

## DAFTAR PUSTAKA

- Abadi, H. S., Subagiyo, S., Jl, A., Hatta, S., Lowokwaru, K., Malang, K., & Timur, J. (2024). Pengaruh Variasi Sudut Kampuh dan Kuat Arus Pengelasan Hasil Las SMAW Baja SS400 untuk Bahan Bejana Tekan terhadap Kekuatan Tarik dan Kekerasan Politeknik Negeri Malang , Indonesia Arus SMAW terhadap Kekuatan Tarik dan Impak Baja Konstruksi IWF JIS G3101. *Jurnal Publikasi Rumpun Ilmu Teknik*, 2(5).  
<https://doi.org/https://doi.org/10.61132/venus.v2i5.588>
- Abdelsalam, A. E. L., Ahmed, M., Hadiri, E., & Abdelwanis, N. S. (2023). Investigating The Effect of SMAW Parameters on The Hardness of Commercial Carbon Steel. *International Journal of Engineering Research & Technology (IJERT)*, 12(01), 48–53.
- Ada, H., Çobanoğlu, M. A., & Kaya, N. (2024). Investigation of the Effect of Electrode Type on Microstructure and Mechanical Properties in the Welding Process of Millux 500 Protection Armour Steels with Shielded Metal Arc Welding Method. *Journal of Advanced Applied Sciences*, 3(2), 55–65.  
<https://doi.org/https://doi.org/10.61326/jaasci.v3i2.300>
- Adi, W. I., Suharno, S., & Indah, W. (2019). the Effect of Variation of Electric Current on Micro Structure and Hardness in Ss400 Steel Welding Process Using the Smaw Method. *Journal of Mechanical Engineering and Vocational Education (JoMEVE)*, 1(2), 81. <https://doi.org/10.20961/jomeve.v1i2.27226>
- Akbar, R. A. S. A. (2024). Enhancing SS 400 Metal Weld Quality through Current Optimization / Meningkatkan Kualitas Pengelasan Logam SS 400 melalui Optimalisasi Arus. *Indonesian Journal of Innovation Studies*, 25, 2. <https://doi.org/https://doi.org/10.21070/ijins.v25i2.1134>
- Al Afghani, F., Hermawan, E., & Shaleha, S. (2022). Efek Nitrocarburizing Pada Material Low Carbon Steel Terhadap Ketahanan Korosi Dan Kekerasan. *Urania : Jurnal Ilmiah Daur Bahan Bakar Nuklir*, 28(1), 11. <https://doi.org/10.17146/urania.2022.28.1.6596>
- Aleksandra Kozłowska,; Anna Wojtacha, A. S. (2025). Effect of Mn concentration and hot deformation on phase transformation kinetics in medium-manganese

*steels with Ti and V microadditions. Journal of Thermal Analysis and Calorimetry.* <https://doi.org/https://doi.org/10.1007/s10973-025-14406-2>  
Effect

- Alipooramirabad, H., Paradowska, A., Nafisi, S., Reid, M., & Ghomashchi, R. (2020). *Post-weld heat treatment of api 5l x70 high strength low alloy steel welds. Materials, 13(24), 1–24.* <https://doi.org/10.3390/ma13245801>
- Arfiansyah., Muhammad Budi Nur Rahmana., Aris Widyo Nugrohoa., Ramadhoni Fahmi Arianto Putraa., N. I. (2023). Pengaruh Sudut Kemiringan Pin Tool dan Feed rate Micro Friction Stir Welding Aluminium 1100. *JMPM: Jurnal Material dan Proses Manufaktur, 7(1), 27–35.* <https://doi.org/DOI:https://doi.org/10.18196/jmpm.v7i1.18970>
- Arifah, A. (2020). Jurnal Mekanik Terapan Efek *Post Weld Heat Treatment* terhadap Sifat Mekanik AISI 316 Hasil Pengelasan GTAW. *Jurnal Mekanik Terapan, 01(02), 81–87.*
- Bawazir, F., Ismy, A. S., Prodi, M., Rekayasa, D. T., Jurusan, D., Mesin, T., Negeri, P., & Mekanik, S. (2021). Pengaruh Variasi Elektroda Las Pada Sambungan Pengelasan Smaw Baja ST 37 Dengan ST 40 Terhadap Sifat Mekanik. *Jurnal Mesin Sains Terapan, 5(2), 1–6.*
- Bhanu & Gupta, P. (2024). *Microstructure-Linked Mechanical Properties of P91-Incoloy 800HT Dissimilar Metal Welds. Welding Journal, 103(10), 283–297.* <https://doi.org/10.29391/2024.103.025>
- Calderon-Uriszar-aldaca, I., Briz, E., Garcia, H., & Matanza, A. (2020). *The weldability of duplex stainless-steel in structural components to withstand corrosive marine environments. Metals, 10(11), 1–24.* <https://doi.org/10.3390/met10111475>
- Callister, W. D., & Rethwisch, D. G. (2018). *Materials Science and Engineering.*
- Chady, T., & Łukaszuk, R. (2021). *Examining ferromagnetic materials subjected to a static stress load using the magnetic method.* In *Materials* (Vol. 14, Nomor 13). <https://doi.org/10.3390/ma14133455>
- Cholilurrahman, M., & Parwaty, N. (2025). Analisis Pengaruh Kuat Arus Dan Jenis Elektroda Terhadap Uji Kekerasan Pada Baja St 42 Dengan Menggunakan Las SMAW. *Jurnal Informatika Multimedia dan Teknik, 2(1), 7–10.*

