NEWSLETTER

INSTITUTION OF INCORPORATED ENGINEERS, SRI LANLA - UAE BRANCH

Business Centre, Meydan Hotel, Nad Al Sheba, PO Box 66691, Dubai, UAE. Tel: +971503863066 Email: iiesluae@gmail.com Web: www.iiesluae.org. Established on 18th July 2006.

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The 46th Annual Sessions and AGM of IIESL – Session 2023-2024

The 46th Annual Sessions and AGM of IIESL – Session 2023-2024 were recently convened. The Institution of Incorporated Engineers, Sri Lanka (IIESL) hosted its Annual Technical Sessions on 27 June 2024 and the 46th Annual General Meeting for the session 2023-2024 on 29 June 2024. The events were conducted with in-person participation at the Hotel Waters Edge and the Lotus Hall at the Bandaranaike Memorial International Conference Hall, Colombo.

The Technical Sessions, under the theme "INCO FUSION," were a platform for IIESL's members to share their knowledge, ideas, and experiences, thereby contributing significantly to the advancement of the engineering industry. The chosen theme, “Shaping the Future of the Engineering Industry of Sri Lanka,” underscored their role in exploring the latest trends, innovations, and best practices.

Distinguished speakers at the sessions included:

- Mr. Thilan Wijesinghe, Chairman Sri lanka Institute of Nanotechnology, Former Chairman, BOI
- Dr. Uthayasanker Thayasiyam, Head, Dept of Computer Science and Engineering, University of Moratuwa
- Mr. Dian Gomas, Former Board Director of MAS Holdings, Former Chairman of Hela Clothing

Continued on to…Page 2 and 3

18th Annual Sessions and the AGM of IIESL UAE Branch

Annual Sessions and the AGM of the IIESL UAE Branch will be held on 15 September 2024.

Await details of the event.

Reserve your day….

IIESL UAE Branch - Election to Executive Committee for Session 2024/2025

Notice Calling Nominations

Nominations are now open for corporate members to apply for positions on the executive committee for the 2024/2025 session. This is a unique opportunity for your growth and development. Associate members are only eligible to apply for positions on the Executive Committee. Closing date for nomination is on **09th September 2024**.

Click the links below to download the necessary documents:

- ✓ **Invitation for nominations - Click Here**
- ✓ **Nomination paper - Click Here**

Photo Gallery of the Technical Session,

Lighting the traditional oil lamp

Eng. Dr. Thoradeniya addressing the gathering

Dr. Uthayasanker

Mr. Thilan Wijesinghe

Mr. Dian Gomez

Resource persons joining the panel discussion

Preforming arts entertained the audience and made the evening colorful

46th Annual General Meeting for the Session 2023-2024

The ceremonial proceedings of the 46th Annual Sessions of the IIESL commenced with the arrival of special invitees, council members, and IIESL members. The Chief Guest, Senior Professor Ananda Jayawardena of the University of Moratuwa, the special guests, and foreign delegates from India, Bangladesh and Nepal received a warm welcome from the Council of Management, Past Presidents, and the Board of Trustees of the IIESL. The event began with the traditional lighting of the oil lamp, symbolizing the dispelling of darkness and the spread of knowledge. The national anthem was sung, and Eng. Sampath Bandara delivered the welcome address, followed by the keynote address from Eng. Mrs. Pushpa Jinadasa. The foreign delegates were congratulated, and Council members exchanged mementos with them. The newly elected Fellows of the IIESL were honored with certificates presented by the chief guest.

The AGM was a momentous occasion, marked by the delivery of the presidential address by Eng. Dr. Bhadranie Thoradeniya, the president. This was followed by an insightful address from the chief guest, Senior Professor Ananda Jayawardena, who also presented mementos. The event culminated with the election of Eng. S B G C P Sampath Bandara as the IIESL President for the Session 2024-2025. He was subsequently inducted as the President of the IIESL by the outgoing President, Eng. Dr. Thoradeniya, followed by a vote of thanks by Eng. U K S Hettige.

Photo Gallery of the Ceremonial Sessions and AGM

Arrival of the President, Chief Guest, and the guests

Lighting the traditional oil lamp

Singing the National Anthem

Eng Sampath Bandara delivering the welcome address

Eng. Pushpa Jinadasa delivering the Keynote address

Eng. Dr. Bhadranie Thoradeniya delivered the presidential address.

Dr Thoradeniya is inducting the elected President, Eng. Sampath Bandara

Eng U K S Hettige delivering the Vote of Thanks

President and the Immediate Past President with the past and present members of the IIESL UAE Branch

From left: Eng. W A Kulathilake, Eng. Keerthiratne, Eng. Deepal Rajaguru, Eng. Dr. Jayantha Hettiarachchi, Eng. Dr. Bhadranie Thoradeniya (President), Eng. S.B.G.C.P. Sampathbandara (president Elect.) Eng. Priyanga De Mel, Eng. C. Wanasinghe, Eng. Sunil Perera (Not in the picture: Eng. Sisira Walaliyadde)

Eng. Priyanga De Mel was elected as a Fellow of the IIESL

Eng. Priyanga De Mel receiving his fellowship certificate from Sr. Prof. Ananda Jayawardena

The Chairman of the IIESL UAE Branch, Eng. Priyanga De Mel achieved a significant milestone by being elected as a Fellow of the IIESL during the ceremonial session of the 46th Annual Sessions on 29 June 2024 at the BMICH, Colombo. His achievement is a prestigious honor and a well-deserved award. As members of the IIESL UAE Branch, we congratulate him and celebrate his accomplishments with great admiration.

