



Construction Industry Institute®

Mitigating Threats of Counterfeit Materials in the Capital Projects Industry

Construction Industry Institute

Abbott	AMEC
Air Products and Chemicals	AZCO
Ameren Corporation	Aecon Group
American Transmission Company	Affiliated Construction Services
Anglo American	Alstom Power
Anheuser-Busch InBev	Audubon Engineering Company
Aramco Services Company	Baker Concrete Construction
ArcelorMittal	Barton Malow Company
Architect of the Capitol	Bechtel Group
BP America	Bentley Systems
Cargill	Bilfinger Industrial Services
Chevron	Black & Veatch
ConocoPhillips	Burns & McDonnell
Consolidated Edison Company of New York	CB&I
DTE Energy	CCC Group
The Dow Chemical Company	CDI Engineering Solutions
DuPont	CH2M HILL
Eastman Chemical Company	CSA Central
Ecopetrol	Cannon Design
Eskom Holdings SOC	Coreworx
ExxonMobil Corporation	Day & Zimmermann
General Electric Company	Dresser-Rand Company
General Motors Company	eProject Management
GlaxoSmithKline	Emerson Process Management
Global Infrastructure Partners	Faithful+Gould
Huntsman Corporation	Fluor Corporation
Intel Corporation	Foster Wheeler USA Corporation
International Paper	Gross Mechanical Contractors
Irving Oil Limited	Hargrove Engineers + Constructors
Kaiser Permanente	Hilti Corporation
Koch Industries	Honeywell International
Eli Lilly and Company	IHI E&C International Corporation
Linde North America	IHS
LyondellBasell	International Rivers Consulting
Marathon Petroleum Corporation	JMJ Associates
National Aeronautics & Space Administration	JV Driver Projects
NOVA Chemicals Corporation	Jacobs
Occidental Petroleum Corporation	KBR
Ontario Power Generation	Kiewit Corporation
Petroleo Brasileiro S/A - Petrobras	Kvaerner North American Construction
Petroleos Mexicanos	Lauren Engineers & Constructors
Petronas	Leidos Constructors
Phillips 66	Matrix Service Company
Pioneer Natural Resources	McCarthy Building Companies
Praxair	McDermott International
The Procter & Gamble Company	Midwest Steel
Public Service Electric & Gas Company	Parsons
Reliance Industries Limited (RIL)	Pathfinder
SABIC - Saudi Basic Industries Corporation	POWER Engineers
Sasol Technology	Quality Execution
Shell Global Solutions US	Richard Industrial Group
Smithsonian Institution	The Robins & Morton Group
Southern Company	S&B Engineers and Constructors
Statoil ASA	SBM Offshore
SunCoke Energy	SNC-Lavalin
Tennessee Valley Authority	Skanska USA
TransCanada Corporation	Technip
U.S. Army Corps of Engineers	Tenova
U.S. Department of Commerce/NIST/ Engineering Laboratory	TOYO-SETAL Engenharia
U.S. Department of Defense/ Tricare Management Activity	URS Corporation
U.S. Department of Energy	Victaulic
U.S. Department of Health & Human Services	WESCO International, Inc.
U.S. Department of State	Walbridge
U.S. Department of Veterans Affairs	Wanzek Construction
U.S. General Services Administration	The Weitz Company
Vale	Wilhelm Construction
The Williams Companies	Willbros United States Holdings
	Wood Group Mustang
	WorleyParsons
	Yates Construction
	Zachry Holdings
	Zurich



Documents

Document Sharing Hub

Mitigating Threats of Counterfeit Materials in the Capital Projects Industry

**Prepared by
Construction Industry Institute
Research Team 307, Mitigating Threats of Counterfeit Materials
in the Capital Projects Industry**

**Research Summary 307-1
September 2014**

© 2014 Construction Industry Institute™

The University of Texas at Austin

CII members may reproduce and distribute this work internally in any medium at no cost to internal recipients. CII members are permitted to revise and adapt this work for their internal use, provided an informational copy is furnished to CII.

This work is available to non-members by purchase; however, no copies may be made or distributed, and no modifications may be made, without prior written permission from CII. *Contact CII at <http://construction-institute.org/catalog.htm> to purchase copies.* Volume discounts may be available.

All CII members, current students, and faculty at a college or university are eligible to purchase CII products at member prices. Faculty and students at a college or university may reproduce and distribute this work without modification for educational use.

Printed in the United States of America.

