / CGF)

Sound Simulation



Visual Database

Training Centre

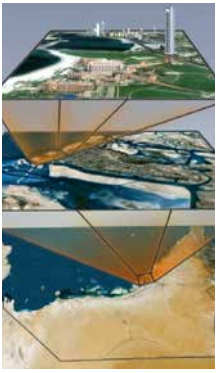
Visual database

High-performance, multi-channel visual system

Synthetic environments: for mission preparation & rehearsal

Production of:
– large, virtual 3D terrains and models
– 2D maps (geo-referenced with the 3D terrains)
– geo-specific, virtual 3D terrains (size of the entire geopolitically relevant region is possible)
based on various "Level of Fidelities"

Rapid database generation



Instructor applications

Instructor support applications / Training support
– 3D Graphical User Interface (GUI) for scenario creation and conducting/ monitoring exercises
– Learning management systems

After action review tool
– Quick and efficient preparation of exercise carried out
– Office automation: automated preparation of briefing and debriefings and take-home packages

Voice / data com system
– Communication and monitoring of Battlefield Management System (BMS), radio and intercom

Computer Generated Forces (CGF)/AI

Artificial Intelligence (AI)

– Autonomous decision-making, compliant with military doctrine, tactical situation and terrain
– Intelligent leadership agents (hierarchical network)
– "Intentional infringements" of prescribed tactics and doctrine of entities
– Simple scenario generation in open and built-up terrains

Computer Generated Forces (CGF)

– Enables to create high-fidelity automated simulations to train for the ever-changing mission state
– Involvement of HQ staff: staff training/command and decision making

SITTAL – Small Arms Trainer

Description

Indoor acquisition of technical skills
– Individual training: Technical instruction of firing (day and night)
– Collective training: Practice of firing techniques in operational situations

Teaching method
– Mastering of firing techniques through monitored drills and rehearsal

Training objectives

Individual training
– Handling weapons: pistol, assault rifle, machine gun, anti-tank, precision rifle
– Learning shooting procedures
– Naked eye, optical sights, IL sights
– Monitoring of aiming, shots, butt & trigger pressure, cant
– Accurate recoil rendering
– Accurate single or sustained burst shots
– Firing range exercises in individual lanes
– Automatic evaluation (efficiency, accuracy, dispersion, loading time, reaction time)

Collective training
– Infantry platoon dismounted level (~10 people)
– Realistic scenarios in virtual battlefield
– Reactive targets (soldiers, tanks)
– Coordination of team
– Position of the team can change during the scenario
– Individual and collective evaluations and AAR

General architecture

Training levels to suit training needs – basic learning exercise

Shoot like at the firing range
– Without ammunition or time limits
– With accurate ballistics

With shot analysis for improvement
– Aiming
– Cant
– Breath
– Tightening of the shooter's trigger finger

Collective training for group training in different scenarios

Firing within the two-person team or the group
– In realistic situations with reactive opponents
– Safely
– With accurate ballistics

With analysis/coaching for improvement
– Shots fired/shot efficiency
– Coordination
– Taking into account the development of the situation

Benefits

Individual and collective evaluations and AAR
– All weapons are real ones:neutralised, instrumented (laser, sensors), with pneumatic recoil
– Learning of shooting procedures from basic skill training up to collective training options

References

French Land Forces
– 43 × 10 lane systems

French Navy (Navy Seals)
– 1 × 10 lane systems

French Air Forces
– 6 × 5 lane systems

SOTA – Forward Observer Simulator

Description

Education and training of the forward observers (artillery or infantry)
– In a virtual battlefield – realistic and varied
– Acquire the know-how for command, control and tuning of the artillery/mortar shots
– Learn and practice the artillery/mortar procedures
– Improve efficiency and reactivity
– Optimise response time