Eng. De Mel has been actively managing the IIESL UAE Branch as Chairman for the third consecutive year. This achievement not only reflects his personal success but also recognizes the Branch as a whole. Celebrating the success of a branch member is our habit, and it's a way to recognize Eng. De Mel as a hands-on manager.

IIESL Technical Visit to Colombo Port

On June 28, 2024, the IIESL arranged a technical site visit to the bustling Colombo Port. Upon our arrival, Mr. Malinda (Ports Authority Engineer) warmly welcomed our team and provided a comprehensive briefing on the remarkable construction works taking place at the site. His guidance was instrumental as he led us on an insightful tour of the area, allowing us to witness the various ongoing projects firsthand and gain a deeper understanding of the work in progress. The visit covered a detailed study of the projects underway at Colombo Port.

IIESL Council of Management 2024-2025	
Eng. S.B.G.C.P. Sampathbandara	**President**
Eng. Assoc. Prof. Bhadranie Thoradeniya	**Immediate Past President**
Eng. K. Ariyawansa	**Past President**
Eng. P.A.D.R. Chandrasiri	**Past President**
Eng. M.P.A. Gunawardena	**President Elect**
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Eng. K.M.I.P.A. Bandara	**Eng. S.P.S. Martino**
Eng. K.S.G. Ariyaratna	**Eng. T.R. Dahanayaka**
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Eng. W.D. Darshana	**Eng. R.M.I.U.B. Ranasinghe**

IIESL Board of Trustees 2024-2025	
Name	**Position**
Eng. S.B.G.C.P. Sampathbandara	President
Eng. Assoc. Prof. Bhadranie Thoradeniya	Immediate Past President
Eng. M.P.A. Gunawardena	President Elect
Eng. V.H.M.S. Babalagama	Secretary
Eng. K.G.I. Deshappriya	Treasurer
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Eng. C. Wanasinghe	Representing PPF
Eng. K.P.C. Jayawardena	Representing Fellows
Eng. (Mrs.) Namalie Siyambalapitiya	Representing Fellows
Eng. (Mrs.) Chithra Boteju	Representing Fellows
Eng. Sisira Walaliyadde	Representing Fellows

IIESL Editorial Board Committee 2024-2025	
Eng. M.P.C. Kumara	**Chairman**
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Eng. Assoc. Prof. Bhadranie Thoradeniya	**IPP Ex – officio**
Eng. M.P.A. Gunawardena	**PE Ex – officio**
Eng. V.H.M.S. Babalagama	**Secretary Ex – officio**
Eng. P.A.D.R. Chandrasiri	**Advisor**
Eng. S.T.J. Arawwawala	**Advisor**
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Eng. N.K.P.P. Waidyasekara	**Member**

Institution of Incorporated Engineers, Sri Lanka – UAE Branch

Business Centre, Meydan Hotel, Nad Al Sheba

P.O. Box 66691, Dubai, United Arab Emirates

Tel: +971 503863066

Email: iiesluae@gmail.com , Web: www.iiesluae.org

SRI LANKAN PROFESSIONALS ASSOCIATION
UNITED ARAB EMIRATES

SLPA Celebrated its First Anniversary as a Registered Professional Association

The Sri Lankan Professionals Association in the UAE (SLPA-UAE) recently marked a significant milestone—its first anniversary as a registered professional association on June 1, 2024. Representatives of the SLPA-UAE, along with their families and members of affiliated associations, came together for a special social event. The celebration took place on an elegant yacht, cruising through Dubai Marina, providing a memorable experience for everyone in attendance.

The recent social gathering hosted by SLPA-UAE was a significant moment in the organization's history, as it was the first event of its kind since its establishment. Attendees had a wonderful opportunity to personally connect with and learn from the esteemed founding members of the organization. IIESL-UAE is a founding association of the SLPA-UAE. Over many years, it has played a vital role in forming the SLPA in the UAE. Finally, the successful establishment of the Sri Lankan Professionals Association in the UAE was celebrated in 2019.

SLPA extended its gratitude to Ceylon Bakers for providing the participants with delicious food and to Dubai Lanka News Channel for its exceptional media coverage. Janaka Dandeniya, a member of IIESL-UAE, deserves a huge thank you for the outstanding arrangements to organize the yacht tour. Additionally, SLPA is grateful to all the affiliate association members for participating in the event and for extending their support, which helped make this event truly memorable.

Make sure to check out the beautiful event moments captured by our members.


Prof. Dayantha S Wijesekera

Prof. Dayantha Wijesekara Memorial Oration

IIESL held its first oration, the Prof. Dayantha Wijesekara Memorial Oration, on 30 May 2024 to commemorate his first death anniversary at Sanhinda Hall, SLIDA, Colombo. The oration was titled "Rise in Rice – the Great Sri Lankan Rice Story" and was delivered by Eng. Dr. T A G Gunasekara, Past President, IIESL. Eng. Anton Peris, Past President of the IIESL, delivered the introductory speech.

