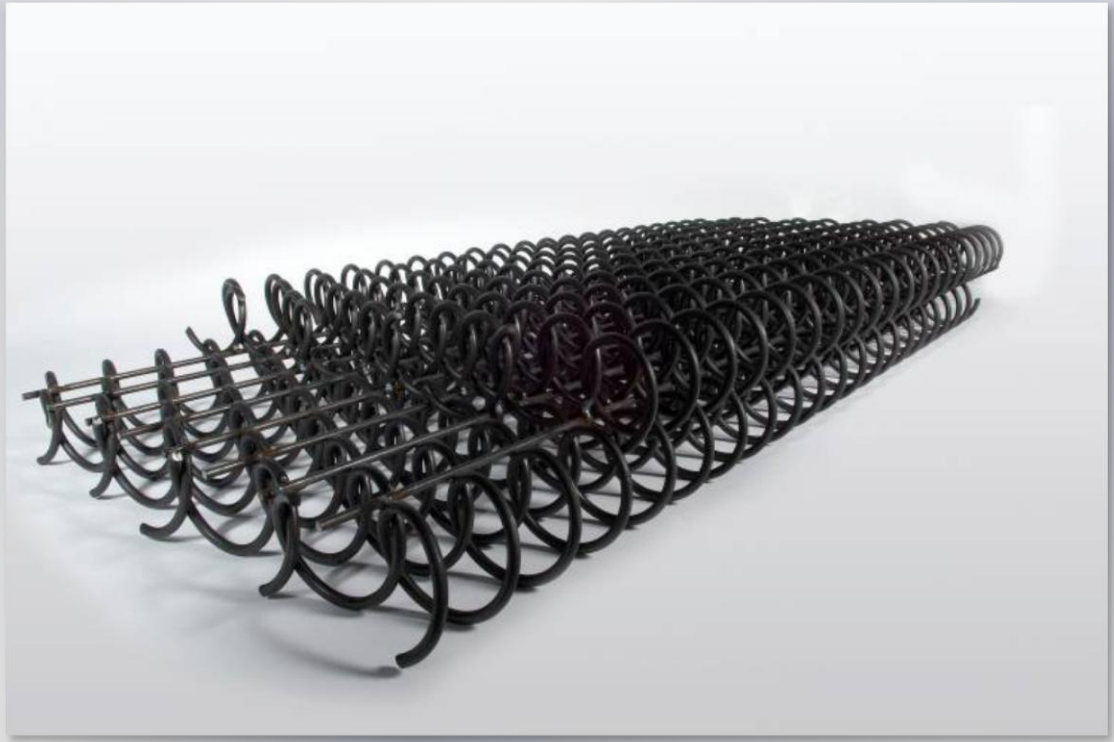
ARMOURING STEEL PRODUCTS

ASP
QUALITY PRECISION STRENGTH

COMPANY OVERVIEW

- Introduction
- Product & Production
- Certification
- Tested Solutions
- Management Services
- Security & Confidentiality
- Clients



Contact

INTRODUCTION

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QUALITY PRECISION STRENGTH

SECURITY SPIRAL ARMOURING

- High-security structures require specialist armouring solutions to maximise resistance to attack
- Integrating steel spiral armouring into the in-situ concrete proven to be most effective solution due to unique interweaving and interlinking capabilities
- **Interweaving** anchors concrete within spiral coils and prevents removal of large sections of concrete and steel
- **Interlinking** woven mattresses ensures the whole structure acts monolithically