- <https://doi.org/https://doi.org/10.71456/jimt/v2i1.1358>
- Curiel, D., Veiga, F., Suarez, A., & Villanueva, P. (2023). *Methodology for the Path Definition in Multi-Layer Gas Metal Arc Welding (GMAW)*. *Symmetry*, 15(2). <https://doi.org/10.3390/sym15020268>
- Dedy., M., Setiawan., I., & P., Y. R. A. (2021). *Design of Shielded Metal Arc Welding Parameters For Optimum Tensile Strength Using Taguchi Method*. *Journal of Mechanical Engineering Science and Technology*, 5(2), 73–78. <https://doi.org/10.17977/um016v5i22021p073>
- Dykas, J., Samek, L., & Grajcar, A. (2023). *SS symmetry Modelling of Phase Diagrams and Continuous Cooling Transformation Diagrams of Medium Manganese Steels*. *MDPI*. <https://doi.org/https://doi.org/10.3390/sym15020381>
- Dziubek, K. F. (2022). *On the Definition of Phase Diagram*. *MDPI*, 12(2). <https://doi.org/https://doi.org/10.3390/cryst12091186>
- Ekene, M., & Oluigbo, C. (2024). *Effect of welding electrode variation on microstructure and mechanical properties of AISI 204 stainless steel plates joined using shielded metal arc welding*. *Engineering Today*, 3(1), 37–45. <https://doi.org/10.5937/engtoday2400002m>
- Fazadima, A., Pratikno, H., & Ikhwan, H. (2022). Analisis Pengaruh Variasi Heat Input terhadap Uji Impact, Uji Metalografi, dan Laju Korosi pada Pengelasan SMAW Sambungan Pelat Baja A36 dengan Baja Structural Steel 400 (SS400). *Jurnal Teknik ITS*, 11(3), 38–43. <https://doi.org/10.12962/j23373539.v11i3.88068>
- Fitri, M., Hidayatullah, P., Wibowo, K. M., & Darmawan, A. S. (2021). *The effect of smaw welding currents on mechanical properties and micro structures of low carbon steels*. *Materials Science Forum*, 1029 MSF(May), 15–23. <https://doi.org/10.4028/www.scientific.net/MSF.1029.15>
- Fitri, M., Sukiyono, B., & Simanjuntak, M. L. (2019). Pengaruh Waktu Penahanan pada Perlakuan Panas Paska Pengelasan terhadap Ketangguhan Sambungan Las Baja. *SINTEK JURNAL: Jurnal Ilmiah Teknik Mesin*, 13(2), 80. <https://doi.org/10.24853/sintek.13.2.80-86>
- Gia Hai, V., Thi Hong Minh, N., & Nguyen, D. T. (2020). *A study on experiment*

and simulation to predict the spring-back of SS400 steel sheet in large radius of V-bending process. *Materials Research Express*, 7(1).  
<https://doi.org/10.1088/2053-1591/ab67f5>

