SPS

samaras SYSTEMS

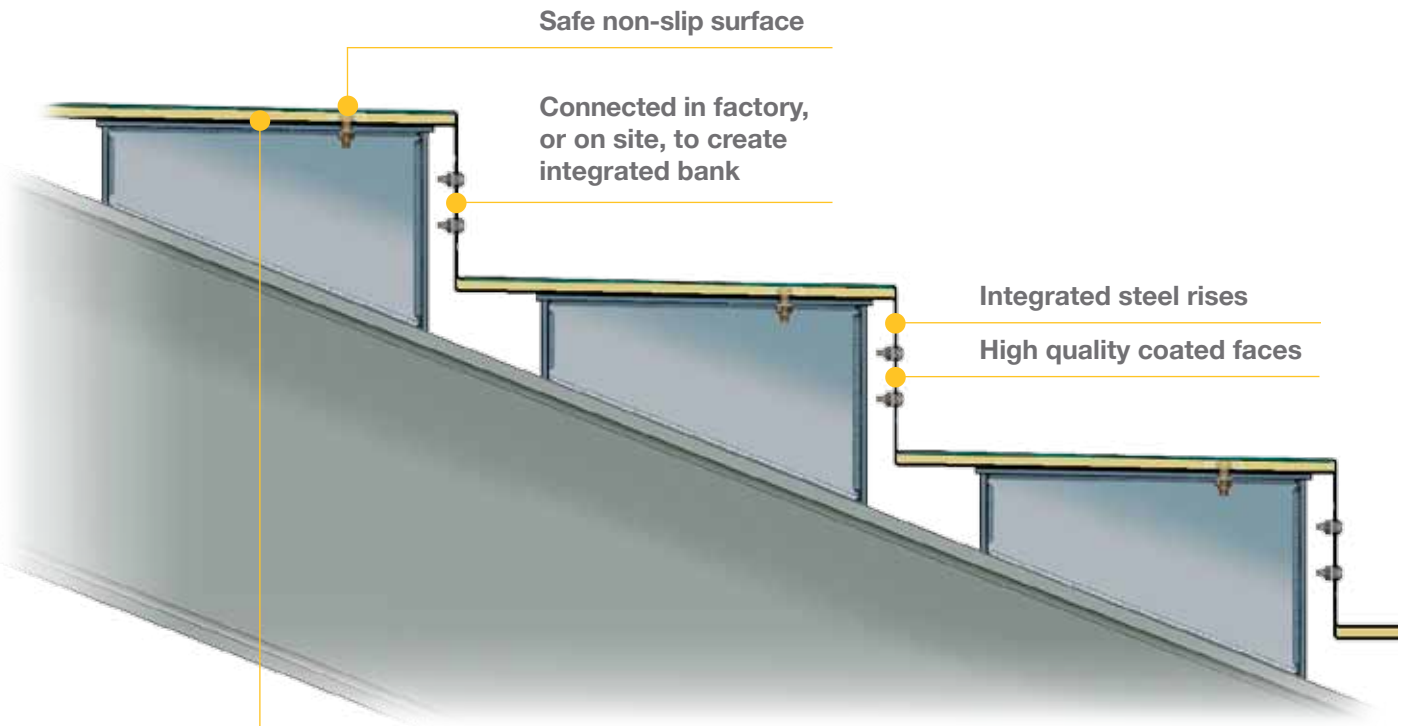
SPS stadia

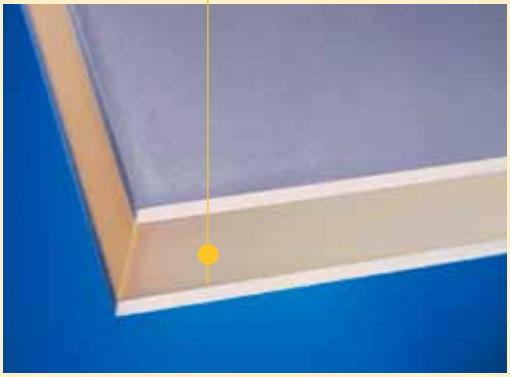



a better way to build

intelligent engineering

SPS prefabricated terracing or riser units are used to create raked seating or standing platforms in stadia and arenas. They are manufactured from steel and SPS in a range of tread widths, rise heights and long clear spans. Their performance is designed to match international stadia and building standards for structural strength and safety, audience comfort and seating unit support. They are delivered to site fully finished and are installed using conventional steel erection practices.