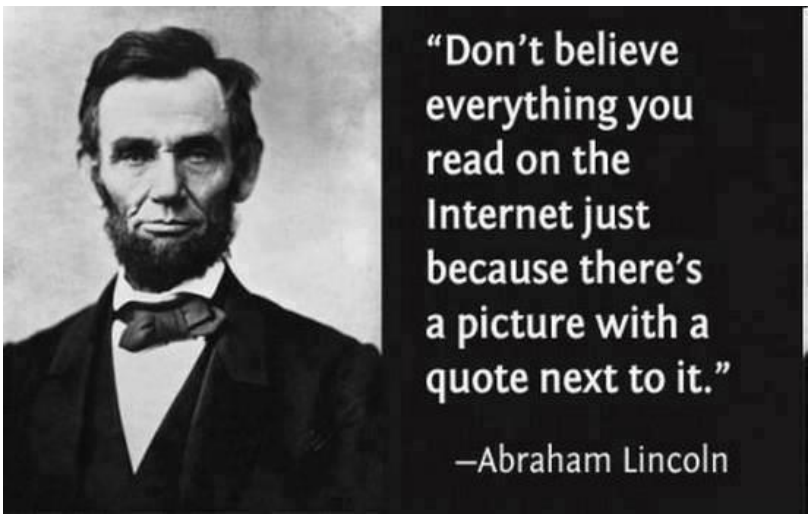
Eng. Dr. T A G Gunasekara delivering the Oration

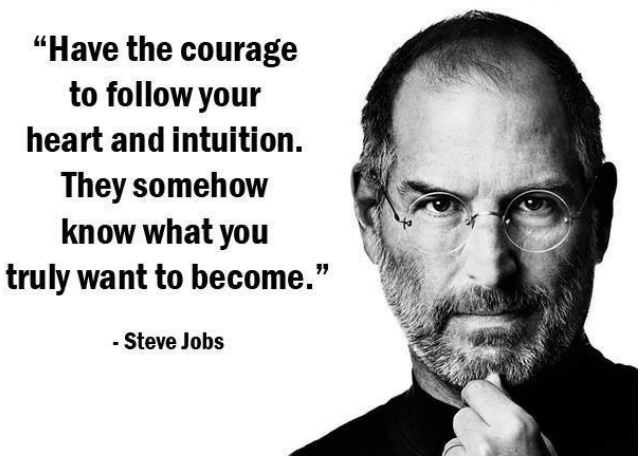
Mrs. Wijesekara with Dr Thoradeniya after garlanding the Dr Wijesekara's photograph

Prof. Dayantha Sepala Wijeyesekera, PhD (Edin), DEC (Eng), DUniv(UKOU), DLitt(OUSL), DSc(Mor), CEng, FIE(SL), FCIT(Lond), FICE(Lond), FNAS(SL), FIChemC, was a multifaceted individual who made significant contributions in various fields towards the progress of engineering profession. His diverse roles, including being a civil engineer turned academic, the first vice chancellor of the Open University of Sri Lanka in 1983, Chairman of the Tertiary and Vocational Education Commission (TVEC) in the Ministry of Youth Affairs and Skills Development of Sri Lanka, vice-chancellor of the University of Moratuwa from 1999 to 2005, the Past President of IESL, and a former Chairman of the Sri Lanka branch of the CIT, UK, and of the ICE, UK, and its Sri Lanka Country Representative, showcase his versatility and the breadth of his contributions.

In 2011, he was named chancellor of the University of Vocational Technology (UNIVOTEC). His paper, "Post-Tsunami Infrastructure Rehabilitation in Sri Lanka," was the runner-up at a paper competition at the Asia Pacific Convention of the Institution of Civil Engineers-ICE (London) in Kuala Lumpur, Malaysia.

Prof. Wijesekara was the guest of honour at the UAE Branch's 2nd Annual Sessions and AGM in 2007.





Risk Transfer Through Insurance and Other Modes in the Construction Industry

By Eng. Anura Jagoda

1. Abstract

Whether construction projects are small or large, they face significant challenges in terms of risks and uncertainties associated with the projects. These risks may affect the contract parties in various ways, such as causing losses, damages, or hindering the achievement of objectives and meeting expectations. Therefore, systematic risk management can help fulfill project obligations by identifying, controlling, and monitoring risks. Insurance is identified as one of the crucial risk management techniques in the construction industry.

Risk transfer mechanisms in the construction industry refer to strategies or methods employed to allocate or transfer project risks from one party to another. These mechanisms help manage and mitigate potential risks that could impact the project's cost, schedule, quality, and overall success.

2. Introduction

Risk is inherent in the construction industry and must be carefully managed to avoid hindering project progress. Construction insurance is a common technique globally, providing financial protection against unforeseen circumstances by transferring risks from clients, consultants, contractors, subcontractors, and other parties. Besides insurance, risks can be transferred through subcontracting specialized works, well-drafted contracts, performance guarantees, warranties, and alternative dispute resolution mechanisms.

Transferring risk is vital for achieving project objectives. Contractors typically use insurance, subcontracting, or modifying contract conditions. Most countries recognize insurance as a primary risk transfer technique, which shifts certain risks to insurers, who provide financial support during unforeseen events. However, some jurisdictions prohibit transferring one's own negligence in construction and design contracts.

Risk is defined as “an uncertain event or condition that, if it occurs, has a positive or negative effect on project objectives.” While risk cannot be eliminated, it can be minimized, managed, transferred, shared, or accepted.

3. The risk management process

The systematic risk management is described as a process of examining areas of risk and determining how each area should be properly addressed. It is a tool used by management to identify sources of risk and project uncertainty, determine their impact, and develop suitable management responses.

A risk management process outlines the steps needed to identify, control, and monitor risks. Within the framework of the risk management process, a risk is defined as any future event that may prevent the achievement of planned goals.
The risk management process can be initiated whenever the ability to meet objectives is at risk. Most construction teams face risks regularly. By implementing this risk process, monitoring and controlling risks can begin to eliminate uncertainties. The risk management process involves conducting risk reviews to identify and quantify risks. Then, the risks are documented, and the risk process helps take action to minimize the likelihood of their occurrence. This approach to the risk process will establish the right way to manage risk today.

