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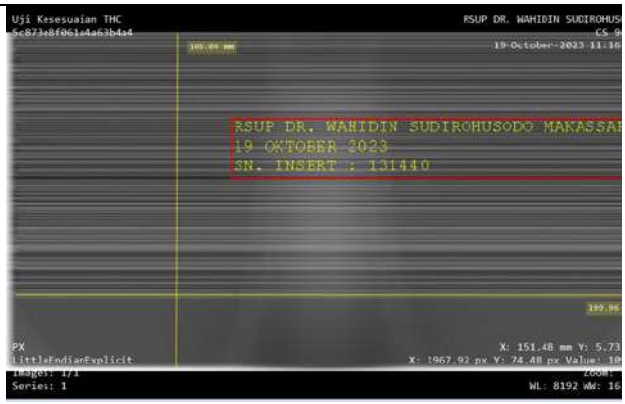
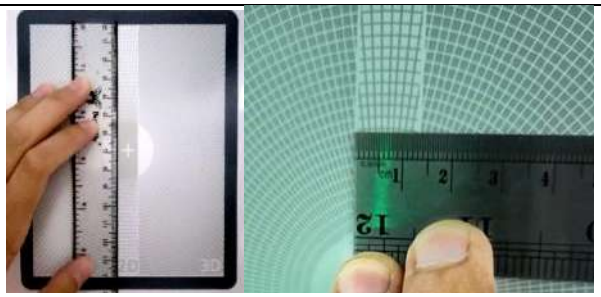
LAMPIRAN

Lampiran 1 Gambar Alat dan Bahan Penelitian

No.	Nama Alat dan Bahan	Gambar
1.	Pesawat gigi *Cone-Beam Computed Tomography* (CBCT)	
2.	Film Gafchromic	
3.	Raysafe Xi R/F Detector	
4.	Meteran	
5.	Selotip	

Lampiran 2 Gambar Pengukuran Berkas Sinar-X

No.	Pengukuran	Gambar

(1)	Berkas Sinar-X Mode Cephalometri pada detektor	
(2)	Berkas Sinar-X Mode Panoramik pada detektor	
(3)	Berkas Sinar-X Mode Panoramik pada film	
(4)	Dimensi slit/penanda	

Lampiran 3 Perhitungan Hasil Data

(1) Nilai eror akurasi tegangan

$$\text{eror}_1\ (\%) = \left|\frac{65-66{,}79}{65}\right| \times 100\% = \left|\frac{1{,}79}{65}\right| \times 100\% = 2{,}75\ \%$$

$$\text{eror}_2\ (\%) = \left|\frac{70-71{,}66}{70}\right| \times 100\% = \left|\frac{1{,}66}{70}\right| \times 100\% = 2{,}37\ \%$$

$$\text{eror}_3\ (\%) = \left|\frac{75-76{,}49}{75}\right| \times 100\% = \left|\frac{1{,}49}{75}\right| \times 100\% = 1{,}98\ \%$$

$$\text{eror}_4\ (\%) = \left|\frac{80-81{,}26}{80}\right| \times 100\% = \left|\frac{1{,}26}{80}\right| \times 100\% = 1{,}57\ \%$$

$$\text{eror}_5\ (\%) = \left|\frac{85-84{,}48}{85}\right| \times 100\% = \left|\frac{0{,}52}{85}\right| \times 100\% = 0{,}61\ \%$$

(2) Nilai koefisien linieritas (CL)

$$\text{CL} = \left(\frac{\text{Paparan dosis radiasi maksimum} - \text{Paparan dosis radiasi minimum}}{\text{Paparan dosis radiasi maksimum} + \text{Paparan dosis radiasi minimum}}\right)$$

$$\text{CL} = \left(\frac{0{,}1026-0{,}1014}{1026+0{,}1014}\right) = \left(\frac{0{,}0012}{0{,}204}\right) = (0{,}005882) \approx 0{,}006\ \text{mGy/mAs}$$

(3) Nilai koefisien variasi (CV)

A. Nilai standar deviasi (SD)

$$\text{SD tegangan puncak} = \sqrt{\sum_{i=1}^{n} \frac{\left(\text{kVp}_i - \overline{\text{kVp}}\right)^2}{n-1}}$$

$$= \sqrt{\frac{(71{,}569-71{,}541)^2 + (71{,}446-71{,}541)^2 + (71{,}538-71{,}541)^2 \\ +(71{,}496-71{,}541)^2 + (71{,}659-71{,}541)^2}{5-1}}$$

$$= \sqrt{\frac{(0{,}784 \times 10^3) + (9{,}025 \times 10^3) + (0{,}009 \times 10^3) + (2{,}025 \times 10^3) + (13{,}924 \times 10^3)}{4}}$$

$$= \sqrt{\frac{(25{,}767 \times 10^{-3})}{4}} = 0{,}0802\ \text{kV}$$

$$\text{SD Keluaran radiasi} = \sqrt{\sum_{i=1}^{n} \frac{(\mu\text{Gy}_i - \overline{\mu\text{Gy}})^2}{n-1}}$$

$$= \sqrt{\frac{(6{,}3401-6{,}3438)^2 + (6{,}3404-6{,}3438)^2 + (6{,}3405-6{,}3438)^2 \\ +(6{,}3350-6{,}3438)^2 + (6{,}3628-6{,}3438)^2}{5-1}}$$

$$= \sqrt{\frac{4{,}7458 \times 10^{-4}}{4}} = \sqrt{1{,}18645 \times 10^{-4}} = 1{,}0892 \times 10^{-2} \approx 0{,}0109\ \text{mGy}$$

$$\text{SD Waktu eksposi} = \sqrt{\sum_{i=1}^{n} \frac{(\text{ms}_i - \overline{\text{ms}})^2}{n-1}}$$

$$= \sqrt{\frac{(6{,}18656-6{,}18642)^2+(6{,}18644-6{,}18642)^2+(6{,}18633-6{,}18642)^2 \\ +(6{,}18633-6{,}18642)^2+(6{,}18644-6{,}18642)^2}{5-1}}$$

$$= \sqrt{\frac{0{,}0366\times10^{-6}}{4}}$$

$$= \sqrt{0{,}915\times10^{-8}} = 0{,}95\times10^{-4} \approx 0{,}0001\ \text{s}$$