Sandwich Plate System (SPS)

SPS is a structural composite comprising two metal plates bonded with a polyurethane elastomer core.

SPS has a high strength to weight ratio making it an excellent alternative to both stiffened steel and reinforced concrete.

SPS is used in a wide variety of applications including structural flooring, stadia and arena terraces, ship repair, ship building and bridges.

SPS stadia

SPS saves weight, time and cost in the construction of high quality stadia and arenas.

smart

SPS weighs a fraction of concrete terraces. This enables a more efficient use of materials by creating the opportunity to reduce the frame and foundation weights. SPS allows greater versatility in the architecture of a stand with longer economic spans and more serviceable concourse space.

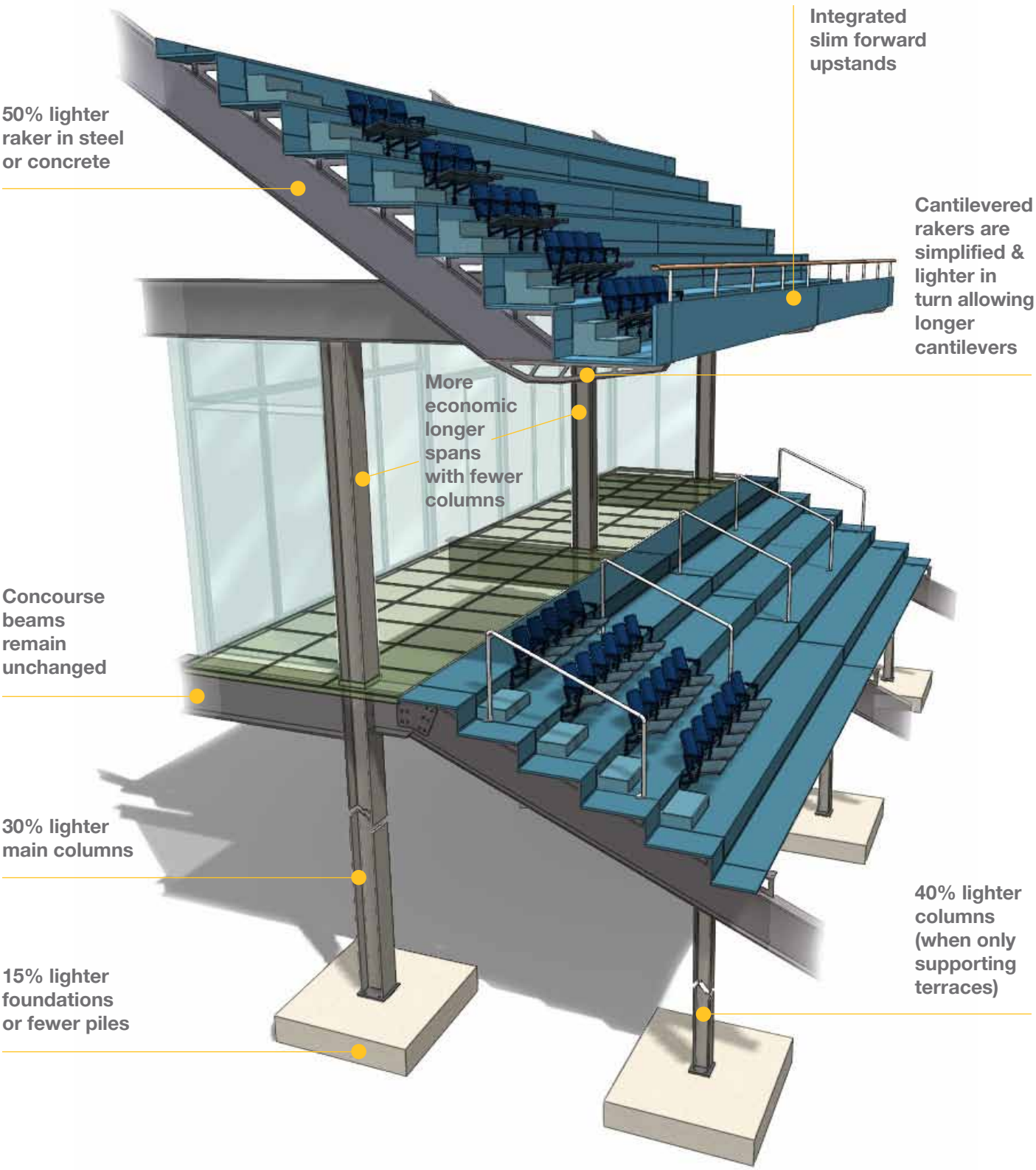
fast

SPS can be erected quickly and easily because they only weigh around one tonne per terrace and use standard steel connection details. 6-10 times more SPS can be transported per truck and 3-4 times more can be lifted per hoist than comparable precast concrete units. As a result, using SPS reduces site complexity and frees main cranes to push forward other areas of the programme.

