

ABSTRAK

PT. Nurcahya Jaya Mandiri merupakan produsen beton siap pakai (ready-mix concrete) di Kabupaten Demak. Berdasarkan data produksi periode Juni 2025–Mei 2026, tercatat 129 kejadian defect dari 7.080 unit produk (1,71%), melebihi target internal 0,20%. Defect D.2 (bleeding) menjadi jenis paling dominan (57,36%) sehingga ditetapkan sebagai fokus penelitian. Penelitian ini bertujuan mengidentifikasi failure mode operator batching plant, menelusuri akar penyebab bleeding, dan merancang Standard Operating Procedure (SOP) perbaikan. Metode yang digunakan mencakup Diagram Fishbone, 5 Whys, Failure Mode and Effect Analysis (FMEA), serta Fault Tree Analysis (FTA). Hasil FMEA pada delapan aktivitas operator menunjukkan total RPN 2.542 dengan nilai kritis 318. Terdapat tiga failure mode prioritas, yaitu FM3–Koreksi kadar air agregat (RPN 648), FM2–Verifikasi komposisi air (RPN 504), dan FM6–Inspeksi slump (RPN 504). Analisis FTA menghasilkan tiga intermediate event, diantaranya yaitu kelebihan air (0,3731), kadar air tak terkoreksi (0,2789), dan penyimpangan tak terdeteksi (0,2264) dengan probabilitas top event 0,6502 serta 12 minimal cut set berorde satu (single point failure). Sebagai usulan perbaikan, dirancang tiga SOP kerja (SOP-BP-01, SOP-BP-02, dan SOP-BP-03) yang dilengkapi empat formulir pendukung dan tiga titik kendali wajib untuk mengendalikan penyebab defect bleeding.

Kata kunci: pengendalian kualitas, beton siap pakai, bleeding, Failure Mode and Effect Analysis, Fault Tree Analysis, batching plant, Standard Operating Procedure

ABSTRACT

PT. Nurcahya Jaya Mandiri is a ready-mix concrete producer located in Demak Regency. Based on production data from June 2025 to May 2026, 129 defect occurrences were recorded out of 7,080 inspected units (1.71%), exceeding the company's internal target of 0.20%. Defect D.2 (bleeding) was the most dominant type (57.36%) and was thus selected as the focus of this study. This research aims to identify failure modes in batching plant operator activities, trace the root causes of bleeding defects, and design Standard Operating Procedures (SOPs) as proposed improvements. The methodology incorporates Fishbone Diagrams, 5 Whys Analysis, Failure Mode and Effect Analysis (FMEA), and Fault Tree Analysis (FTA). The FMEA results across eight operator work activities revealed a total RPN of 2,542 with a critical value threshold of 318. Three priority failure modes were identified: FM3–Aggregate moisture content correction (RPN 648), FM2–Water composition verification on the control panel (RPN 504), and FM6–Pre-delivery slump inspection (RPN 504). FTA analysis identified three intermediate events are excess water in the mix (0.3731), uncorrected aggregate moisture content (0.2789), and undetected production parameter deviations (0.2264) with a top event probability of 0.6502 and 12 first-order minimal cut sets indicating single point failures. As an improvement proposal, three operator working SOPs (SOP-BP-01, SOP-BP-02, and SOP-BP-03) were designed, supported by four forms and three mandatory control points to prevent bleeding defects.

Keywords: quality control, ready mix concrete, bleeding, Failure Mode and Effect Analysis, Fault Tree Analysis, batching plant, Standard Operating Procedure