Figure 3.2 Risk Management Theory (Tonks, 2006)

Construction projects can be tailored to control all types of risks by applying a systematic risk management process. This can be achieved by adopting a practical method of identifying, assessing, monitoring, and controlling risks in a structured manner.

3.3 Benefit of systematic risk management process

Construction projects with high levels of uncertainty often make many assumptions during the pre-contract stage, particularly in the feasibility study. Systematic risk management helps control these uncertainties by identifying risks and examining which assumptions could affect the project's success, focusing on actions to control risks, and measuring the cost-benefits of such actions (Godfrey, 2004).

The benefits of this process can be categorized as follows: risk identification, assessment, analysis and evaluation, treatment, and monitoring and review (Preeti, 2011).

Risk identification benefits: The critical phase of the risk management process is risk identification. The major benefit of this stage is that all risks are identified and considered in mitigation strategies. This implies that all identified risks can be potentially resolved in a planned way without affecting the project objectives and the end result. Another benefit of this stage is that all assumptions are listed and properly analyzed. Analyzing assumptions is a very important action in removing potential inaccuracies and inconsistencies at the start of the risk process.

Risk assessment benefits: This phase focuses on each identified risk and assessing its effect on the project. Measures are taken to rule out or minimize the assessed risk through discussion or debate among various stakeholders such as insurance companies, financial institutions, subcontractors, vendors, and so on. The greatest benefit of this process is to facilitate bringing various opinions to the table. In finalizing potential solutions, everyone's suggestions are highly regarded.

Risk analysis and evaluation benefits: It is part of the risk assessment process where each risk is accounted for along with its attributes, such as importance, likelihood of occurrence, recommendations to minimize risks, and stakeholder profiles. Each risk identified in the construction activities or process indicates the consequences of allocating ownership of the risk. Modifying policies and setting up contingencies are the benefits of a successful risk analysis and evaluation exercise.

Risk treatment benefits: The risk profiles have been finalized, prioritized, graded, and measured, leading to the implementation of the plan. Significant benefits in operational efficiencies and profitability are achieved through successful handling of risks.

Risk monitoring and review benefits: To support a successful action plan for a business, it is necessary to conduct continuous risk monitoring and review of risk treatment plans. This activity leads to long-term gains by incorporating lessons learned into better risk management strategies for future activities and evaluating the effectiveness of risk treatment measures (Preeti, 2011).

3.4 Risk Transfer in Construction Contracts

3.4.1 Overview of contractual risk transfer

Contractual risk transfer is a technique that involves allocating risk to the party best suited to manage it, though often, the party with greater bargaining power shifts the risk to the other party. This transfer can occur through insurance, legal means, or contractual agreements. Essential requirements for parties accepting risk include the ability to manage it, financial capability, and sustained existence.

Risk management tools include avoidance, modification, retention, and transfer. Factors influencing transfer include control over the risk, understanding of the risk, legal limitations, customary practices, and bargaining positions. Transferring risk doesn't reduce its criticality; it merely shifts it. Some risks cannot be transferred or may not be economically viable to do so, and must be absorbed by the owner. Insurance is the most common method of risk transfer in construction, along with subcontracting and modifying contract conditions.

3.5 Construction Contracts Insurance Requirements in the Construction Industry

3.5.1 Overall considerations for contract insurance requirements

Risks and uncertainties are inherent in construction projects, including accidents or other unforeseen events, leading to substantial losses or liabilities for clients or contractors. Therefore, parties often obtain construction insurance policies to protect their work against such risks and ensure that the benefits of undertaking a project outweigh its potential costs (Vetsch, 2009). A critical aspect of construction risk management is developing a balanced approach to risk allocation. Clients and contractors should be aware of clauses in the contract conditions that can significantly impact their ability to control and manage risks during contract negotiations (Muse and Kneisel, 1999). Insurance plays a major role in any risk management program by transferring designated risks to a financially sound party who, for an agreed premium, is willing to assume some or all of the financial responsibility against any losses (Barrie and Paulson, 1992).

Insurance and indemnity provisions in contracts address risk by allocating general liability between clients/owners and contractors for unforeseen consequences or defaults, and by requiring contractors or clients/owners to have insurance covering unforeseen losses and liabilities.

Insurance requirements in construction contracts typically aim to cover the majority of risks placed on the contractor by indemnity clauses. Any gaps between indemnity and mandatory insurance requirements must be accepted by the contractor who may choose to obtain additional insurance or accept the risk of fulfilling indemnity obligations from their assets.

Several types of insurance are available in the construction industry that cover different aspects of construction contracts. The most common types used by owners, contractors, subcontractors, vendors, developers, and design professionals include:

(i) Commercial General Liability Insurance;
(ii) Property Insurance;
(iii) Contractor's All Risk Insurance;
(iv) Professional Indemnity Insurance; and
(v) Wrap-Up Insurance
The insurance required for the construction contracts for various parties involved in the construction project is shown in Figure 3.5.**2**

