INTISARI

Elemen pembayang eksternal merupakan alat peneduh terbaik mengendalikan komponen matahari langsung (*direct*) tetapi kaca juga sangat baik untuk menghalangi radiasi cahaya langit (*diffuse*). (Aldawoud, 2013) menyatakan bahwa *electrochromic glazing* memiliki performa lebih baik dibanding *conventional fixed shading devices* (*overhangs* dan *side fins*) dalam mereduksi radiasi matahari. Untuk itu dilakukan penelitian lebih lanjut untuk mengetahui mengapa elemen pembayang eksternal kurang efektif terhadap transmisi radiasi matahari global.

Modeling dilakukan terhadap lantai tipikal berukuran 36m x 36m pada bangunan hipotetik gedung perkantoran berlantai banyak berpengkondisian udara di *Plug-in Open Studio Google Sketchup* versi 7. Input data termal dan simulasi di *Energy Plus* versi 8.1, data iklim Jakarta (6.204°LS, 106.821°BT, 8m). Elemen pembayang yang digunakan adalah HSA (*Horizontal Shadow Angle*): *overhangs*, VSA (*Vertical Shadow Angle*): *side fins*, dan HSA VSA (*Horizontal Vertical Shadow Angle*): *egg crate*. Masing-masing dengan sudut bayang 30°, 45° dan 60°. Kaca yang digunakan adalah SHGC (*Solar Heat Gain Coefficient*) 0.20, SHGC 0.43, SHGC 0.54. *Base case*: SHGC 0.77 tanpa pembayang.

Hasil simulasi menunjukkan kaca SHGC 0.20 lebih efektif terhadap transmisi radiasi matahari global tahunan dibanding elemen pembayang lainnya di delapan orientasi. Karena kaca SHGC 0.20 lebih efektif terhadap transmisi radiasi matahari *direct* dengan persentase penurunan transmisi radiasi matahari *direct* mencapai 39% (215.34 watt/m²) dari *base case* yang harus diturunkan sebesar 40% (222.56 watt/m²), dan juga lebih efektif terhadap transmisi radiasi matahari *diffuse* mencapai 58% (322.44 watt/m²) dari *base case* yang harus diturunkan sebesar 60% (555.86 watt/m²). Sedangkan HSA VSA 30, persentase penurunan transmisi radiasi matahari *direct* sebesar 39% (215.89 watt/m²) dan persentase penurunan transmisi radiasi matahari *diffuse* hanya mencapai 52% (289.88 watt/m²).

Kata Kunci: Transmisi radiasi matahari *direct* dan *diffuse*, elemen pembayang eksternal, kaca (SHGC).

ABSTRAC

External shading devices are the best performance in reducing direct solar radiation component but glazing also is the best performance in reducing diffuse solar radiation component. (Aldawoud, 2013) shown that electrochromic glazing provides the best performance in reducing solar heat gains compared to other conventional fixed shading devices (overhangs and side fins). Advanced research to investigate why conventional fixed shading devices are not effective reducing global solar radiation.

A 36m x 36m typical office hyphothetical building and air conditioning is modeled using Plug-in Open Studio in Google Sketchup version 7. Input data thermal and simulation using Energy Plus version 8.1 with Jakarta weather files (6.204°S, 106.821°E, 8m). Shading devices are tested using HSA (Horizontal Shadow Angle): overhangs, VSA (Vertical Shadow Angle): side fins, and HSA VSA (Horizontal Vertical Shadow Angle): egg crate. Each one with shadow angle 30°, 45° and 60°. Glazing are tested using SHGC (Solar Heat Gain Coefficient) 0.20 glazing, SHGC 0.43, SHGC 0.54. Base case: using SHGC 0.77 glazing with no shading devices.

The annually output data show that SHGC 0.20 glazing provides the best performance in reducing global transmitted solar radiation compared to other tested shading devices in eight orientations. Caused SHGC 0.20 glazing is more effective reducing direct transmitted solar radiation up to 39% (215.34 watt/m²) of 40% (222.56 watt/m²) base case that have to reduce, and glazing also is more effective reducing diffuse transmitted solar radiation up to 58% (322.44 watt/m²) of 60% (555.86 watt/m²) base case that have to reduce. While HSA VSA 30, the percentage reduction direct transmitted solar radiation is 39% (215.89 watt/m²) and diffuse transmitted solar radiation 52% (289.88 watt/m²) only

Key words: Direct and diffuse transmitted solar radiatioan, external fixed shading devices, glazing (SHGC).