- Gonzalez Romero, H. A., Bastos Blandón, E. A., Casadiego Miranda, L. P., & Niebles Nuñez, E. E. (2023). *Influence of Heat Input on the Weldability of ASTM A131 DH36 Fillet Joints Welded by SMAW Underwater Wet Welding. Sustainability (Switzerland)*, 15(14). <https://doi.org/10.3390/su151411222>
- Gunawan, F., Sholih, H., Domodite, A., Surya, A., Dharmanto, A., & Saepudin, A. (2024). Menentukan Varian Arus Pengelasan Plat ( A36 ) Las SMAW Dengan Elektroda E7018. *Metalik: Jurnal Manufaktur, Energi, Material Teknik*, 3, 49–55.
- Hajar Isworo, R. N. H. (2021). Pengaruh variasi temperatur preheating dan kuat arus terhadap uji kekerasan dan struktur mikro hasil pengelasan smaw baja 1,2). *ELEMEN Jurnal Teknik Mesin*, 8(2), 141–148.  
<https://doi.org/https://doi.org/10.34128/je.v8i2.172>
- Hong, Y., Chang, B., Peng, G., Yuan, Z., Hou, X., Xue, B., & Du, D. (2018). *In-Process Monitoring of Lack of Fusion in Ultra-Thin Sheets Edge Welding Using Machine Vision. Sensors*, 18(8), 2411.  
<https://doi.org/10.3390/s18082411>
- Huang, Xiao-ya, B. Z., Tian, ;Qiang, & Wu, ;Hong-hui. (2023). *Machine learning study on time temperature transformation diagram of carbon and low alloy steel. Journal of Iron and Steel Research International*, 30.  
<https://doi.org/DOI:10.1007/s42243-023-00932-6>
- Huang, C. H., Hou, C. H., Hsieh, T. S., Tsai, L., & Chiang, C. C. (2022). *Investigation of distinct welding parameters on mechanical and corrosion properties of dissimilar welded joints between stainless steel and low carbon steel. Science Progress*, 105(4), 1–18.  
<https://doi.org/10.1177/00368504221126795>
- Karczewski, M., Mrocza, K., Parzych, S., Bała, P., Cios, G., Mikuła, J., & Je, G. (2025). *Analysis of the Effects of Tandem Welding ( Fronius TPS / i - TWIN ) of S1100QL and S1300QL Steels. MDPI*, 18, 1–26.  
<https://doi.org/https://doi.org/10.3390/ma18112577>

- Khamari, B. K., Dash, S. S., & Karak, S. K. (2019). *Effect of welding parameters on mechanical and microstructural properties of GMAW and SMAW mild steel joints. Ironmaking & Steelmaking*, 0(0), 1–8. <https://doi.org/10.1080/03019233.2019.1623592>
- Kharanan. (2023). *A Study on Mechanical Properties and Microstructure of Microalloyed Steels in The Case of Arc Welding Process. J-STAGE*, 658, 17–23. <https://doi.org/https://doi.org/10.5188/ijmsmer.659>
- Kumar, S. (2023). *E7018 vs E7018-1 vs E6013 vs E7016 vs E6011 all other Welding Rod Explained. Material Welding*.
- Lester Chin Zen Kai, Sung Aun Naa, E. J. N. T. (2023). *A Study of Weld Seams on Low Carbon Steel ABS Grade a Marine Plates Using SMAW Process. Journal of Sustainable Manufacturing in Transportation*, 3(1), 9–20. <https://doi.org/10.30880/jsmt.2023.03.01.002>
- Li, Y., Yang, S., Peng, Z., Wang, Z., & Gao, Z. (2022). *Microstructure, Fatigue Properties and Stress Concentration Analysis of 6005 Aluminum Alloy MIG Welded Lap Joint. Materials*, 15(21). <https://doi.org/10.3390/ma15217729>
- Mahajan, S., & Chhibber, R. (2020). *Experimental investigations on P22/P91 dissimilar shielded metal arc welds for power plant applications. Proceedings of the Institution of Mechanical Engineers, Part L: Journal of Materials: Design and Applications*, 234(10), 1313–1324. <https://doi.org/10.1177/1464420720939115>
- Margono, B., Suryono, E., Sudargo, P. H., & Fatah, A. (2023). *Optimasi Pengelasan Disimilar Metal SS304 Dan Mild Steel Untuk Meminimalkan Efek Distorsi. JTE Tenika*, 8(mm), 19–24. <https://doi.org/DOI:https://doi.org/10.52561/teknika.v8i2.285>
- Mohd-lair, N. A., Yuyut, Y., Ahmad, Z., & Mohd, A. (2021). *SMAW : The Effects of Currents and Welding Rod Diameters on Welded Joint Ultimate Tensile Strength Using the Full Factorial DOE SMAW : The Effects of Currents and Welding Rod Diameters Factorial DOE. Journal of Physics: Conference Series PAPER*. <https://doi.org/10.1088/1742-6596/2129/1/012071>
- Muhammad Ikhwanul Munir, P. H., & Raharjo, A. (2023). *Analisis Pengaruh Perlakuan Panas Hasil Pengelasan Gmaw Baja St- 40 Terhadap Kekerasan*