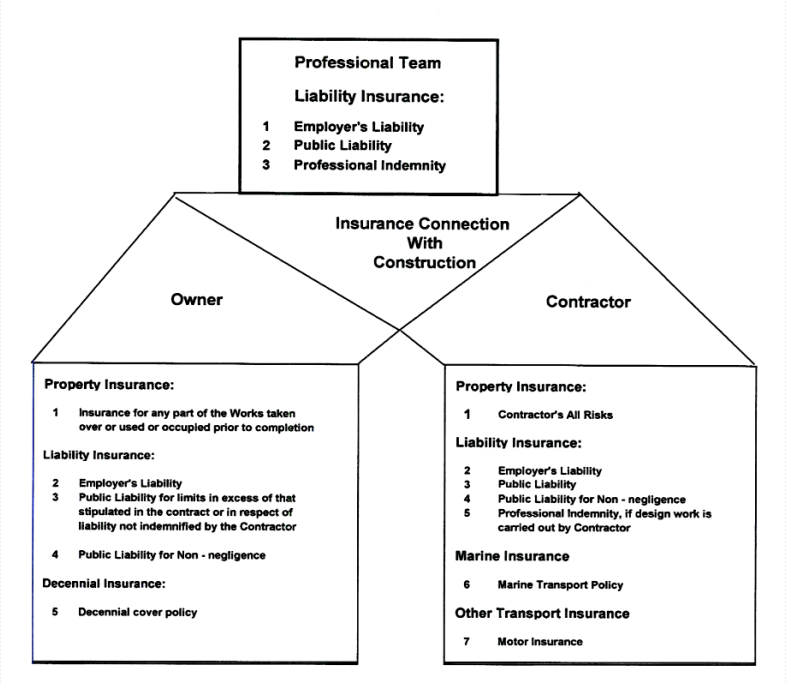


Figure 3.5.2 Insurance which may be required in the construction project (Bunni, 2003)

3.6. Types of Insurance Policies in the Construction Industry

3.6.1 Commercial General Liabilities Insurance

Commercial General Liability insurance covers liability resulting from damage caused by the insured to third parties. It includes coverage for death, personal injury, damage to property, or other losses sustained by persons other than the insured, and also covers the costs of responding to and defending claims arising from such liability. Coverage becomes effective when the liability event arises due to an incident that can be classified as an 'accident'. There are standard exclusions in this insurance, including:

a) Damage caused intentionally by the insured;
b) Injuries to employees of the contractor or consultant;
c) Pollution liability.

Different insurance companies may impose additional specific exclusions in their policies. However, the exclusions listed above are among the most critical in Commercial General Liability insurance, as they prevent claims for damages to the insured's own property and work from being recovered from the insurer (Vetsch, 2009).

3.6.2 Property Insurance

Property insurance covers physical property and assets against various risks such as fire, theft, vandalism, natural disasters (like earthquakes or floods), and other specified perils. It typically covers both real property (buildings and structures) and personal property (contents and equipment) owned by individuals, businesses, or organizations.

Property insurance excludes coverage for certain risks that could damage the insured's property, arising from a wide range of sources such as war, hostilities, rebellion, revolution, pollution, arson, vandalism, pressure waves caused by aircraft, temperature changes, and loss or damage due to occupation of the premises by the insured. Internal defects are also commonly excluded in property policies, including those arising from the use of faulty materials, workmanship, or design, as well as latent defects. These policies do not cover the cost of rectifying defects in the internal design or composition of the insured property due to faulty materials, workmanship, design flaws, latent defects, or inherent vice affecting its use and functionality (Vetsch, 2009).

3.6.3 Contractor's All Risk Insurance

Contractor's All Risk insurance covers direct physical loss or damage to buildings or other components of a construction project. It also includes coverage for materials and equipment on-site intended for incorporation into the work. These policies typically encompass the interests of the owner, main contractor, and all subcontractors and suppliers. Common exclusions in these policies include risks such as war, faulty design, faulty materials, faulty workmanship, nuclear incidents, and earthquakes. Deductibles are commonly applied in Contractor's All Risk insurance, with the amount depending on the size and type of the project.

3.6.4 Professional Liability Insurance

Professional liability insurance provides protection against claims for damages resulting from acts such as professional errors or omissions committed or alleged to have been committed by architects and engineers in performing design, construction management, and other duties. This type of insurance is also referred to as "Errors and Omissions" or "E&O" insurance. Coverage under professional liability insurance policies differs from that provided by general liability insurance, which typically excludes professional exposures such as design errors by design professionals. Professional liability policies often cover a broader range of economic losses (Alliant, 2011).

The coverage provided by professional liability insurance policies is subject to financial limits. If these limits are exceeded, the professional's own funds are at risk. Should these funds be depleted, any remaining loss would fall to the client (Vetsch, 2009).

Professional liability policies are commonly issued as annual contracts written on a 'claims made' basis but policies are rarely issued on an occurrence basis. This means the policy covers claims made against the professionals during the period of insurance, regardless of when the negligent act took place. Therefore, many contracts stipulate that the insurance must be maintained for a certain period after the completion of the work. This can be achieved through obtaining a run-off cover, for which a single premium is paid.

3.6.5 Wrap-up Insurance

The wrap-up policy typically provides coverage for the owner, contractor, subcontractors, and consultants instead of each party obtaining separate insurance policies for Commercial General Liability, Employer's Liability, and other types of liability risks. It covers the period of construction of a project and extends for an additional period after completion to address any issues that may arise during the warranty period. Once wrap-up insurance is in place, individual liability policies are no longer available to make claims that fall under the coverage provided by the wrap-up policy.

The advantages of wrap-up insurance include: a) contractors gaining access to higher policy limits at a lower cost; b) the policy extending for a period after project completion, providing security and stability in coverage for the owner. One notable drawback of wrap-up insurance is that it typically excludes coverage for damage to the project itself during construction, necessitating separate property policies to cover this risk (Vetsch, 2009).

In Summary

Risk Management practices in the construction industry

It has been observed that risk management practices in the industry are reasonably applied in major projects, involving risk identification, assessment, response, and to some extent, risk attitude. The primary aim of risk management is to effectively control various risks during the execution stage. The impact of risks invariably affects owners, consultants, contractors, and other project stakeholders. Implementing a formal risk management process in the construction industry may not eliminate risks entirely, but it can mitigate their undesirable impacts on the project.

