

Review

Research Status and Progress of All-Position Narrow-Gap GMAW for Pipelines

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Abstract: During the all-position narrow-gap welding process of pipelines, welding defects tend to occur in non-flat welding positions, constraining the quality and efficiency of pipeline construction. This paper addresses the sidewall and interlayer lack of fusion defects that commonly arise in all-position pipeline welding. Based on the research achievements of scholars and engineering technicians at home and abroad in recent years, the paper summarizes the influence laws of droplet transfer characteristics, arc morphology, and molten pool behavior on weld seam formation under different welding positions during gas metal arc welding. Additionally, the paper explores strategies for optimizing weld bead formation, including optimizing welding process parameters, controlling the molten pool flow with an external magnetic field, and using laser-arc hybrid welding. The paper points out the development trends of all-position pipeline welding technology, providing technical guidance and problem-solving ideas for alleviating the flow of the molten pool and optimizing the formation of all-position weld seams in engineering practice. Furthermore, it offers direction for scientific research for relevant researchers.

Keywords: all-position welding; narrow-gap gas metal arc welding; droplet transition; pipeline construction



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1. Introduction

Oil and gas pipelines bear the responsibility of transporting oil and gas resources, serving as a bridge that connects supply and demand. Accelerating the construction of oil and gas pipelines is critical support for the high-quality development of the industry but also an effective aid to steady economic growth. Due to the constraints of on-site construction conditions, all-position welding methods are predominantly used in pipeline construction at present [1,2], involving manual or semi-automatic welding, which has relatively low efficiency. Compared with the traditional welding methods, narrow-gap welding reduces the bevel cross-sectional area, transforming the previously required large-angle, multi-layer, multi-pass welding process into multi-layer, single-pass welding process. This not only reduces the material consumption and improves the welding efficiency but also decreases heat input and thermal deformation, making it suitable for all-position welding. As a result, this method has been widely used in the on-site construction of long-distance oil and gas pipelines.

All-position narrow-gap gas metal arc welding (GMAW) is prone to the following defects during the construction process: (1) Due to the small bevel angle, the arc does not sufficiently heat the side wall, which is prone to side wall unfused defects; (2) In non-flat welding positions, the influence of gravity can cause the middle of the weld seam to bulge,

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PIPELINES OF PROGRESS A STATUS REPORT ON THE GLASS CEILING, 1992 **The Glass Ceiling** Beverly A. Dugan, 1993 Pipelines of Progress DIANE Publishing Company, 1993-06-01 Contents workforce trends overall trends in the Fed contractor community corp mgmt reviews commitment continues at the top despite a change in leadership reaffirmation and commitment to inclusivity and diversity areas warranting greater attention recruitment practices lack of opportunity to contribute and participate in corp development experiences performance measures mobility what works tracking women and minorities with advancement potential ensuring access and visibility ensuring a bias free workplace

Measuring Glass Ceiling Effects in Higher Education: Opportunities and Challenges Jerlando F. L.

Jackson, Elizabeth M. O'Callaghan, Raul A. Leon, 2014-07-30 This volume offers readers a comprehensive means to understanding glass ceiling effects in higher education Each chapter approaches the glass ceiling from a different perspective providing compelling arguments that truly highlight the importance and usefulness of collecting data on this topic Institutional decision makers will find valuable information to confront the challenge of glass ceiling effects across different institutional environments Likewise institutional researchers will find step by step protocols to collect and analyze glass ceiling data as well as a variety of rich examples Readers will not only find this sourcebook useful for institutional planning purposes but it will also help them truly understand how the glass ceiling impacts women and people of color in higher education **Cracking the Glass Ceiling** Carole K. Adair, 1999 Barriers which hinder career advancement of women are complex and varied They have become top agenda items for most corporations and the government The glass ceiling is a term that symbolizes a variety of barriers that prevent qualified individuals from advancing higher in their organization Although many women hold management positions few have made the breakthrough to top level positions To determine what conditions are required for women to attain top executive positions an ethnographic study was conducted at a hospital The study was limited to four women who held executive positions one associate administrator one interim associate administrator one director and the CEO An in depth data gathering technique using observation interviews and documentation was used to investigate factors such as education skills influences support barriers and corporate culture The findings revealed a having opportunities to be participating valued family members and to compete in activities while young helps girls to develop a sense of competence and mastery b education credential building experiences certain competencies and being willing to take risks are necessary for success c having certain attitudes and philosophies are crucial factors in their success d mentors network involvement and relationships with peers does affect mobility e the women did have a career plan not in the sense of a linear career plan but rather one in the form of the spiral career concept f the hospital is a structure which provides opportunities to develop careers g the women understand accept and have learned to adapt to the culture of the society in which they live and work h the women are savvy at expressing affirming and communicating the

substance of their culture to others i the amount of prejudice a woman encountered depended upon several components and j the barriers to advancement experienced by the women do not confirm those discussed in the review of literature Further research is recommended on the qualifications of male and female CEOs educational programs most appropriate for female executives how successful female executives learned to deal with their barriers and why certain organizations do not have top female executives

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Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations for Fiscal Year 1995 United States. Congress. Senate. Committee on Appropriations. Subcommittee on Departments of Labor, Health and Human Services, Education, and Related Agencies,1994

Pipelines of Progress United States. Department of Labor,1992 The glass ceiling refers to those barriers that have prevented the advancement of women and minorities into the top levels of executive management in major U S corporations In 1991 the U S Department of Labor released a report describing the Glass Ceiling Initiative This document reports on what occurred in the year following the beginning of this initiative The overall message is that while progress has been made in the workplace by minorities and women the commitment and actions that led to the progress must be maintained and enhanced if the goal of full and equal employment opportunity is to be realized The report discusses recent research data on workplace advancement which show mixed results Also noted is Department of Labor data on federal contractors which show that minorities and women have made progress over the past 10 years Much of the report concerns the progress of those companies the Department of Labor has monitored through Glass Ceiling Initiative pilot reviews and compliance reviews These data are presented in anecdotal fashion highlighting a number of examples which show that glass ceiling barriers can be removed The report cites the following barriers to career advancement and notes that they warrant greater attention recruitment practices lack of opportunity to contribute and participate in corporate development practices general lack of corporate ownership of equal opportunity principles performance measures and mobility The following methods are cited as successful approaches to removing glass ceiling barriers tracking women and minorities with advancement potential ensuring access and visibility ensuring a bias free workplace and continued placement of women and minorities into entry level professional positions DB

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