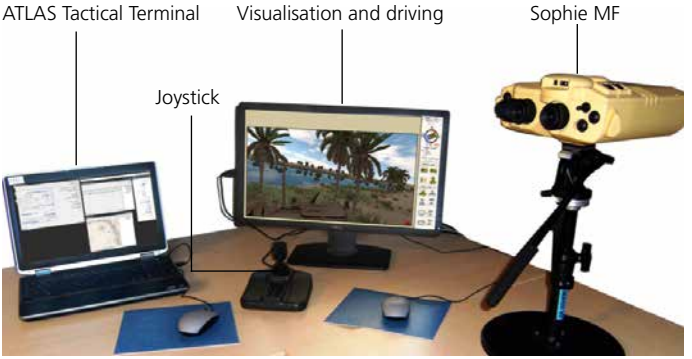
Training objectives

Crews (chief, pilot and observer)
– Carry out mission from a vehicle (mounted mode) or on foot (dismounted mode)
– Have vehicle observation means (cameras, naked eye) and optronic binocular SOPHIE (day vision, night, thermal, IL, Laser Range Finder) for view of the battlefield
– Command, control and adjustment of artillery shots via a tactical terminal (TTO ATLAS) linked to the upper level, for all types of shots (including moving targets)
– Drive vehicle and navigate in the field (real or real-like)
– Operate independently of the other involved crews

Trainer
– Edits the training exercises (offline)
– Supervises the exercises (on line)
– Plays the role of the upper level (tactical network)
– Manages and executes the shots of artillery of all calibres (155, mortars) using the tactical terminal (TTI) for all types of ammunition and all kinds of shots
– Can monitor in real time every view from the crews
– Manages the exercise play and the animations (fixed/mobile targets, friends/foes)
– Debriefs the exercise (replay, results of fires)
– Supervises the technical status of the simulator

Simulator
– Operates the real or geo-typical terrains with great realism
– Faithfully reproduces the effects of artillery shots (HE shells, SMK, ILL, BONUS) on fixed or mobile units and field (smoke, fire, explosions, destroyed entities, craters)
– Allows viewing in visible and optronics modes
– Integrates a Computer Generated Forces (CGF) that drives the animations with artificial intelligence, for realistic behaviour
– Simulates realistically the environmental effects (weather, wind, rain, fog, sun, smoke, shadows)
– Simulates the sound perception at any point on the field

Crew station



General architecture

One room for both instructor station and crew stations

– Typical size: 9 m × 15 m × 3 m for 6 crew stations

– Separate technical room is preferable: typically 3 m × 2.5 m

Highly realistic 3D environment for maximum training success

References

French Land Forces – (artillery school, infantry school, 10 regiments)
– 13 SOTA in use (Config.: 1 instructor and 2 to 6 crews)
– 1A real Canjuers firing range database
– 12 geo-typical terrains (European – desert)

SANG – Saudi Arabia (Caesar program)
– 6 SOTA delivered (5 commissioned, Config.: 1 instructor and 6 crews)
– 2 geo-typical terrains (urban – desert – mountains)

DTS – Driver Training Simulator

Description

Training with a simulator is more demanding:

– lessons can be based on several exercises increasing in the level of difficulty (e.g. heavy traffic, bad weather, day/night, unforeseen situations)
– training with a simulator reduces environmental impact
– training with a simulator increases operational safety and proficiency
– the training syllabus can be individually adapted to the trainee's learning progress
– flexible training solution for individual and combined driver training

From low to high fidelity: always matching the training requirements

Up to a high fidelity DTS

– Trainee workplace: cabin mock-up
– Controls & instruments: replicas
– Display system: screen projection, simulated Rear-view mirrors, simulated rear-view camera
– Motion system: motion platform, vibration system
– Training support: instructor operating station (IOS), voice communication system
– Virtual environment: visual database, visual system, sound simulation
– Instructor applications: simulator start-up, exercise creation, exercise control, administration tools

Training objectives

Basic training
– Familiarisation with the training simulator (technology of the simulator, etc.)
– Familiarisation with the driver's environment (controls & instrument panels in the cabin mock-up)
– Correct handling and operation (e.g. start-up and shut-down procedures, knowledge and use of controls & instrument panels)
– Familiarisation with the vehicle's dimensions (width, length and height)
– Manoeuvring