To analyze the risk-transferring methods adopted by the major stakeholders in the Construction Industry.

One major method of risk transfer is through insurance, which addresses potential risks. However, insurance is not always the most efficient or economical method for all circumstances. Some risks can be effectively managed through methods such as subcontracting, risk retention,

risk avoidance, and risk reduction. Risk sharing is also a method to alleviate the burden of one party's risks by entering into multiparty agreements, such as Partnering and Integrated Project Delivery systems, with other parties involved in a contract.

Construction contracts insurance requirements in the construction industry.

The various analyses and responses from the construction industry clearly outline the insurance requirements. Professional liability, general liability, construction works insurance, property insurance, and workers' compensation are identified as particularly beneficial for organizations in construction. Given the inevitability of risk in any construction project, insurance becomes essential for transferring risk and achieving project objectives. Insurance, subcontracting, and sureties offer essential protection to contracting parties. These measures contribute to creating a less risky environment for the construction industry, thereby encouraging more companies to participate in construction business.

The contract provisions in the standard forms of Contracts used in the construction industry pertaining to the risk transferring methods.

It is evident from various research studies that standard forms of contracts generally allocate risk to the party best suited to manage it, but there is room for improvement in enhancing risk identification, analysis, and allocation to a deeper extent. Including a separate risk analysis form with tender documents in standard contracts would help identify various project risks not covered by contract provisions.

When a party is unable to effectively manage a risk, it becomes necessary to share or transfer that risk to another party capable of managing it. Projects fraught with uncertainties and lack insurance coverage may jeopardize the liquidity of contractors or organizations in the event of unforeseen circumstances or mismanagement during project execution. Conversely, when a client undertakes an insurance policy, it provides assurance to contracting parties that the project will not be jeopardized if the contractor fails to perform. Both clients and contracting parties benefit from having relevant insurance coverage for the project. Incorporating these insurance provisions into standard contract forms can encourage clients to initiate projects, thereby generating work for contractors and ultimately enhancing the construction industry as a whole.

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Eng. Anura Jagodage. NDT, MSc(QS), FIIESL, FRICS, FAIQS, AIQS(SL), I Eng.
Immediate Past Chairman, IIESL UAE Branch

Couplers – Mechanical Splicing of Reinforcing Steel Bars

By Eng. Ramanathan Arisanan

Introduction

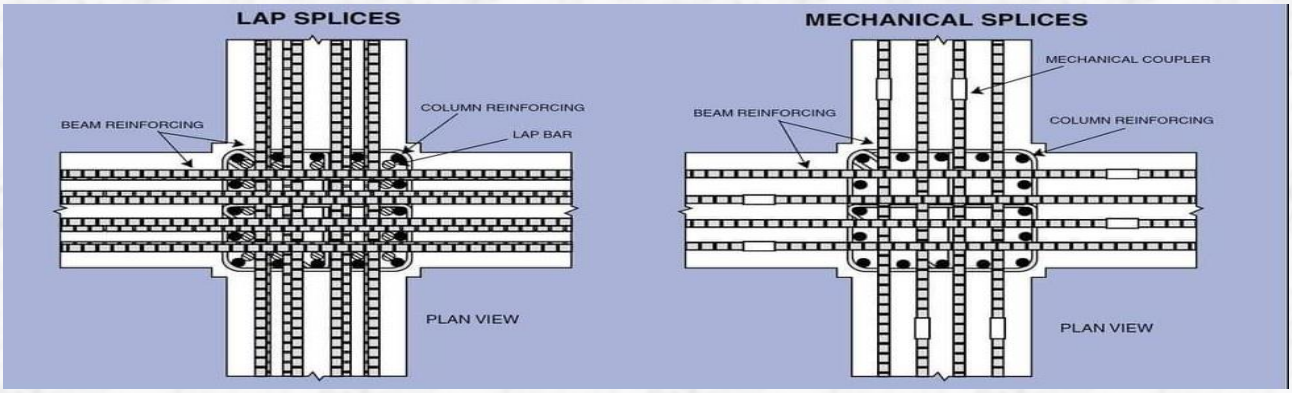
The overlap of reinforcement bars is essential for reinforced concrete structures. This process involves overlapping two parallel bars, as steel reinforcement is embedded in concrete to withstand tensile and compression forces under load. This enhances structural performance and ensures load continuity. Lapping requires more steel for design and installation. However, mechanical couplers can ensure load path continuity instead of lapping and reduce the amount of steel reinforcement needed. Mechanical couplers have been recognized for several years as a way to reduce the use of long bars. Both consultants and contractors now acknowledge the benefits of couplers in speeding up construction, increasing productivity, and simplifying design details. Streamlined reinforcement detailing, particularly in congested areas, minimizes fixing errors and makes detailing and fixing seismic reinforcement easier.

Location of Mechanical Couplers in a Structural Concrete Element

Mechanical couplers are commonly used in various structural concrete elements, strategically placed to maximize their benefits. They significantly reduce rebar congestion, improving concrete flow and consolidation, thereby enhancing the construction process's efficiency. Moreover, they provide greater flexibility in design options and are known for their cost-effectiveness. Typically manufactured from mild steel, couplers can also be made from alloys of different metals as long as they meet the minimum strength requirement (125% of the yield strength of rebar).