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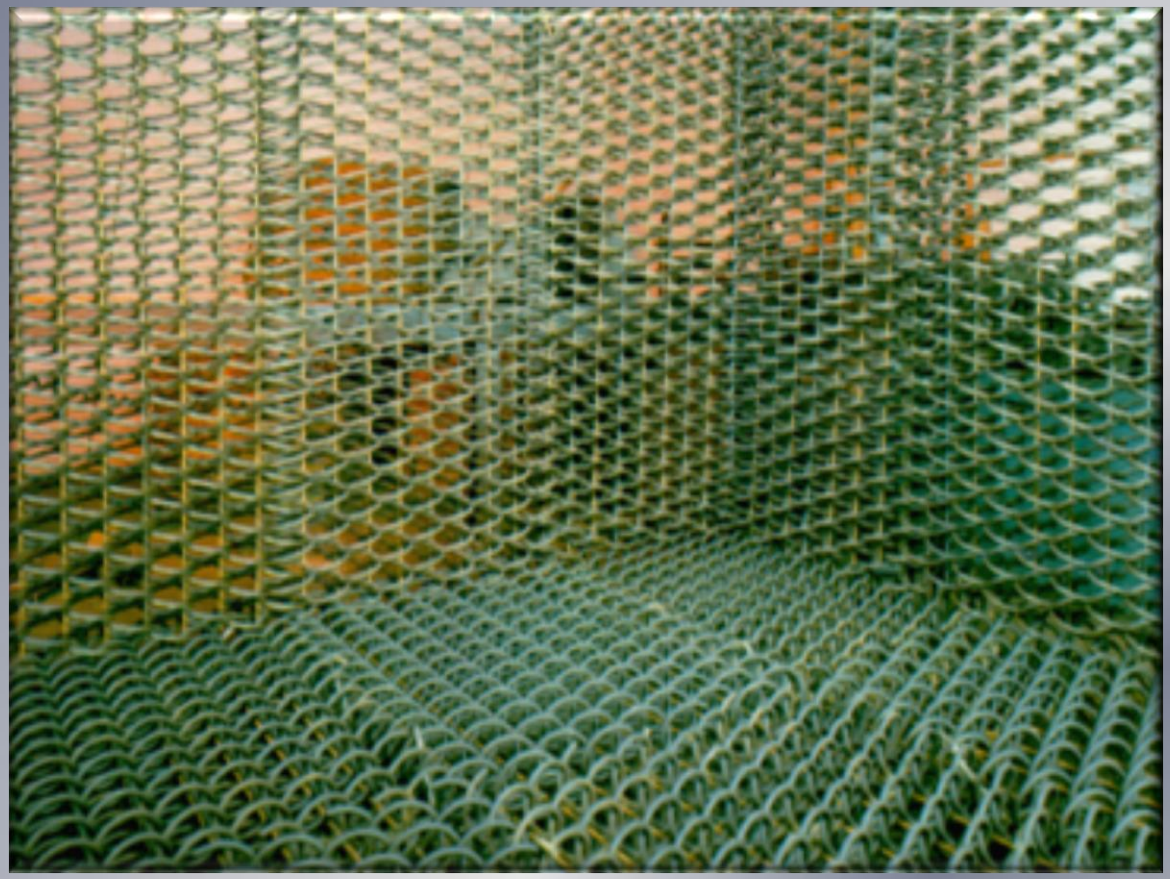

SECURITY STEEL ARMOURING

Interlinked Monolithic Structure

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QUALITY PRECISION STRENGTH

ARMOURING STEEL PRODUCTS

- Formed to produce a new generation of spiral armouring elements
- Aims to deliver class-leading, fully accredited, cost-effective monolithic solutions for security sensitive environments such as
  - Large dimension vaults
  - Blast walls
  - Blast protective structures
  - Blast containment chambers

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ARMOURING STEEL PRODUCTS

- Strategy based on
  - Investment in second generation machinery
  - Rigorous quality control of raw materials
- Achieved the highest Resistance Grade possible in tests carried out in line with the benchmark European Standards
- Exclusive supplier of Gunnebo Security Spiral Reinforcement
- Provides a full service to clients including design, detailing, project support and training