Contents

<i>Chapter</i>	<i>Page</i>
Executive Summary	v
1. Introduction	1
2. Methodology	3
3. Data Analysis and Research Findings	5
4. Model Development and Implementation	11
5. Conclusions and Recommendations	23
References	27

Executive Summary

CII established Research Team (RT) 307, Mitigating Threats of Counterfeit Materials in the Capital Projects Industry, to expand upon the research of RT 264, Product Integrity Concerns in Low-cost Sourcing Countries, which documented the variety, scope, and impact of counterfeiting threats to the capital projects industry. Beyond reconfirming and updating the status of the threat of counterfeit, fraudulent, and suspect items (CFSI) to the industry, the primary purpose of the RT 307 research was to help CII member companies and other interested parties mitigate the presence and effects of CFSIs in the capital project supply chain. The research team developed effective mitigation strategies, practices, and methods for addressing CFSIs discovered on projects, and further proposes the CII CFSI Risk Mitigation Framework to help CII member companies reduce their exposure to CFSI. CII member companies can use this framework at a company or business unit level to improve their internal management processes for blocking CFSIs from their capital project supply chains. The framework can also help organizations improve the identification, assessment, mitigation, and communication components of their risk management programs.

To support the framework, the research team developed a catalog of 19 CFSI risk mitigation strategies, a resource that presents each strategy, explains its implementation, and discusses the challenges inherent to mitigating the type of CFSI it addresses. Any organization can modify the catalog to make it an evolving (customized) point of reference on CFSI risks. (See Chapter 4 of this research summary for an overview of the catalog and see Implementation Resource (IR) 307-2 for a detailed discussion of its use.)

RT 307 also studied alternative solutions and the feasibility of mitigating CFSIs at the industry level. As a result, the research team developed a phased approach to implementing the research findings. The first phase is to apply the framework internally at the individual CII membership level. The second phase would expand the application to the broader level of the entire CII membership and the construction industry. Applying a

uniform framework across the entire industry would create alignment on data collection and evaluation. Such uniformity would provide the basis for developing and implementing a CFSI database to facilitate the timely exchange of accurate data on CFSIs at the industry level. (See Research Report 307-11, *Mitigating Threats of Counterfeit Materials in the Capital Projects Industry*, for details on this phased database approach.)

In the second phase CII would collect the data from CII member companies and channel it to a data exchange program after appropriate review. After collecting the data, CII would analyze it and publish any CFSI trends and patterns detected. Beyond requiring the collaboration of CII members, this phase would also require governance and logistical support from CII. Important motivations for this CII-centered initiative include the following:

- CII leads anti-CFSI efforts within the construction industry.
- CII would extend its role as a facilitator of industry collaboration.
- CII can facilitate the anti-CFSI actions of its membership.
- CII is at the forefront for reporting trends in the construction industry.
- As a research organization, CII can avoid some regulatory issues (e.g., anti-trust).

Since establishing such an overarching apparatus would require considerable deliberation, coordination, time, and resources, the research team recognizes that it is not immediately actionable. Thus, the team restricted its in-depth discussion of this second phase to RR 307-11.

This research summary is composed of five chapters: an introduction delineating the scope and objectives of the research, as well as the expected output; two subsequent chapters that discuss the research methodology, data analysis, and key findings; a fourth chapter summarizing the CFSI Framework and implementation model; and, a final chapter of conclusions and recommendations for future CFSI research.

Introduction

The threat of CFSI is a growing concern in the globalized business environment (UNODC 2010; EPRI 2009). Increasing trends in global outsourcing, the transnational nature of projects and products, and the ease of transferring information and knowledge have all changed the dynamics of global business; within this new environment, industry has seen a substantial increase in the number of CFSI cases. This trend has created a critical need for in-depth research of the current industry strategies and practices to mitigate the loss of product integrity in the capital project supply chain. (See Figure 1.)