- Dan Struktur Mikro. *Ring Mechanical Engineering (RING ME)*, 3(2), 105–112.
- Nata, O. D., Hidayat, M., & Rohman, S. A. (2021). Analisis Kekuatan Uji Bending Pengelasan Shielded Metal Arc Welding (Smaw) Material Ss400 Menggunakan Kawat Las E6013 Berbagai Variasi Arus Listrik. *Hexagon Jurnal Teknik dan Sains*, 2(1), 12–15. <https://doi.org/10.36761/hexagon.v2i1.871>
- Nishikawa, S., Hasegawa, T., & Takahashi, M. (2019). *Effect of PWHT Conditions on Toughness and Creep Rupture Strength in Modified 9Cr-1Mo Steel Welds. High Temperature Materials and Processes*, 38(2019), 739–749. <https://doi.org/10.1515/htmp-2019-0031>
- Oktavia, N., & Dahlan, D. (2024). Elektodeposisi Lapisan Tembaga pada Baja SS-304 dengan Larutan Elektrolit Mengandung Ekstrak Daun Binahong sebagai Inhibitor Korosi. *Jurnal Fisika Unand*, 13(3), 413–419. <https://doi.org/10.25077/jfu.13.3.413-419.2024>
- Oktaviandy, N. R., Kardiman, K., & Hanifi, R. (2023). *Effect of Preheat Temperature Variation with Cooling Media on Mechanical Properties in Welding SS400 Steel. Sintek Jurnal: Jurnal Ilmiah Teknik Mesin*, 17(2), 130. <https://doi.org/10.24853/sintek.17.2.130-142>
- Park, M., Lee, G. H., Jang, G., Kim, H. C., Kim, B., & Kim, B. J. (2024). *the Effects of Post Weld Heat Treatment on Microstructure and Mechanical Properties of Api X70 Linepipe Using Submerged Arc Welding. Archives of Metallurgy and Materials*, 69(1), 99–102. <https://doi.org/10.24425/amm.2024.147794>
- Purwanto, A., Wijoyo, W., & Fajar Riyadin, A. (2023). Pengaruh Polaritas Mesin Las pada Pengelasan SMAW (Shielded Metal Arc Welding) Terhadap Sifat Fisik dan Mekanik Baja Karbon Rendah. *Jurnal Teknik Indonesia*, 2(4), 150–158. <https://doi.org/10.58860/jti.v2i4.238>
- Putra., Sanam., Inda Aidatul Azpah., Difqi Faza Umary., Muhamad Suhaedi., A. Y. W. (2017). Pengaruh Ketebalan Root Face Dan Polaritas Terhadap Defect Pada Tembusan Hasil Pengelasan SMAW. *Fakultas Teknik-UNIVERSITAS WAHID HASYIM SEMARANG*, 19, 94–98. <https://doi.org/http://dx.doi.org/10.36499/jim.v18i2.6710>