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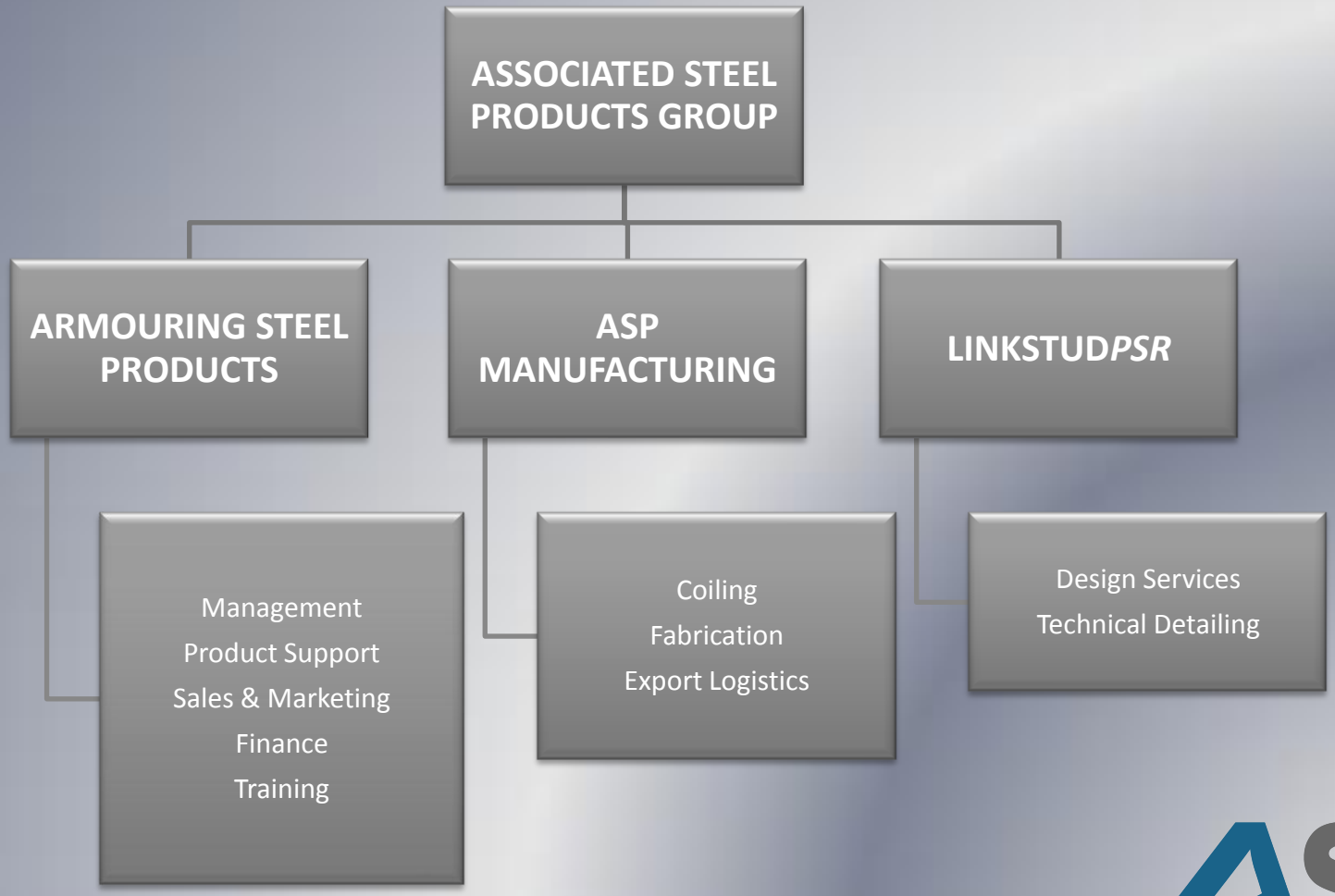
ASP GROUP STRUCTURE



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PRODUCT & PRODUCTION

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PRODUCT

- ASP spiral armouring manufactured from specially selected 12mm carbon steel
- Helically formed to produce spiral lengths with diameters from 100mm - 250mm
- Choice of pitch size options from 15mm - 190mm providing a range of armouring densities
- Spiral lengths interwoven to produce mattresses
- Mattresses easily interlinked on-site to create an immensely strong monolithic structure