Advanced training
– Respond correctly to specific vehicle malfunctions
– Night driving and driving in bad weather conditions (rain, fog, snow and ice)
– Gain a secure feeling for the vehicle in off-road driving on sand, rocky terrain, snow
– Evaluate if terrain is passable (steep slopes, riverbeds, crossing ditches and obstacles)
– Realistic off-road training
– Driving in urban areas, on roads and highways, on snow and ice
– Interacting with traffic
– Prevent accidents and critical situations (avoiding collisions, safe distances and passing)
– Driving over bridges and tank bridges
– Driving with variable additional payload
– Driving with night sight device

Tactical training
– Training and improvement of tactical driving skills in a combat environment (closed hatch)
– Use of terrain coverage
– Driving under combat conditions
– Driving in a convoy (individual training: convoy vehicles can be generated by the traffic control; team training, several simulators can be combined for tactical exercises)
– Train formation, patrol and convoy trips
– Handling critical situations and manoeuvres in convoy formation

General architecture

Display system
– 180° protection screen

Cabin mock-up
– Realistic replica of the driver cabin

Cabinets
– Computers and electronics

Instructor operation system (IOS)

6 axis motion platform

References

Driver training simulator
– BMP-3 (Infantry Fighting Vehicle)
– G6 (SP Howitzer)
– M109 (SP Howitzer)
– HMMWV (Hummer)
– Tatra (Heavy Truck)
– Leclerc (MBT)

DTS for Steyr truck (Fatran)
– Swiss Armed Forces

GTS/TTS – Gunner/Turret Training Simulator

Description

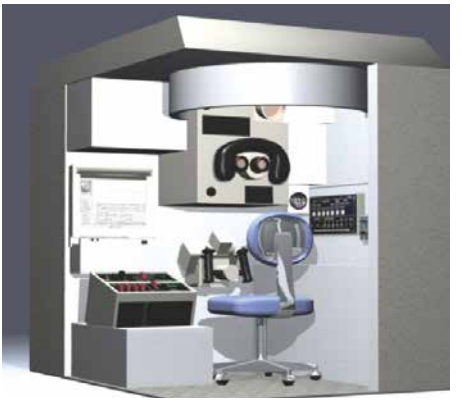
Main advantages of the GTS:

– Flexible training solution for individual gunner training
– High quality replicas, large virtual terrains and Computer Generated Forces (CGF) provide a very realistic training environment
– The customer's training strategy is fully integrated in the system design
– Supports a large list of training goals and evaluation rules

Training objectives

Basic training

– Familiarisation with the training simulator
– Familiarisation with the environment (controls, instrument panels and sights)
– Correct handling and operation of the weapon system (e.g. weapon start-up and shut-down procedures, knowledge and use of controls, instrument panels, sights and fire control system)



Advanced training

– Respond correctly to specific weapon system malfunctions
– Operate in adverse environmental conditions
– Search, detect, locate and identify targets
– Training of the engagement decision process:
– Training of the target engagement execution:
– Training of the target engagement execution methods: battle sight gunnery and precision gunnery
– Engage static and moving targets from a static or moving vehicle
– Engage targets using manual handles
– Engage multiple targets which require different ammunition types
– React on fire misses: observe the impact point relative to the target, adjust and fire again
– Train adjustment methods
– Observe the target for the damage assessment

General architecture

Sights, controls and instruments

Gunner station
– Realistic replica of the driver cabin

Local operation system (LOS)

References

Turret-team training simulator
– Leclerc (MBT)

CTS – Crew Training Simulator

Description

The CTS uses state-of-the-art technology such as:

– High-end multi-channel visual system
– High fidelity digital sound system
– Realistic visual database
– High-performance computer environment
– Modern, intuitive window based graphical user interface (GUI)
– Computer Generated Forces (CGF)
– Distributed Interactive Simulation (DIS)
– Voice/data communication system
– Sophisticated built-in test equipment (BITE)
– Networking capability
– Platoon level: up to four CTS can be linked for platoon training
– Squadron/company level: up to three platoons can be linked for combined training

Training objectives

Individual training

– Train individual skills for each crew member
  - driver
  - gunner
  - commander
– Deal with malfunctions as well as unforeseen and critical situations without risk
– Night operation, operation in bad weather conditions and heavy combat environments

Crew training

– Training of the crew's collective automation process
– Improve commander's leadership, planning, decision-making, navigation and communications skills