Couplers are commonly used in;

- Pile and foundation
- Column and beam
- Slab and wall
- Further expansion – pier, abutment, column, core wall, Pile, and Retaining wall



Typical Use of Mechanical Couplers

Types of Mechanical Couplers in Use

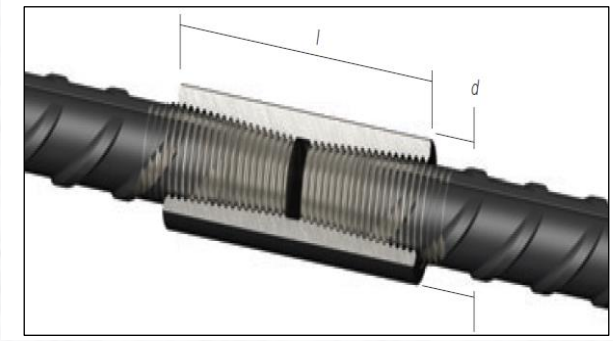
Different types of couplers are used in construction projects, depending on the site location, access to tools and machines, and the size of reinforcement steel.

- Threaded type coupler
- Pressed / grip type coupler
- Screw-type coupler

The three types of couplers require different fixing methods. The quantity of rebar to be fixed and the location will determine which coupler is most appropriate for a particular situation. The pictures below detail the mechanical coupler application locations.

❖ Threaded Type Coupler

The Tapered Thread coupler is designed for most applications requiring the joining of reinforcing bars. The ends of the rebar are cut square, and a tapered thread is cut onto the bar to fit the tapered thread coupler. The sleeve is then tightened onto the threaded bar end using a calibrated torque wrench. These couplers are available in sizes ranging from 12mm to 50mm.



Threaded coupler joining two bars

Threaded couplers joining bars of a RC slab

Advantages of using threaded couplers

- ✓ No need for specially trained or specialized workers to fix couplers at the site.
- ✓ No need of expensive machinery or tools. You only need a Torque or Pipe wrench ring.
- ✓ Couplers can be installed quickly and easily on-site.
- ✓ Less risk and easy to install couplers on site.

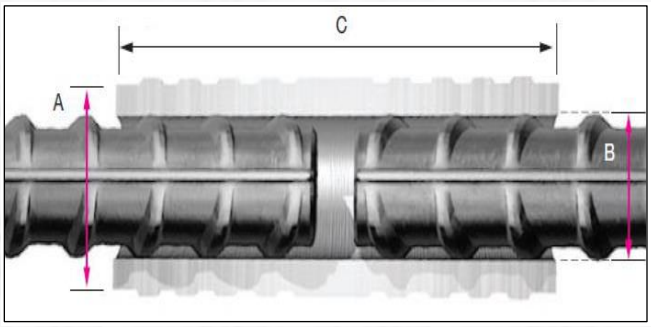
Disadvantages

- ✓ The thread pitch must be the same for the coupler and reinforcement steel bar.
- ✓ Extension of construction -There is difficulty in threading to the existing reinforcement bar; need *a special die machine* on site.
- ✓ Extension of construction - Especially the existing reinforcement bar above 20 mm dia., making a thread on the existing steel bar is impossible, so we can't use a threaded coupler *on* site.

❖ Pressed / Grip Type Coupler

Pressing technology is a mechanical coupler system designed to connect bar ends without threading; the two rebar ends are put into the coupler, each size half of the coupler length, and pressing it by the special pressing mould with the pressing machine. After pressing the coupler to connect, tighten with the rebar inside. These mechanical connections are mainly used

in the repaired working site, where some rebars are left outside of the projects without threading or some normal project sides that they do not want to do threading with rebar. Available to suit pressed / grip type coupler sizes 16mm to 40mm.



Pressed grip coupler connecting two bars

Couplers connecting column bars

Advantages

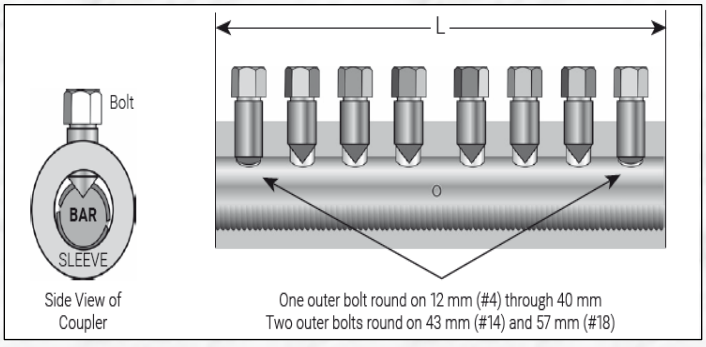
- ✓ No threading at ends, no cross-sectional area reduction, and just cut the end of the bar.
- ✓ Less repair or retrofit works at the site
- ✓ Easy to fit any cold shear cut bar end.

Disadvantages

- ✓ Special trained or specialized people are required to fix the coupler at the site.
- ✓ Need expensive machinery or tools, such as a higher-capacity hydraulic machine.
- ✓ High risk in handling installing a coupler on site.
- ✓ Useability at all locations depends on bar spacing and hydraulic tool head size.

❖ Screw Type Coupler

Screw-type couplers are used when it is not feasible to prepare the ends of the rebar for threading, such as when connecting the rebar to an existing structure that is already fixed on site. The coupler supports the two splice bars within the coupler, locking them in place with a series of bolts that shear off once tightened. These couplers are sometimes called "Alligator Couplers" due to their appearance. Screw-type couplers are available in diameters ranging from 10mm to 40mm.



Advantages

- ✓ Less access / remote location can be easily fix the coupler at the site
- ✓ Easy to fix any position of the reinforcement bar at the site.

Disadvantages

- ✓ Special trained or specialized people are needed to fix the coupler at the site.
- ✓ Need expensive machinery or tools such as air impact wrench or electric impact wrench machine.
- ✓ The final assembly may not be straight
- ✓ The impact wrench may not deliver enough torque.
- ✓ The head of the innermost screw does not shear off.