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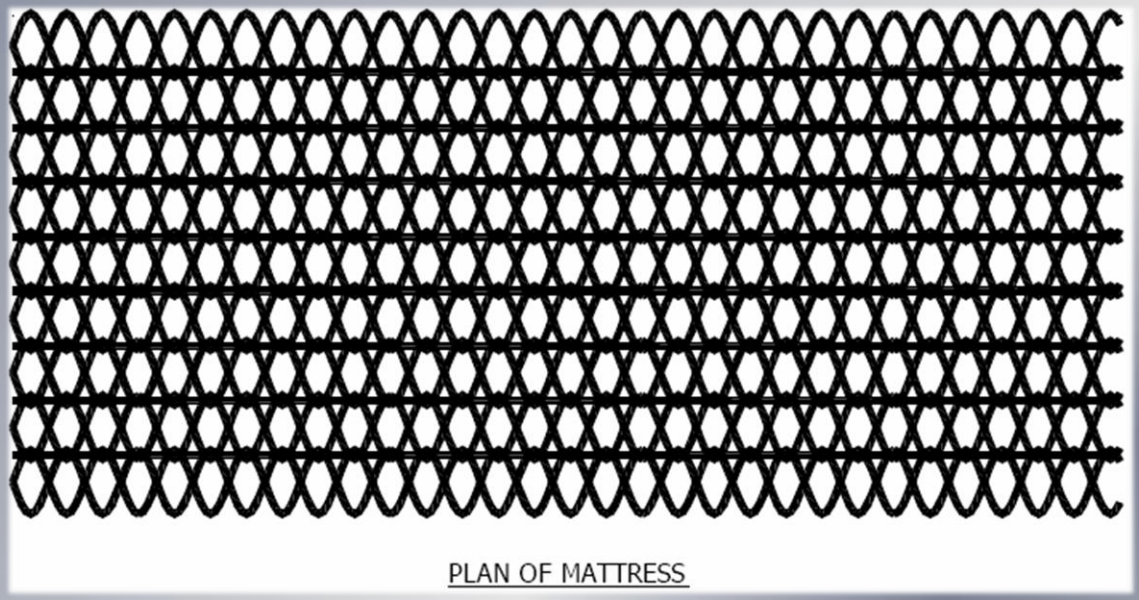
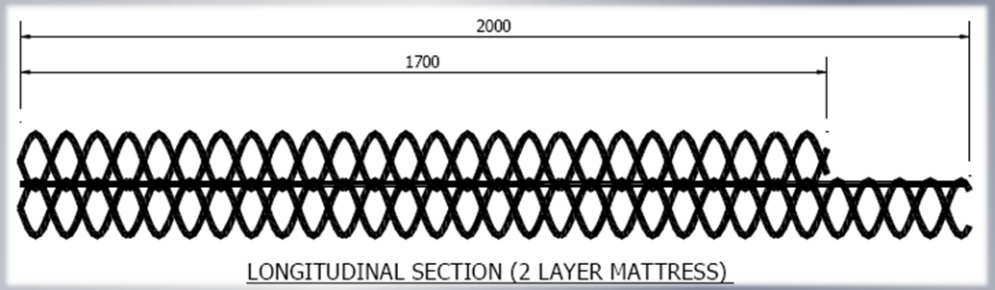
TYPICAL ARMOURING MATTRESS



PLAN OF MATTRESS



LONGITUDINAL SECTION (2 LAYER MATTRESS)