Tactical training unit

– Complete mission training at the following levels:
  - Platoon and
  - Company
– Tactical exercises involving dismounted infantry group commanders and vehicle commanders
– Train the tactical unit in an urban operation, military operation in open terrain and peace support mission where it is confronted with different situations and different levels of aggression
– Train the unit commander's mission planning procedures and tactical skills
– Train the coordination and communication (voice and C4I) between the different tactical units
– Train technical and tactical skills from individual up to combined arms tactical training in a mission preparation and rehearsal scenario

General architecture

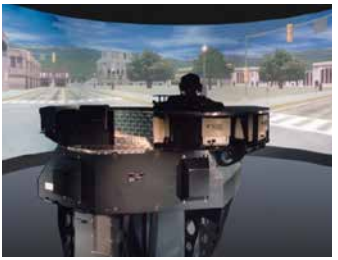
Turret Compartment
– Commander workplace
– Gunner workplace

Driver Compartment
– Driver workplace

Instructor Operation Station (IOS)
– Instructor workplace

References

Crew training simulator
– Leclerc (MBT):
  ▪ 3 platoons Leclerc (MBT) Crew Training Simulators (CTS)
  ▪ 1 company commander Crew Training Simulator (CTS)
  ▪ 1 forward observer
  ▪ BMP-3 (Infantry Fighting Vehicle)
  ▪ 3 platoons BMP-3 Crew Training Simulators (CTS)
– Leopard 1 (MBT, Norwegian Armed Forces)
– Leopard 2 (MBT)
– CV 9030 (Norwegian Armed Forces)
– M109 (Self-Propelled Howitzer, Swiss Armed Forces)

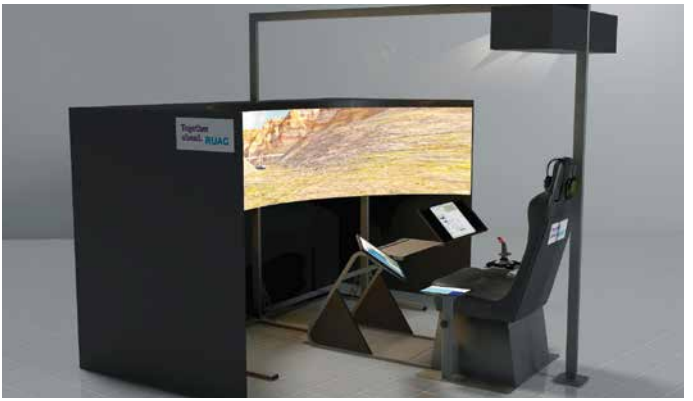


RPS – Role Player Station

Description

Key features

– Interface to simulation systems
– Role change with minimal reconfiguration
– Tactical control of associated Computer Generated Forces
– Easily deployable
– Low infrastructure 2.0 m × 2.5 m × 2.0 m, power and network requirements
– Touch-control displays
– Adjustable control elements
– Voice communication interface
– 140° FOV circular projection screen
– DIS/HLA interface
– Game-based technology



Tailored to your needs

RUAG Role Player Station

– Supports and expands the tactical capabilities of training scenarios (man in the loop actions)
– Consists of a generic environment with immersive projection screen for 3D sights and a seat
– Scenario interaction through touch-screen monitors and communication system
– Easily deployable and can be linked for combined tactical exercises into simulation systems using open interfaces (DIS/HLA)
– Uses the standards of the simulation industry
– Configurable in very short time to serve different roles
– Relies on the flexibility of the RUAG Virtual Arena platform and therefore can simulate a large set of possible land and air assets in the scenarios
– The Role Player Station can play roles, e.g. opponents, civilians or support forces
– A main 2D/3D map with an intuitive touch-interface allows the realistic tactical control of associated simulated units (Computer Generated Forces)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Customer statement

"Thanks to our STES training system we can train highly diverse deployment scenarios in an effective manner – from individual training to training at platoon level. I can't imagine a simulation system with better cost efficiency."

Customer statement, Officer, French Army

"Today the armed forces are under an enormous amount of budget pressure. The simulations and training systems of RUAG are an effective way of saving on cost without compromising training quality."

Max Fenner, Colonel (Retired), Commander Land Forces Training Centre (Swiss Armed Forces), 2005–2011

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