economic

SPS delivers significant cost savings and increased revenue opportunities to stadia and arena projects. Typically total cost savings can be between 15% and 25%*. This comes from the reduction in structural frame and foundation weights as well as a shorter programme. Additionally this shorter programme offers earlier commissioning and revenues.

** As assessed by HOK Sports, Mott Macdonald and Franklin Sports Business in their January 2008 "SPS Terraces Design & Cost Assessment".*


Integrated slim forward upstands
50% lighter raker in steel or concrete
Cantilevered rakers are simplified & lighter in turn allowing longer cantilevers
More economic longer spans with fewer columns
Concourse beams remain unchanged
30% lighter main columns
40% lighter columns (when only supporting terraces)
15% lighter foundations or fewer piles

smart

SPS is light, versatile and carbon efficient.

light

SPS weighs less than one quarter of a comparable precast concrete terrace. This efficient use of materials allows a significant reduction in the weight of the structural frame and foundations - raker beams can be 50% lighter, columns 30% and foundations 15%.

versatile

The intrinsic qualities of SPS provides more choices in the architecture of a stand, stadium or arena and increase the opportunities for making a venue more profitable. Longer spans are possible for a similar cost to a concrete, terraced short span structure and the dynamic qualities of SPS make it eminently suitable for stadia hosting sporting and music events.

sustainable

Stadium structures incorporating SPS is significantly less steel and concrete and require 50% fewer vehicle movements. When combined this reduces carbon emissions for a typical structure by 10-15%, which makes using SPS popular with planning authorities and good for the environment.

And at the end of a stadium's service life, SPS are readily demountable for re-use in another structure, or the constituents of SPS – steel and elastomer – can easily be reclaimed and recycled.

"We designed the arena bowl with SPS in mind; nothing else could have delivered the solution we wanted."

Damon Lavelle, Architect HOK Sport

fast

SPS terraces save construction time, simplify projects and allow earlier opening.

time saved

SPS can shorten construction programmes by 15%, because 3-4 times more SPS can be lifted per hoist than precast concrete units. With crane time on a project's critical path, fewer terrace lifts allow other elements of the build to be significantly accelerated.

less complexity

SPS is quick and easy to erect: all structural connections use standard steel detailing. Fixture points for seats and other attachments can be pre-drilled in the factory. Joints can be made watertight simply and effectively, reducing the need for additional under-stand protection. Furthermore, even in confined spaces with restricted crane access SPS can be lifted into place using a tele-handler.

open early

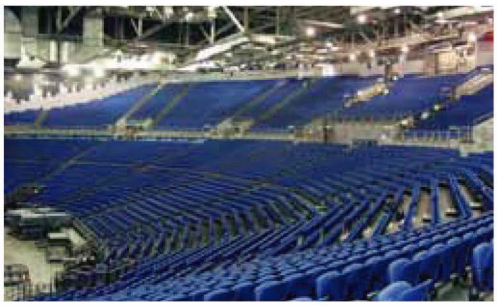
Using SPS makes it easier to meet demanding stadium project schedules. Reducing the programme offers owners earlier opening for new venues and the opportunity to complete extension projects within ever shortening off-seasons.

"There is no doubt that SPS provided the right solution for our tight timetable"

Charles Barnett, Chief Executive, Ascot Racecourse

economic

SPS can achieve project cost savings of over 20% and increase revenue opportunities.



reduced costs

SPS saves structural schedule costs as outlined in the preceding pages. While every stadium has different needs, SPS typically delivers between 15-25% project savings. And being more versatile, greater savings are available in the most demanding applications, such as elevated bowls and cantilevers.