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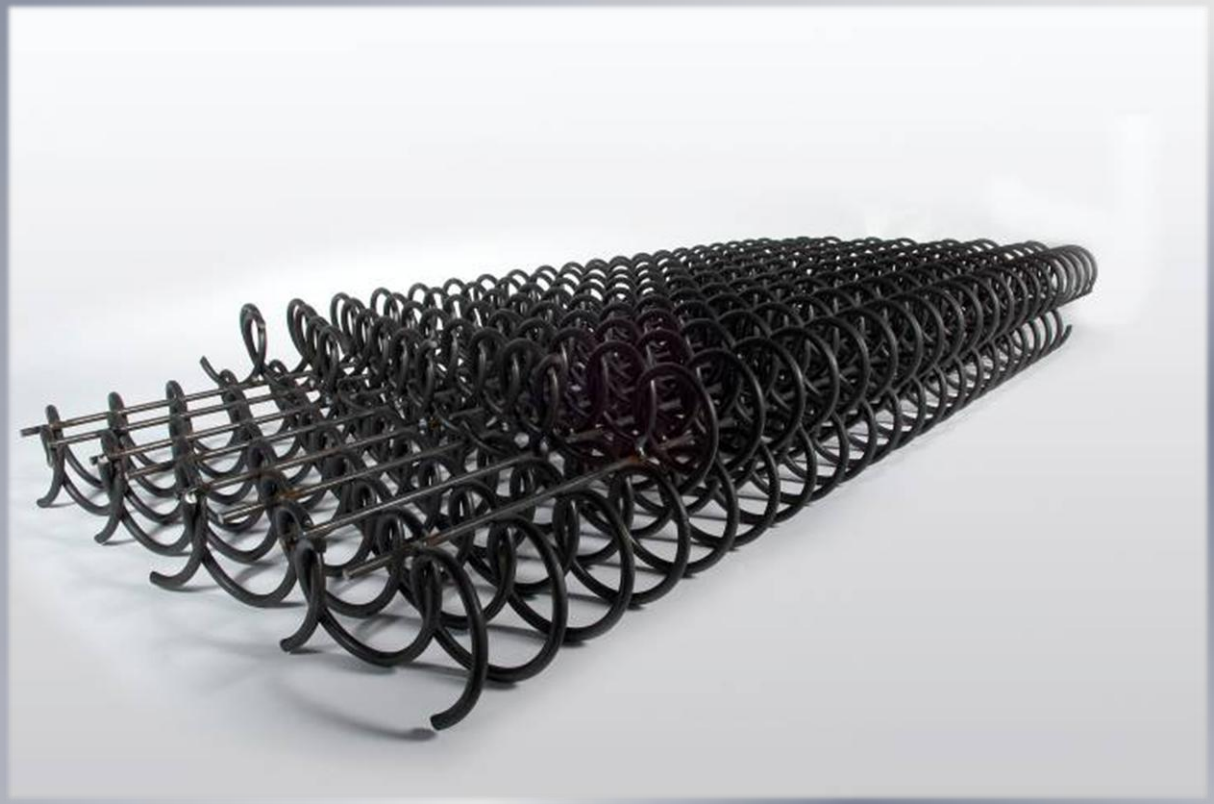
ARMOURING MATTRESS



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PRECISION ENGINEERING

- Investment in second generation machinery
- High degree of control over pitch and diameter of coils produced
- Supports uniformity and integrity of mattress
- Removes potential planes of failure vulnerable to explosive shockwaves

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HIGH GRADE RAW MATERIALS

- Tight control of metallurgy key to removing any variability in product quality
- Certified by UK CARES – UK Certification Authority for Reinforcing Steels

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HIGH GRADE RAW MATERIALS

- Careful selection of supplying mill and upstream manufacturers to
  - Ensure tensile and mechanical properties plus bend, bond and fatigue performance
  - Avoid trace elements causing hardening, surface cracking or fluctuations in tensile strength