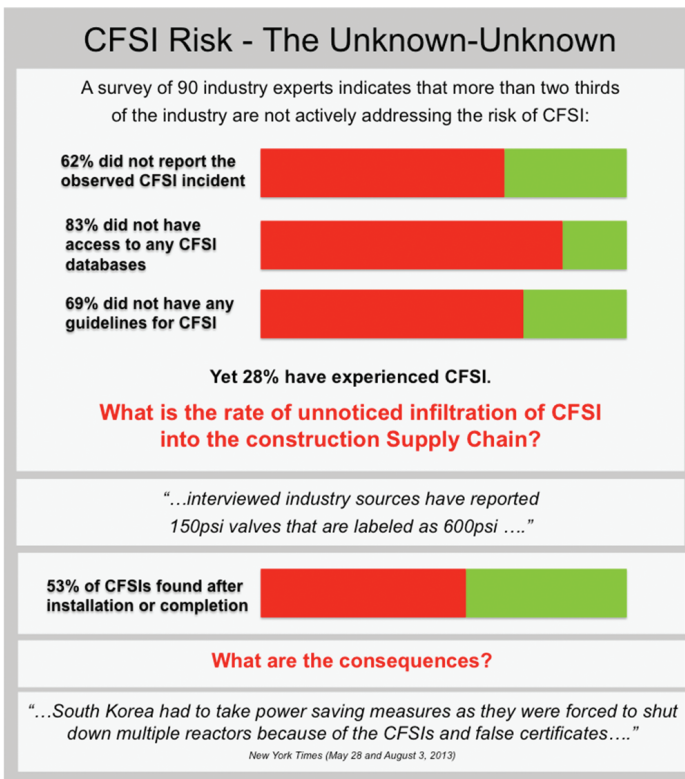


Figure 1. Summary of Research Stages and Outcomes

While industries such as nuclear power, electronics, automotive, aerospace, pharmaceutical, and even fashion have already performed extensive CFSI studies, the construction industry has lagged behind in such efforts. And, because of the critical need for solutions across industries, the impact of the RT 307 research is likely to reach beyond construction. As indicated in RR 264-11, the implications of CFSI extend beyond project safety, to cost, schedule, and quality (CII 2010).

The capital projects industry is particularly vulnerable to CFSI because its characteristics and exigencies so differentiate it from other industries (e.g., unrepeatable projects, high initial investments, long payback periods, multiple-party involvement, and tight profit margins). Because the research team recognized that the nature of the industry necessitates a construction-specific approach to mitigating CFSI incidents, it developed the CFSI Framework through methodical research of CFSI incidents and existing mitigation strategies. Figure 1 summarizes this methodology, showing the major research stages and the outcomes of the process. The research took the following steps: 1) literature review of existing mitigation strategies; 2) surveys and interviews; 3) case studies of CFSI mitigation strategies; and 4) development of the CFSI Framework. In addition, the research proposes the CII-based industry-wide CFSI data collection and exchange initiative.

Methodology

To achieve its objectives, RT 307 resolved to pursue a multi-staged approach. In the first stage, the research team perceived a clear need to identify CFSI mitigation strategies used in other industries, then to survey their effectiveness, and finally to propose a framework to mitigate the risk of CFSI. (See Figure 1.) To identify existing mitigation strategies, the team first reviewed the RT 264 publications, CFSI mitigation studies in diverse industries (considering their implications for the construction industry), and the literature on risk analysis approaches and methodologies. This information-gathering involved putting data into five categories: 1) state of the art within the construction industry; 2) state of the art within other industries; 3) supply chain issues; 4) risk analysis methodologies; and 5) mitigation strategies and their implications.

The second stage of the research aimed to collect more data through surveys, interviews, case studies, and industry outreach. The focus of the surveys and interviews was on contractors, owners, and suppliers—both CII members and non-members. The preliminary survey effort served as an initial internal benchmarking of the companies represented on the research team, collecting 48 responses. Also, the team used the preliminary survey data along with the information gathered from the literature review to frame the main survey instrument and research outline. At the same time, the team conducted 11 interviews to reach out to the wider industry. At the next step, the RT conducted a comprehensive survey of CII member companies and a select group of non-CII member companies, collecting 90 responses.

The main survey instrument asked participants to share their experiences of CFSIs on their capital projects. The team structured this survey around the following five topics: 1) the experience of CFSIs on capital projects; 2) procurement practices; 3) CFSI detection processes; 4) CFSI reporting processes; and 5) CFSI awareness and education procedures. The responses to this survey served as the basis for a

structured interview. This interview instrument covered four components of risk mitigation: 1) risk identification, risk assessment, 2) risk mitigation, 3) risk communication, and 4) risk training and education. The objectives of the interviews were to reconfirm the results of the surveys and literature review, and to validate the proposed CFSI Framework. At the same time, to establish future needs, the team collected 50 responses to a follow-up survey. Finally, the data collection plan involved several case studies to validate the framework. Two additional case studies were performed on the data exchange programs at the Electric Power Research Institute (EPRI) and ERAI, Inc., to investigate possible challenges and strategic choices for the proposed CFSI collaborative initiative.

The third research stage focused on the development of a proposed framework, inclusive of four risk components: 1) risk identification, 2) risk assessment, 3) risk mitigation, and 4) risk communication. The research team designed the framework for CII member use, with a catalog of CFSI risk mitigation strategies for different types of CFSIs. The team then used the framework as the basis for its CFSI risk mitigation tool, an MS Access-based resource that CII members can use to establish their own internal databases of CFSI events, and to assess their exposure to CFSIs.

Finally, the team produced an outline of its proposal that CII establish a collaborative effort to consolidate CFSI data from across the industry and to channel it into data exchange programs. The purpose of this effort would be to increase industry awareness and prevention of CFSI infiltration of the supply chain through information-sharing and data analysis for CFSI trends and patterns.