- Putra, M. A. (2024). *The effect of welding electrode variations on the mechanical properties of AISI 1018 material using the SMAW process* Pengaruh variasi elektroda las terhadap sifat mekanik material AISI 1018 menggunakan proses SMAW. *Journal of Mechanical Engineering and Fabrication*, 1(2).
- Qiao, L. L. F., Wen, W., Sun, J., Li, D. F., Li, P. P., & Cao, T. D. (2023). *Continuous Cooling Transformation Behavior of High Carbon Pearlitic Steel*. *Material Sains and Enginnering*, 905, 83–87. <https://doi.org/https://doi.org/10.4028/www.scientific.net/KEM.905.83> DOI link
- Rahman, H. K., & Sunyoto, S. (2021). Pengaruh Arus SMAW Terhadap Kekuatan Tarik dan Impak Baja Konstruksi IWF JIS G3101 SS400. *Jurnal Dinamika Vokasional Teknik Mesin*, 6(1), 35–45. <https://doi.org/10.21831/dinamika.v6i1.37070>
- Rajab, D. A., Artitana, L., Suprayitno, A., Info, A., & Variations, E. (2024). *Analysis Of Smaw In Different Materials With*. *Jurnal Dinamika Vokasional Teknik Mesin*, 08(2), 113–125. <https://doi.org/10.21831/dinamika.v8i>
- Ramadhani, M., Rochiem, R., & Zain, M. I. (2023a). *Analysis of the Effect of Electrode Variation and Current on the Welding Results of Corten A Steel using SMAW Method on Microstructure , Corrosion Resistance , and Mechanical Properties*. *Journal of Applied Sciences, Management and Engineering Technology*, 4(1), 10–20.
- Ramadhani, M., Rochiem, R., & Zain, M. I. (2023b). *Analysis of the Effect of Electrode Variation and Current on the Welding Results of Corten A Steel using SMAW Method on Microstructure , Corrosion Resistance , and Mechanical Properties*. *Journal of Applied Sciences, Management and Engineering Technology*, 4(1), 10–20.
- Rozi, F. (2024). *The effect of welding current on the mechanical properties of ST60 steel in the SMAW welding process*. *Journal of Mechanical Engineering and Fabrication*, 1(1), 20–24.
- Saeheaw, T. (2024). *Analytical optimization of open hole effects on the tensile properties of SS400 sheet specimens using an integrated FFD-CRITIC-DFA method*. *Heliyon*, 10(1), e23920.

<https://doi.org/10.1016/j.heliyon.2023.e23920>

- Salahudin, X., Ihza, Y., Pramono, C., & Widodo, S. (2021). Analisis Kekuatan Tarik Baja Karbon Rendah Hasil Pengelasan Smaw Dengan Variasi Bentuk Kampuh Las. *Journal of Mechanical Engineering*, 5(1), 8–14. <https://doi.org/10.31002/jom.v5i1.3941>
- Saputra, R. S., Hidayat, S. T., & Dwi, T. (2024). Optimasi Uji Tegangan Tarik Pengelasan Tungsten Inert Gas pada Penggabungan Beda Material Baja Galvanish ( SGCC ) dengan Baja Karbon Rendah ( SPCC-SD ). *Jurnal Rekayasa Energi dan Mekanik*, 04(01), 36–47.
- Setiawan, E. A., & Rosidah, A. A. (2023). Pengaruh Variasi Posisi Pengelasan dan Diameter Elektroda pada Pengelasan Logam Tak Sejenis AISI 304 – ST42 terhadap Kekuatan Tarik dan Lebar HAZ. *Jurnal Teknik Mesin*, 20(1), 1–4. <https://doi.org/10.9744/jtm.20.1.1-4>
- Shobri, M. (2019). Pengaruh Arus Pengelasan Terhadap Kekuatan pada Proses Las SMAW Menggunakan Elektroda Type E6013. *Jurnal Inovtek Polbeng*, 9(2), 378–381.
- Sopiansyah, Yusuf, I., & Sumardi. (2021). Kaji eksperimen pengaruh variasi elektroda dan kuat arus pengelasan SMAW pipa baja AISI 1026 terhadap nilai kekerasan dan pengujian magnetic particle. *Journal of Welding Technology*, 3(2), 47–52.
- Sulaiman, M., Febdia Pradani, Y., & Bahtiar, I. (2022). Pengaruh Variasi Kuat Arus Terhadap Kekuatan Tarik Baja ST 60. *Metrotech (Journal of Mechanical and Electrical Technology)*, 1(2), 61–69. <https://doi.org/10.33379/metrotech.v1i2.1402>
- Sutrimo, Sutjipto, S., & Pratomo, N. (2021). Pengaruh Variasi Arus Proses Pengelasan Gtaw Pada Material Aisi 1015. *Sigma-Mu*, 13(1), 1–6. <https://doi.org/10.35313/sigmamu.v13i1.3647>
- Sutton, A. P. (2021). *Phase Diagrams. Concepts of Material Science*. <https://doi.org/https://doi.org/10.1093/oso/9780192846839.001.0001>
- Syafa'at, I., Khalim, A., & Darmanto, D. (2019). Analisa Keausan Disc Besi Cor Dengan Metode Matematika Sederhana Menggunakan Tribometer Pin-on-Disc Tanpa Pelumas. *Jurnal Ilmiah Momentum*, 15(1), 79–90.

