BAB 7
KESIMPULAN DAN SARAN

7.1 Kesimpulan.

1. Persamaan-persamaan dalam fungsi berat jenis (SG) dan sudut □ untuk menghitung besaran sifat mekanis kayu Indonesia yang dihasilkan dapat digunakan sebagai referensi untuk menentukan kuat kayu Indonesia pada rentang berat jenis 0.3-0.8 dan kadar air 15%.

2. Persamaan umum kuat tumpu baut dari hasil penelitian dalam disertasi ini dapat digunakan untuk perhitungan kuat sambungan dengan baut pada peraturan kayu Indonesia. Kuat tumpu baut pada 5%-*offset* diameter ($F_{ef//}$) tidak hanya dipengaruhi oleh berat jenis (SG), tetapi juga oleh besarnya rasio kelangsingan baut (λ).

3. Parameter-parameter sifat mekanis non-linier material hasil penelitian ini khususnya model kurva tegangan-regangan bi-linier untuk kuat tekan dapat digunakan untuk analisis non-linier. Batas regangan non-linier yang berbeda untuk kuat tekan maupun kuat tarik dapat digunakan untuk batas regangan runtuh pada model analisis non-linier.

4. Prediksi kegagalan sambungan dapat didasarkan pada model kurva tegangan-peralihan dengan menggunakan persamaan-persamaan untuk menghitung parameter-parameter k_1, k_2, F_{ep}, F_{ef}, R_{k2}, R_{pf} dan μ_{up} dan menentukan ragam kegagalannya berdasarkan analisis tegangan dan fraktur. Fenomena yang ada yaitu kurva lengkung non-linier pada kurva tegangan–peralihan dimulai pada saat $F_{ep//}$ (batas proporsional) dan berakhir pada $F_{ef//}$ (5%-*offset*), sedangkan garis kekakuan elastis (k_1) dan garis kekakuan inelastis (k_2) merupakan garis singgung pada kurva lengkung non-linier. Model kurva prediksi dalam disertasi ini sesuai dengan hasil uji eksperimental.

5. Analisis tegangan dan fraktur pada kurva prediksi memperjelas proses tercapainya batas-batas tegangan kritis material dan terjadinya awal retak, penjalaran retak dan keruntuhan. Proses kegagalan sambungan dimulai dengan hancurnya kayu akibat tegangan tekan sejajar serat mencapai kekuatan batas dan atau akibat kombinasi fraktur ragam I dan II yaitu kombinasi tegangan tarik tegak-lurus serat dan tegangan geser sejajar serat yang menyebabkan terjadinya awal retak pada bidang kontak dan kurva lengkung non-linier pada kurva tegangan–peralihan. Terjadi penjalaran retak diikuti dengan terjadinya keruntuhan belah atau geser blok.

6. Batas proporsional ($F_{ep//}$) lebih kecil nilainya untuksambungan dengan berat jenis kayu (SG) yang besar, sedangkan besarnya rasio kelangsingan baut (λ) dan jarak ujung (e_d) kecil pengaruhnya.
7. Daktilitas sambungan yang menghasilkan kinerja yang baik adalah untuk jarak ujung (e_d) yang besar dan kelangsingan baut (λ) yang kecil. Rasio daktilitas cukup besar rentang variasinya, suatu faktor reduksi daktilitas R_d dapat digunakan untuk batasan yang aman dalam disain. Batas peralihan saat keruntuhan pada kurva tegangan-peralihan dapat diprediksi dengan menggunakan rasio daktilitas μ_{up}.
8. Beban statik berulang *loading-unloading* pada batas sebelum penjalaran retak merambat dengan cepat, tidak berpengaruh terhadap reduksi kekakuan maupun kekuatan sambungan.

7.2 Saran.

1) Model kurva tegangan-peralihan untuk memrediksi kegagalan sambungan dengan baut tunggal dalam disertasi ini dapat digunakan lebih lanjut untuk analisis sambungan dengan baut majemuk.
2) Revisi dan pengembangan lebih lanjut dengan menggunakan model kurva prediksi dalam disertasi ini terhadap hasil-hasil penelitian sambungan yang sudah pernah ada dapat dilakukan.
3) Angka reduksi daktilitas maksimum $R_d = 0.5$ dan jarak ujung $e = 7d$ dapat digunakan untuk menentukan kinerja yang aman dalam desain sambungan dengan baut tunggal.
4) Metode Elemen Hingga dapat digunakan sebagai alat bantu untuk menentukan daerah-daerah dengan tegangan maksimum dalam memrediksi pola kegagalan sambungan. Metode Elemen Hingga dapat digunakan juga untuk menentukan distribusi tegangan tarik dan geser pada daerah ujung sambungan.

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