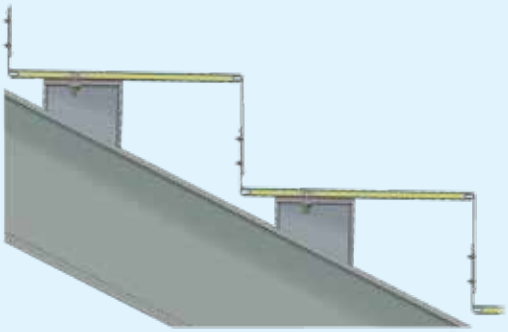
increased revenue

The economic benefits of shorter programmes, which allow a new stand or stadium to open early, are also significant. Hosting just one additional game can generate revenue of more than £40 per seat. This can add contribution equivalent to 25% of the total savings.

"We can use SPS to update Crusaders existing site and then use them at the new ground when the club relocates; this will save time and money."

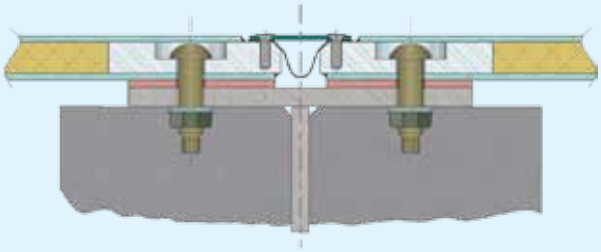
Olan Crowley, Architect, Frank Crowley Architects Ltd

details



connections

For most stadium projects single ‘Z’ shaped SPS units are factory pre-assembled into either triple or quadruple terrace configuration ensuring that the majority of connections are completed in off site factory conditions. The remaining on site connections are throughbolted providing an integral watertight structure.

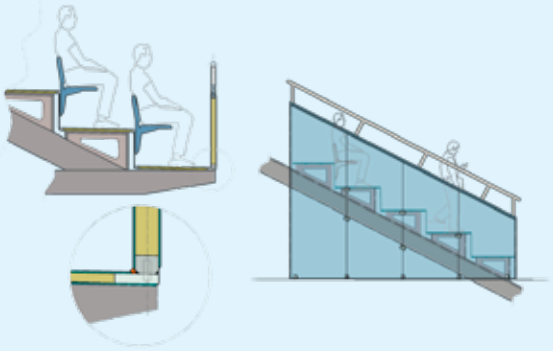


butt & seat joints

Joints between SPS units are robust and simple to complete on site because of the precise tolerances to which each SPS unit can be fabricated. The butt joints are accurate and the units readily attached to the raker seats. The joint allows for expansion without compromising the integrity of the waterproof seal.

expansion joints

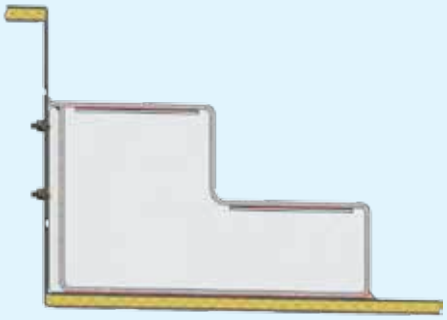
Horizontal and vertical surfaces of movement joints between adjacent banks of terraces incorporate an integral drainage solution with a durable cover plate. The membrane joint provides a watertight and smoke resistant seal with natural drainage that is easy to install and simple to maintain. The overlapping plates provide protection to the membrane joint and a non-slip finish, which is consistent with the SPS.



upstands & balustrades

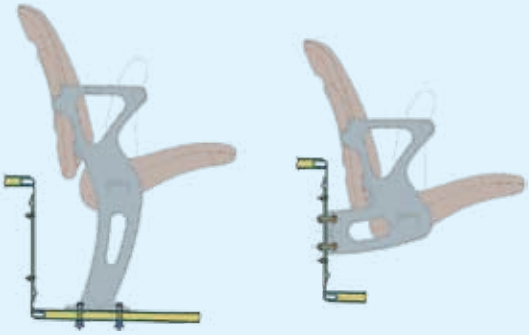
The upstands and balustrades required at the forward and side edges of terraces can be made with SPS plates that are either bolted or welded to the SPS or to the supporting structure. The SPS plates and connection details are designed to have sufficient strength to resist the factored loads and to provide a suitable seating arrangement for any rail mountings in accordance with the Green Guide in the UK, which is also known as “The Guide to Safety at Sports Grounds”.

SPS has been designed to incorporate all of the detailing required in a modern stadium while utilising the inherent benefits of steel and off-site prefabrication to offer an architecturally elegant and construction efficient solution.