<https://doi.org/10.36499/jim.v15i1.2665>

- Syaripuddin, Alamsyah, S. F., & Budhi Susetyo, F. (2021). Pengaruh Krom pada Sambungan Las Terhadap Sifat Mekanik Baja Karbon dengan Elektroda E 6013. *Jurnal Asimetrik: Jurnal Ilmiah Rekayasa & Inovasi*, 3, 9–16. <https://doi.org/10.35814/asiimetrik.v3i1.1565>
- Syukran, S., Syahri, A., & Ismy, A. S. (2023). *The Effect of Heat Input on the Tensile Strength and Toughness of welded SS400 Materials by SMAW*. *Journal of Welding Technology*, 5(1), 21–25. <https://doi.org/10.30811/jowt.v5i1.3508>
- Umairroh, U., Jalaluddin, J., Kamar, I., Bahri, S., Kurniawan, E., & Faisal, F. (2024). Pemanfaatan Ekstrak Daun Pandan Wangi (*Pandanus Amaryllifolius* Roxb) Sebagai Inhibitor Korosi Pada Baja Ss 400 Dalam Larutan H<sub>2</sub>So<sub>4</sub> 1 M. *Jurnal Teknologi Kimia Unimal*, 13(1), 72–82. <https://doi.org/10.29103/jtku.v13i1.16546>
- Vinh, N. N. (2022). Study on dislocation cell structure, dislocation density-fatigue property relationship of a structural steel. *Journal of Science and Technology in Civil Engineering (STCE) - HUCE*, 16(1), 29–41. [https://doi.org/10.31814/stce.huce\(nuce\)2022-16\(1\)-03](https://doi.org/10.31814/stce.huce(nuce)2022-16(1)-03)
- Wibowo, A., Widiastuti, H., Arifin, N. L., & Aryanto, N. P. (2021). Pengaruh Holding Time Annealing terhadap Perubahan Mikrostruktur Baja Struktur S690QL dan S235JR. *Jurnal Integrasi*, 13(1), 46–52. <https://doi.org/10.30871/ji.v13i1.2881>
- Wieslaw Fracz. (2023). *Reprocessing Possibilities of Poly(3-hydroxybutyrate-co-3-hydroxyvalerate)–Hemp Fiber Composites Regarding the Material and Product Quality*. *Materials*.
- Wilujeng, A., Hadiwijaya, L., Fatah, M., Fikri, M. A., & Zakhi, A. N. (2021). Pengujian Las SMAW Pada Rangka Engine Trainer Mitsubishi Canter 110 PS. *Techno Bahari*, 8(1), 13–17. <https://doi.org/10.52234/tb.v8i1.114>
- Winardi, Y., Fadelan, F., Munaji, M., & Krisdiantoro, W. N. (2020). Pengaruh Elektroda Pengelasan Pada Baja AISI 1045 Dan SS 202 Terhadap Struktur Mikro Dan Kekuatan Tarik. *Jurnal Pendidikan Teknik Mesin Undiksha*, 8(2), 86. <https://doi.org/10.23887/jptm.v8i2.27772>
- Wu, H., Yu, J., Wang, Z., Qi, G., Xiao, B., Hu, B., Liu, S., & Yu, Y. (2024).

Understanding the Effect of Austempering Temperature on the Crystallographic Features and Mechanical Properties of. *MDPI*.

Zhihao, Z., Yan, M., Shuo, L., Lihong, S., Leigh, F., Huijun, L., Baosen, W., & Hongtao, Z. (2024). *Inhomogeneous Strain Behaviors of the High Strength Pipeline Girth Weld under Longitudinal Loading*. *MDPI*, 1–20. <https://doi.org/https://doi.org/10.3390/ma17122855>