

PERANCANGAN AWAL PESAWAT TANPA AWAK R-215 AG UNTUK MISI PEMANTAUAN LAHAN PERTANIAN

OLEH: REZA AMSAL GINTING

ABSTRAK

Perkembangan pesawat tanpa awak atau UAV (Unnamed Aerial Vehicle) saat ini sangatlah pesat sekali dan banyak dipergunakan untuk misi-misi tertentu seperti: pemantauan lahan pertanian. Data requirement & objective (DR&O) sangatlah diperlukan untuk merancang pesawat, apakah pesawat itu sesuai dengan tujuan misinya. Ada beberapa aspek yang perlu diperhatikan untuk merancang pesawat seperti: desain konfigurasi geometri pesawat, hasil karakteristik aerodinamika pesawat, nilai parameter kestabilan statik pesawat dan range serta endurance pesawat. Dari aspek desain konfigurasi geometri pesawat bisa dilihat dari bentuk konfigurasi geometri secara menyeluruh sesuai dengan kondisi yang diperlukan, dari aspek aerodinamika dapat dilihat dari karakteristik terbang pesawat dari, aspek kestabilan statik dilihat saat kondisi terbang apakah pesawat disebut stabil statik atau tidak, aspek range serta endurance dapat dilihat terbang jelajah dan lama terbang pesawat. Tujuan perancangan awal pesawat yaitu menghasilkan konfigurasi geometri yang akan digunakan pesawat, mengetahui hasil karakteristik aerodinamika pesawat saat terbang, mengetahui nilai parameter kestabilan statik pesawat dan mengetahui range dan endurance pesawat yang dapat ditempuh saat terbang

Sasaran tahapan perancangan awal pesawat R-215 AG yaitu: mendapatkan hasil konfigurasi geometri pesawat, mendapatkan hasil karakteristik aerodinamika pesawat, dengan software ANSYS 16, mendapatkan nilai parameter kestabilan statik pesawat dengan software XLF5 dan range serta endurance pesawat saat terbang

Kesimpulan yang dapat diperoleh dari analisis perancangan awal pesawat tanpa awak R-215 AG yaitu: Hasil perhitungan konfigurasi dan geometri sesuai DR&O yang dibuat, hasil karakteristik aerodinamika pada pesawat R-215 AG untuk mendapatkan MTOW sesuai lift dengan angle of incident 3° dengan lift: 31,344 N dengan massa: 3,198 kg lebih dari 2,735 kg dan hasil analisis kestabilan statik pesawat disimpulkan telah memenuhi kriteria kestabilan statik dengan hasil Kestabilan statik matra longitudinal: nilai $C_{m\alpha}$ lebih kecil dari 0 (negatif) yaitu: -0,0139 yang berarti pesawat dalam kategori stabil statik matra longitudinal. Kestabilan statik matra directional: nilai $C_{\eta\beta}$ lebih besar dari 0 (positif) yaitu: 0,0011 jadi pesawat termasuk dalam kategori stabil statik matra directional. Kestabilan statik matra lateral: Nilai $C_{l\beta}$ lebih kecil dari 0 (negatif) yaitu: -0,00004. Jadi pesawat termasuk dalam kategori stabil statik matra lateral dan hasil Range: 7,226 km serta Endurance: 1,423 jam.

Kata kunci: perancangan, pesawat tanpa awak, aerodinamika, kestabilan statik, range, endurance

DESIGN UNMANNED AIRCRAFT R-215 AG FOR MISSION OF AGRICULTURAL LANDS

BY: REZA AMSAL GINTING

ABSTRACT

The development of unmanned aircraft is currently developing and widely used for certain missions such agricultural monitoring. Data design requirements and objectives (DR & O) are necessary to design aircraft whether the aircraft is in line with its mission objectives. There are several aspects to consider for designing aircraft such as: airplane geometry configuration, aircraft aerodynamic characteristics, static stability parameters and range and endurance aircraft from the design aspect of geometry configuration of the aircraft can be seen from the form of geometry configuration as whole in accordance with the conditions required from the aspect of aerodynamics can be seen from the characteristics of flying aircraft from the static stability aspect seen when flying conditions whether the plane is called static or not and from the aspect range and endurance can be seen flying cruising and long flying aircraft. The purpose of the initial design of the aircraft is to produce the configuration of the geometry that the aircraft will use, to know the results of the aerodynamic characteristics of the aircraft while flying, to know the parameters of static stability parameters and to know the range and endurance of the aircraft that can be taken during flight

The objectives of the initial design stage of the R-215 AG aircraft are: to obtain the result of airplane geometry configuration, to see the aircraft's aerodynamic characteristics, with ANSYS 16 software, to get the parameters of static stability of the aircraft with XLF5 software and the range and endurance of aircraft which can then be studied with DR & O data.

The conclusions can be obtained from the initial design analysis of unmanned aircraft R-215 AG that is: Result of configuration and geometry according to DR & O make, aerodynamic characteristic result on R-215 AG to get MTOW according to elevator with angle of incident 3° with elevator: 31,344 N with mass: 3,198 kg more than 2,735 kg, static stability analysis result concluded to have met static stability criteria with static longitudinal stability: C_{m_α} is smaller than 0 (negative) is -0.0137 which means plane in the static stable category of longitudinal matra. Static stability of the matra directional: the value of C_{η_β} is greater than 0 (positive) that is: 0,0009 so the plane is included in the category of static stable directional matra. Static stability of the lateral dimension: The value of C_{l_β} is smaller than 0 (negative) ie: -0.00001. So the plane is included in the category of static stabilized lateral and lateral Range results: 7,226 km and Endurance: 1,423 hours

Keywords: *design, unmanned aircraft, aerodynamics, static stability, range, endurance*