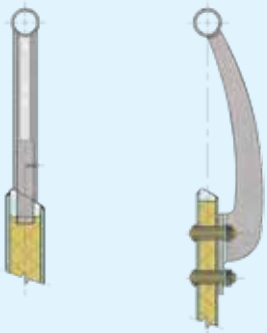
steps

Steps for SPS use lightweight steel boxes, which are acoustically damped. These steps, which can often be placed by hand, are then glued and fixed to the terrace with hidden mechanical fasteners. They have the same coating and nonslip finish as the SPS, with a contrasting strip positioned at the nose.



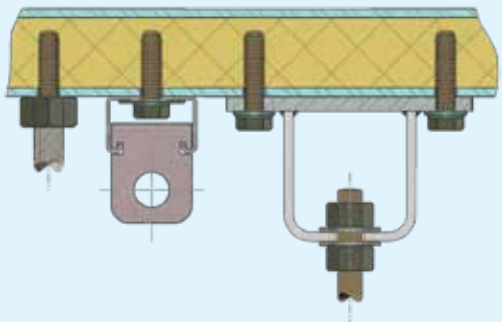
seat connections

Seats are connected to either the treads or rises of SPS using industry standard mechanical fasteners. Holes for these fasteners can be made either in the field or pre-drilled as part of the fabrication process. SPS have been designed for bolting individual seats or posts that accept seat rails.



handrail connections

Handrails make architectural statements and upstands vary from stadium to stadium. SPS upstands lend themselves to robust and elegant solutions to which the handrails can be readily connected.



services

Brackets and hangers for the normal attachments required in stadia can be located and fixed on site to the underside of the tread with self-tapping screws. Creating openings and penetrations in SPS uses industry standard techniques and is easier, safer and quicker than in concrete.

NB: Construction details not assessed as part of BPS7007

performance

SPS meet all the performance requirements of modern venues hosting sports or entertainment events including rock concerts.

structural

The design and behaviour of SPS is well understood and can be readily predicted by numerical analyses. Deflections under a full static load are less than L/1000 and have been verified by full scale crowd tests on a range of structural configurations.

SPS forms a stiff structure with a natural high frequency. Resonance build-up is prevented and their dynamic response is within the criteria set by UK regulations.

acoustic

The elastomer core of the SPS tread dampens structure-borne noise. SPS feels comparable to walking on concrete.

The acoustic insulation provided by SPS treads is typically 35 dB and is increased by architectural cladding to the underside.

safety

SPS sections are coated with an industry standard non-slip coating consisting of a highly durable grit held in place by an epoxy or polyurethane binder. These coatings have demonstrated excellent durability and significant slip resistance over standard concrete, especially in wet conditions.

SPS can meet ratings of up to 120:120:120 minutes of fire resistance for loadbearing capacity, integrity and insulation. This is achieved by factory applying industry standard fire protection to the underside of the SPS.

through-life

SPS have factory applied corrosion protection which has been shown to last considerably longer than the life expectancy of a typical stadium. These coatings are available in a vast range of colours.

developed by

Intelligent Engineering

Intelligent Engineering (IE) was established to develop and commercialise SPS technology and now licenses the use of SPS to market leaders by sector and by application.

IE's team of commercial and technical staff work in four offices to build markets for SPS, p ovide technical advice, secure materials approvals and continually advance SPS technology. The team is supported by an Advisory Board of senior technical and business representatives for each target market.

with BASF

Intelligent Engineering developed SPS with BASF, the world's largest chemical company. BASF is a global leader in the development of polyurethane technology and has regional offices to support SPS p ojects

leading fabricators

Intelligent Engineering has manufacturing and fabrication partners and licensees for SPS around the world. SPS Terraces are manufactured by some of the world's leading steel production and fabrication companies.

tested and approved

SPS Terraces have undergone tests including full-scale static, dynamic and fi e tests to the requirements of BRE Product Standard BPS7007 – Performance requirements for grandstand units (see tables 1(a) and 1(b)).

BRE Certification

Certificated to BPS 7007
Approved Building Product ABP008

ie intelligent engineering

BASF The Chemical Company

bre

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stadia and arenas

SPS save weight, time and cost in the construction of high quality stadia and arenas

buildings

SPS enable significantly lighter structu es with shorter, less risky construction programmes

bridges

SPS are much lighter and less complicated than conventional concrete and steel structures.

ship repair

SPS is used extensively throughout the world in maritime repairs, including the refurbishment and strengthening of bulk carriers, ferries, liners, oil rigs and offshore structures.

ship building

SPS is used in components for new build vessels that improve efficiency during fabrication and performanc in service

For more information on SPS and our products:

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intelligent engineering