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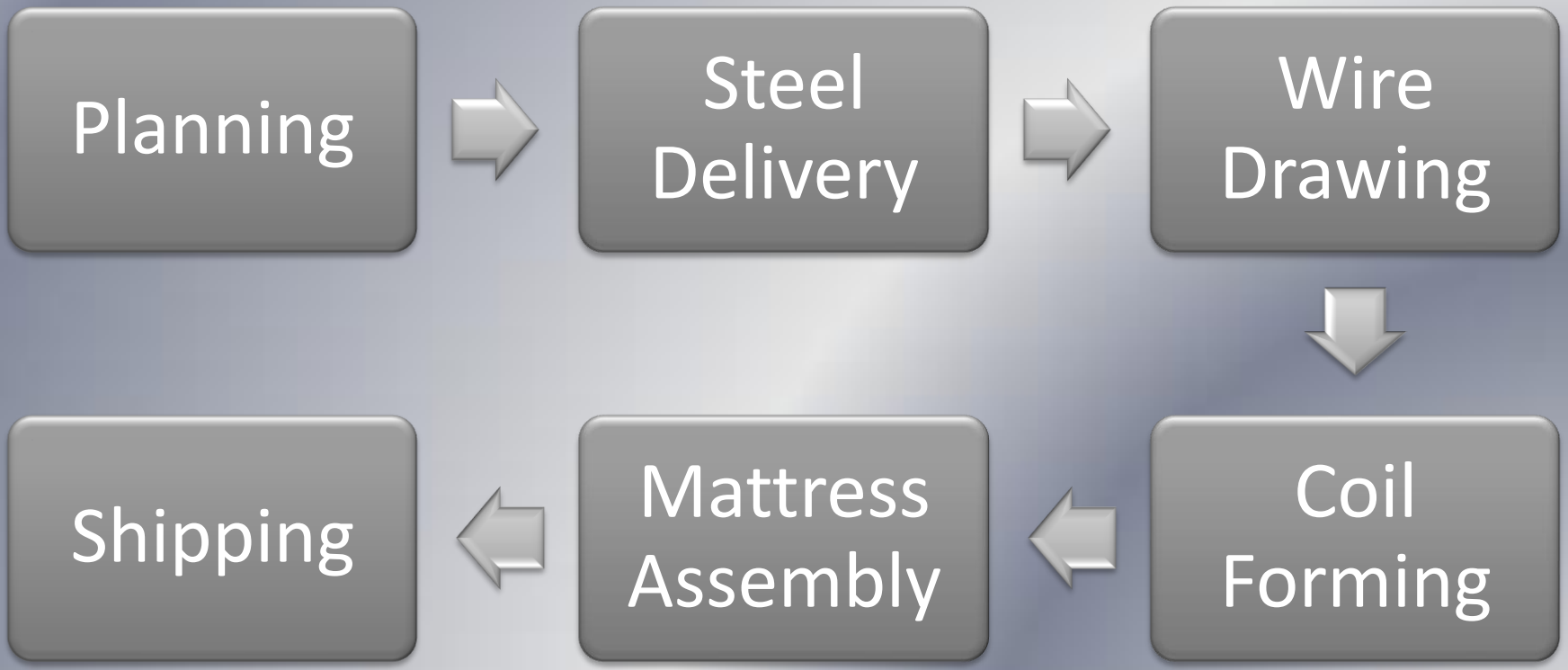
PRODUCTION PROCESS



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PRODUCTION PROCESS

PLANNING

- Dimensions of the springs and mattresses to be produced confirmed
- Modular process followed to ensure ease of handling, optimised transportation and speedy construction

STEEL DELIVERY

- Specially selected steel delivered to wire drawing partner in 2000kg coils

WIRE DRAWING

- Steel cleaned and then drawn to regularise size
- Steel put through small die to ensure uniform diameter and tensile strength

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PRODUCTION PROCESS

COIL FORMING

- Steel formed into spiral springs according to project specification
- Each length individually coded in preparation for mattress assembly

MATTRESS ASSEMBLY

- Mattresses bench-assembled by team of 3-5 individuals
- Spiral springs woven in sequence to form single layer which is then tack welded
- For multiple layer mattresses, layers are interwoven with layers kept apart with spacer bars
- Once dimensions have been checked the mattress is welded

SHIPPING

- Mattresses individually labelled and palletised in sequence for shipping in 40' high cube containers

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CERTIFICATION

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EUROPEAN STANDARDS

- European Standard EN 1143-1 (2010) the benchmark for rating vault and strongroom resistance to attack
- Structures classified to a **Resistance Grade** (0-XIII) based on **Resistance Value** (time taken to gain 'complete access')
- Additional 'CD' and 'EX' designations applied where structure meets additional resistance criteria
- Independent tests show that ASP spiral armouring exceeds requirements for highest grade possible - **Resistance Grade CD EX XIII**

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EN 1143-1 (2010) CLASSIFICATIONS

Resistance Grade	Resistance Value	RV for EX Designation	RV for CD Designation
0	30	-	-
I	50	-	-
II	80	4	-
III	120	6	-
IV	180	9	-
↓↓	↓↓	↓↓	↓↓
X	1350	68	10000
XI	2000	100	10000
XII	3000	150	10000
XIII	4500	225	10000

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TESTED SOLUTIONS

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TESTING OVERVIEW

- To prove effectiveness against Thermal, Mechanical and Explosive attack
- Undertaken by BRE Global and TPS in 2009 and 2011
- Structure under test – a typical section of a two wall / control corridor-based vault

