

ASSESSING HUMAN CAPITAL: A LEAN MANUFACTURING EXAMPLE

Kim LaScola Needy, P.E., Bryan A. Norman, Bopaya Bidanda, and Poonsiri Ariyawongrat,
University of Pittsburgh; Wipawee Tharmmaphornphilas, Chulalongkorn University;
Rona Colosimo Warner, Rolls-Royce

Abstract

This article describes an approach and methodology that explicitly considers the assessment of human capital in a lean manufacturing environment supported by cellular manufacturing. It details a systematic approach where human capital is inventoried in the form of developing a skills database. Specific critical skills are identified, grouped, and placed onto a Skills Inventory Form (SIF). The SIF is used to assess the skill levels of each worker via an employee, supervisor, and consensus assessment approach. The approach is illustrated in a Fortune 100 company, showing how to use it to drive training requirements, change hiring practices, assign workers, and establish compensation and reward systems.

Introduction

Companies often make broad statements claiming that people are their greatest assets. Upon close examination of the practices of these companies, one often finds that the company pays lip service with this statement. Companies that value human capital often fall short when systematically assessing it. This can lead to poor hiring decisions, ineffective training programs, poor retention, and low worker satisfaction.

A cornerstone in successfully implementing lean manufacturing is total involvement. This total involvement includes personnel from the shop floor to top management. For total involvement to be effective, personnel must share the vision of lean manufacturing and be properly trained in its fundamentals. Companies moving toward lean manufacturing often do this via a cellular manufacturing approach. A common shortcoming when implementing cellular manufacturing is not accounting for the human element in the cellular design (Bidanda, Ariyawongrat, Needy, Norman, and Tharmmaphornphilas, 2001). This oversight can result in a less than optimal design.

This article describes an approach and methodology to assess human capital in a lean manufacturing environment supported by cellular manufacturing. It details a systematic approach to inventory human capital to develop a skills database. Critical skills, identified for a group of workers, are grouped into technical, human, and lean categories, then placed onto a Skills Inventory Form (SIF). The SIF is used to assess the skill levels of each worker via employee, supervisor, and consensus assessment. Data from the assessment can drive training initiatives, change hiring practices, assign workers, and establish compensation and reward systems. This is illustrated in a Fortune 100 company. Lessons learned from the implementation, as well as suggested areas for future research are discussed.

About the Authors

Kim LaScola Needy is an associate professor of industrial engineering (IE) at the University of Pittsburgh and a Wellington C. Carl Faculty Fellow. She received her BS and MS in IE from the University of Pittsburgh, and her PhD from Wichita State University. Her research interests include activity based costing, engineering economic analysis, engineering management, and integrated resource management.

Bryan A. Norman is an associate professor of IE at the University of Pittsburgh and a William Kepler Whiteford Faculty Fellow. He received his PhD in industrial and operations engineering from the University of Michigan, and has BSIE and MSIE degrees from the University of Oklahoma. His research focuses on the modeling of complex problems in manufacturing systems.

Bopaya Bidanda is co-director of the Manufacturing Assistance Center and Ernest Roth Professor and Chair of IE at the University of Pittsburgh. In addition to his doctoral degree from the Pennsylvania State University, he has industrial experience in manufacturing systems, tools, and precision manufacturing. His research includes computer integrated manufacturing systems, robotic applications, IE, automated data collection, and shared manufacturing.

Poonsiri Ariyawongrat is a PhD candidate in the IE department at the University of Pittsburgh. She received her BS in physics from Chulalongkorn University, and her MS in engineering management from George Washington University. Her interests are in activity-based costing, engineering management, balanced scorecard, and lean manufacturing.

Wipawee Tharmmaphornphilas is a lecturer at the IE department, Chulalongkorn University, where she received her BS in IE. She received her MS degree and PhD in IE from the University of Pittsburgh. Her interests and research in solving problems through quantitative analysis by modeling and applying heuristic methods.

Rona Colosimo Warner is an operations director, combustion systems at the Indianapolis facility of Rolls-Royce. She received a BS in applied mathematics and MS in IE from the University of Pittsburgh. Her research interests include integrated resource management.

Contact: Kim LaScola Needy, PhD, P.E., University of Pittsburgh, Department of Industrial Engineering, 1041 Benedum Hall, Pittsburgh, PA 15261, phone: 412-624-9838, fax: 412-624-9831, email: kneedy@engrng.pitt.edu.