

PENGARUH PENAMBAHAN BAKTERI *BACILLUS CEREUS* DENGAN
METODE MIKROENKAPSULASI DALAM PROSES
SELF HEALING CONCRETE

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INTISARI

Perawatan bangunan sipil adalah kegiatan memperbaiki dan mengganti bagian, komponen, bahan bangunan atau prasarana dan sarana agar bangunan sipil tersebut tetap layak fungsi. Beberapa ide inovatif ataupun gagasan inovatif tentang perawatan infrastruktur sipil banyak berkembang salah satunya adalah dengan *self healing concrete*. Penelitian ini bertujuan untuk mengetahui pengaruh penambahan bakteri *bacillus cereus* pada campuran beton bakteri terhadap proses *self healing concrete* serta mengetahui pengaruh terhadap pengujian kuat lentur sebelum retak, absorpsi, dan permeabilitas. Bakteri *bacillus cereus* yang ditambahkan dalam campuran beton segar berbentuk mikro kapsul dan berbahan dari: bakteri *bacillus cereus*, *nutrient broth* serta *carboxyl methyl cellulose*. Mikro kapsul bakteri aktif ketika kapsul pecah akibat kerusakan, mekanisme *self healing* dipicu melalui pelepasan dan reaksi dari agen penyembuhan di wilayah retak, beberapa agen bereaksi ketika kontak dengan uap air dan udara. Hasil penelitian membuktikan terjadinya penambahan mikro kapsul bakteri berpengaruh terhadap kuat lentur pada sampel benda uji sebelum retak dengan campuran bakteri 0% = 7,48 MPa, dan 1,1% = 8,96 MPa. Nilai absorpsi dengan campuran bakteri 0% = 1,25 % dan 1,1% = 1,93 %. Koefisien permeabilitas dengan campuran bakteri 0% = $3,75 \times 10^{-7}$ cm/dt dan 0,9% = $3,96 \times 10^{-7}$ cm/dt. Bakteri *Bacillus cereus* tumbuh akibat retakan yang disebabkan beban lentur. Percepatan pertumbuhan bakteri untuk *self healing concrete* berpengaruh karena adanya kadar pH yang sesuai dengan pertumbuhan bakteri. Penambahan mikro kapsul bakteri menghasilkan penambahan kuat lentur. Sebaliknya dalam pengujian absorpsi, dan permeabilitas menghasilkan nilai penyerapan yang besar dikarenakan dari pori beton dan sifat bakteri yang bisa hidup karena air.

Kata kunci: beton bakteri, mikro kapsul bakteri *bacillus cereus*

INFLUENCE OF ADDITION OF BACTERIA BACILLUS CEREUS
BY THE METHOD MICRO CAPSULE-SHAPED IN THE PROCESS OF
SELF-HEALING CONCRETE

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ABSTRACT

Civil building maintenance is a repair or replace parts, components, materials and building or infrastructure as a tools in order for the buildings remain inviable functions. Some of the innovative ideas or innovative ideas to treat of civil infrastructure has been thrived one of the development is self-healing concrete. This research aims to know the influence of addition of bacteria bacillus cereus bacteria in the concrete mix versus the process of self-healing concrete, as well as knowing the effect on bending strength before crack, absorption, and permeability. Bacillus cereus bacteria were added to the concrete mix fresh micro capsule-shaped and made from the bacteria bacillus cereus; nutrient broth and carboxyl methyl cellulose. Micro capsule bacteria active when the crush capsule due to damage, self-healing mechanism is triggered through the release and reaction from the healing agent in the area of crack, some agents react while in contact with moisture and air. The research results prove the occurrence of bacillus cereus bacteria growth that fills cracks in the event because the maximum load on bending test before crack. Bending test result with micro bacterium 0% = 7,48 MPa, and 1,1% = 8,96 MPa. Absorption test result with micro bacterium 0% = 1,25% and 1,1% = 1,93%. Coefficient permeability test result with micro bacterium 0% = $3,75 \times 10^{-7}$ cm/dt and 0,9% = $3,96 \times 10^{-7}$ cm/dt. Acceleration of the growth of bacteria for self-healing concrete effect due to pH levels corresponding to the growth of bacteria. The addition of micro-capsule bacteria produce powerful addition of supple. On the contrary in testing absorption, absorption and permeability values generate large because of the porous concrete and properties of bacteria that would live because of the water.

Key words: Concrete, Micro bacterium bacillus (Cereus Bacteria Capsules)