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THERMAL LANCE TEST

- Objective to create 350mm aperture in external wall within 2 hours
- Test halted after only 1 of 28 lances used pierced wall in 2 hour period
- Resistance value equated to 6107RU - 65% above value required for Resistance Grade XIII

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DIAMOND CORE DRILL TEST

- Objective to create 350mm aperture in both test structure walls
- External wall: aperture created in time equivalent to 9,991RU - exceeding Grade XIII by 100%
- Internal wall: aperture created in time equivalent to 17,575RU - 75% above threshold required for **Resistance Grade CD XIII**

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EXPLOSIVE BLAST TEST

- Objective to create 350mm aperture in both test structure walls using SEMTEX
- Walls tested individually
- Identical methodology
  - 4 holes for explosive charge
  - 22 holes in circular pattern to form stitch drilled weakness
  - Simultaneous detonation

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EXPLOSIVE BLAST TEST - EXTERNAL WALL

- Both faces experienced severe damage
- Breaching evident local to position of attack charges

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EXPLOSIVE BLAST TEST - INTERNAL WALL

- Front face
  - Partial de-lamination
  - Remaining concrete and spiral armouring undamaged
- Rear face
  - Some minor cracking evident
  - Attack with sledgehammers and chisels failed to remove face

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EXPLOSIVE BLAST TEST - CONCLUSION

- Both tests failed to create 350mm aperture required to allow ‘complete access’
- Structure under test achieved highest possible security classification under EN 1143-1 (2010) –

  Resistance Grade EX XIII

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TESTING CONCLUSIONS

- The tests undertaken show that ASP's armouring elements deliver the highest possible resistance to attack according to the latest European guidelines

RESISTANCE GRADE CD EX XIII

- Furthermore, the significant 'over-performance' in some tests shows that ASP armouring elements provide a high level of 'future-proofing' against more aggressive methods of attack yet to be developed

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DESK STUDY - ATTACK ESTIMATES

Weapon	External wall as part of two-wall system	Internal wall standalone
Bare High Explosive (5kg)	Potential breach of external wall – No damage to internal wall	Extensive damage to front and rear faces but no breach
Bare High Explosive (10kg)	Breach of external wall – Superficial damage to internal wall	Extensive damage to front and rear faces but no breach
Bare High Explosive (20kg)	Breach of external wall – Front face damage to internal wall	Potential breach
RPG-7	Detonation within external wall causes breach – Front face scabbing to internal wall	Penetration into wall causing extensive damage to both front and rear faces

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MANAGEMENT SERVICES

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DESIGN

- Through LinkStudPSR, ASP provides a full design service to clients
- Primary focus on providing all standard details required to achieve security ratings specified
- All detailing undertaken by qualified Structural Engineers experienced in general construction and high-security structure creation

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DESIGN

- Complete method statement supplied for installation, fully integrated with overall project design drawings
- Includes detailed specification on concrete pour
- Full integration with Gunnebo to ensure vault door and ancillary services meet requirements for Resistance Grade specified

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DESIGN

- ASP always requests involvement at earliest stage to eradicate any design conflicts between overall building and integrated high-security structure
- Embedded relationship between ASP and project Structural Engineer likely to positively impact quality, costs and timeframes

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TRAINING

- On-site installation designed to be simple and efficient
- ASP committed to ensuring all installers receive full training
- Training normally delivered in UK but technical and training support occasionally delivered on-site

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SECURITY & CONFIDENTIALITY

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SECURITY & CONFIDENTIALITY

- High-security projects attract interest from well-resourced syndicated criminals prepared to use all means available to gain information that could support an attack
- ASP aims to work closely with all key parties involved to ensure comprehensive security procedures are put in place well in advance of project start-up
- ASP has drawn up a series of security recommendations that will help protect project information and all project personnel potentially vulnerable to approach

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ASP RECOMMENDATIONS

- ASP provides a series of recommendations under a variety of category headings -
  - Professional Team
  - Protection of Information
  - Contractor Personnel
  - Site Access Controls
  - Site Confidentiality

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CLIENTS

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CONTACT

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