B. Nilai Koefisien Variasi (CV)

$$\text{CV}_{\text{tegangan}} = \frac{\text{SD}_{\text{tegangan}}}{\overline{\text{kVp}}} = \frac{0{,}0802}{71{,}541} = 0{,}00112\ \text{kV}$$

$$\text{CV}_{\text{keluaran radiasi}} = \frac{\text{SD}_{\text{keluaran radiasi}}}{\overline{\overline{\mu\text{Gy}}}} = \frac{1{,}0892\times10^{-2}}{6{,}3438} = 0{,}00171\ \text{mGy} \approx 0{,}002\ \text{mGy}$$

$$\text{CV}_{\text{waktu eksposi}} = \frac{\text{SD}_{\text{waktu}}}{\overline{\text{ms}}} = \frac{0{,}95\times10^{-4}}{6{,}18642} = 0{,}000015\ \text{s} \approx 0{,}000015\ \text{s}$$

(4) Nilai HVL

Tabel 10 Data HVL yang terukur oleh alat uji

Tegangan setting (kV)	Tegangan terukur	HVL terukur (mmAl)
65	66,79	2,94
70	71,66	3,15
75	76,49	3,37
80	81,26	3,62
85	84,48	3,79

- Nilai HVL pada tegangan 70 kV

$$\frac{(\text{X}-\text{X1})}{(\text{X2}-\text{X1})} = \frac{(\text{Y}-\text{Y1})}{(\text{Y2}-\text{Y1})}$$

$$\frac{(70\ \text{kV}-66{,}79\ \text{kV})}{(71{,}66\ \text{kV}-66{,}79\ \text{kV})} = \frac{(\text{Y}-2{,}94\ \text{mmAl})}{(3{,}15\ \text{mmAl}-2{,}94\ \text{mmAl})}$$

$$\text{Y}-294 = \frac{3{,}21\ \times 0{,}21}{4{,}87}$$

$$\text{Y} = 0{,}1384 + 294 = 3{,}07\ \text{mmAl} \approx 3{,}1\ \text{mmAl}$$

(5) Nilai Kebocoran Tabung (L)

$$\text{Leakage (L)} = \text{X}\cdot\left(\frac{\text{kVp}_{\text{maks}}}{\text{kVp}_{\text{set}}}\right)^2\cdot\frac{\text{mA}_{\text{cont}}}{\text{mA}_{\text{set}}}\cdot\frac{1}{1000}\frac{\text{mGy}}{\text{jam}}$$

$$\text{L}_{\text{I}} = 0{,}055\cdot\left(\frac{90}{90}\right)^2\cdot\frac{0{,}25}{2}\cdot\frac{1}{1000}\frac{\text{mGy}}{\text{jam}} = 0{,}00687\frac{\text{mGy}}{\text{jam}}$$

$$\text{L}_{\text{II}} = 0{,}009\cdot\left(\frac{90}{90}\right)^2\cdot\frac{0{,}25}{2}\cdot\frac{1}{1000}\frac{\text{mGy}}{\text{jam}} = 0{,}00113\frac{\text{mGy}}{\text{jam}}$$

$$L_{III} = 0{,}056 \cdot \left(\frac{90}{90}\right)^2 \cdot \frac{0{,}25}{2} \cdot \frac{1}{1000} \frac{\text{mGy}}{\text{jam}} = 0{,}00701 \frac{\text{mGy}}{\text{jam}}$$

$$L_{IV} = 0{,}106 \cdot \left(\frac{90}{90}\right)^2 \cdot \frac{0{,}25}{2} \cdot \frac{1}{1000} \frac{\text{mGy}}{\text{jam}} = 0{,}01321 \frac{\text{mGy}}{\text{jam}}$$

$$L_{V} = 0{,}001 \cdot \left(\frac{90}{90}\right)^2 \cdot \frac{0{,}25}{2} \cdot \frac{1}{1000} \frac{\text{mGy}}{\text{jam}} = 0{,}00013 \frac{\text{mGy}}{\text{jam}}$$

(6) Nilai deviasi DAP

$$Deviasi_1\ (\%) = \left|\frac{520 - 514{,}586}{520}\right| \times 100\% = \left|\frac{5{,}414}{520}\right| \times 100\% = 1{,}041\ \%$$

$$Deviasi_1\ (\%) = \left|\frac{839 - 829{,}75}{839}\right| \times 100\% = \left|\frac{9{,}25}{839}\right| \times 100\% = 1{,}102\ \%$$

$$Deviasi_1\ (\%) = \left|\frac{1892 - 1915{,}73}{1892}\right| \times 100\% = \left|\frac{23{,}73}{1892}\right| \times 100\% = 1{,}254\ \%$$