Cost Analysis

A cost analysis, based on reinforcement steel savings in lapping indicates that couplers are more cost-effective than laps, as shown in the figures below. Additionally, mechanical couplers simplify design parameters, are easy to install, and sometimes reduce the required reinforcement, resulting in cost savings at each joint.

Please Note—The writer considers the reinforcement bar lap length to be 62.5 times the diameter of the bar. Supplying, fabricating, and fixing reinforcement costs 4.8 AED per kilogram.

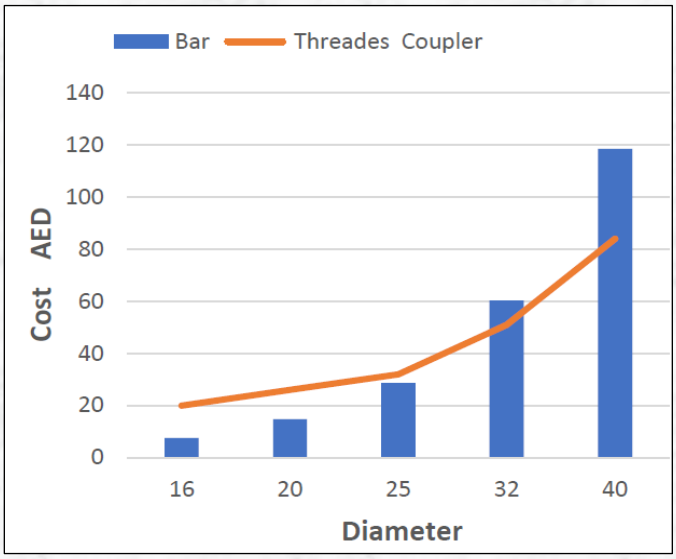


Figure 01-Cost Analysis – Threaded Coupler Vs. Bar

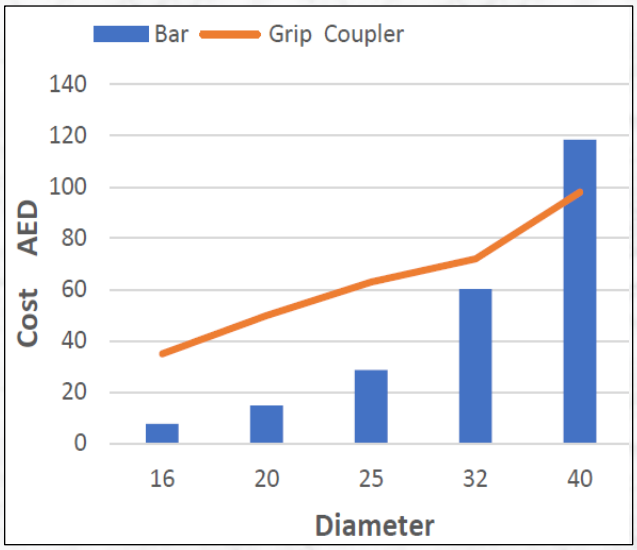


Figure 02-Cost Analysis – Grip/ Pressed Coupler Vs. Bar

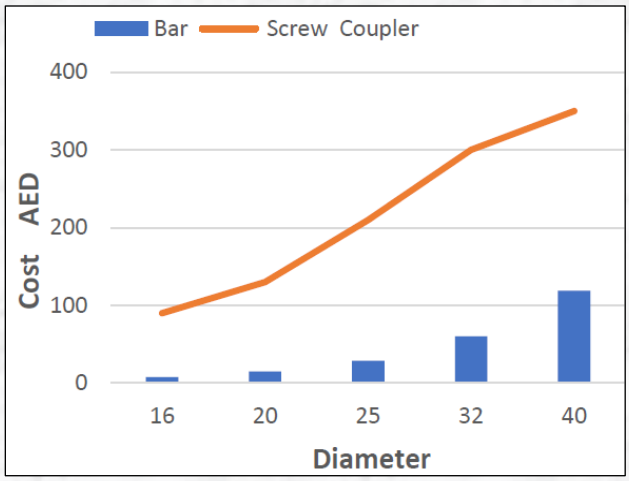


Figure 01, Cost analysis for the *threaded* coupler with reinforcement bar, shows that using a coupler with a diameter above 32 mm saves money.

Figure 02, Cost analysis for the *Pressed / Grip* coupler with reinforcement bar, shows that using a coupler above a diameter of 40mm saves money.

Figure 03, Cost analysis for the screw coupler with Reinforcement bar It, isn't shown cost savings to use a screw coupler; this type of coupler is used in very rare situations.

Figure 3-Cost Analysis – Threaded Coupler Vs. Bar

Conclusions

Mechanical couplers are used instead of providing the development length of the reinforcing bar to achieve continuity of the load path. They help avoid congestion of reinforcement bars in heavily reinforced structures due to laps, reduce the concrete/steel ratio, and improve the use of concrete by providing more space between bars. This study demonstrates that three types of mechanical couplers are effective and economical replacements for the lap length of bars. The couplers used here are "threaded couplers," which save a nominal cost for each joint above 32mm in size. They are also the simplest couplers for connecting two bars quickly and easily in the field. Thus, mechanical threaded couplers are very effective, as they are easy to install and reduce time, risk, and cost.

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Eng. Ramanathan Arisanan
CEng, Ieng. *MSc, BEng, NDT, MIIESL, MICE, MRICS, CEng EC*
Construction Manager
Waagner Biro Bridge System LLc.
Dubai, U.A.E

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No. 27/B, Udumulla Road,
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