

ANNEX A: HIGH GEAR TVET COURSE UPGRADE VISUALS

Example Demokit Aids & Textbook and Industry Linkages (14 demokit aids in total)

Example Demonstration Aid	TVET Textbook / Concepts Covered	Context /Industry
<p>Example Aid 1: Open and Cross Belt Drives</p>	<p>Belt Drives</p> <ul style="list-style-type: none"> • Open, crossed and V belt drives • Radians • Effective diameter • Velocity ratio • Belt velocity • Belt length • Angle of contact • Tension in belt 	<ul style="list-style-type: none"> • Crankshaft/alternator or air conditioner (Vee belt) • Conveyor/Fan belt • Car engine • Lathe/Milling machine
<p>Example Aid 2: Power Supplies</p>	<ol style="list-style-type: none"> 1) Half wave rectification 2) Full wave rectification 3) Smoothing capacitor 4) Use Information to calculate: <ul style="list-style-type: none"> • Average or DC values • RMS values • The efficiency • Ripple factor • PIV value 	<ol style="list-style-type: none"> a) Power supplies converting AC- DC b) EG. Laptop/phone charger

TVET Implementation Visuals (2021)



Portable Demokit Aid Storage Box (1 per lecturer)



Sample of Demokit Aids (mechanical engineering)



TVET Lecturer Training Workshop (Eastern Cape)



TVET Lecturer Training Workshop (KZN)



TVET Classroom Implementation



TVET Classroom Implementation

Example TVET Lecturer Lesson Plan Excerpts (lesson plans leverage High Gear demokits)




Eastcape Midlands College Lesson Plan

Subject: Mechanotechnics Level: N4 Campus: Charles Goodyear
 Week: Lecturer:

TOPIC:	BELTS DRIVES	LENGTH OF LESSON: 300 (Minutes)
WEIGHTING:	5	
SUBJECT OUTCOME:	Upon successful completion, students should possess intellectual knowledge and applied competence in main theories and concepts of <u>Mechanotechnics</u> .	
LEARNING OUTCOMES:	On completion of this topic students should be able to: <ul style="list-style-type: none"> • Do calculations involving flat-, V- and Conveyor belts. • Calculate the power transmitted by belt tension, belt size and belt length of a flat-belt drives. • Calculate the power transmitted by and number of belts needed on V-belt drives. • Calculate the power and mass conveyed 	
OUTCOMES (EFAL ONLY): (Be specific e.g letter of enquiry, report etc)	<ul style="list-style-type: none"> • Introduction of belt • Types of belt drives • Flat belt drive <ul style="list-style-type: none"> ○ Effective diameter ○ Velocity Ratio ○ Belt velocity ○ Belt length open ○ Angle of contact ○ Friction – slack ○ Centre distance ○ Calculate the tension ○ Centrifugal tension ○ Torque transmitted ○ Power transmitted ○ Force on bearings • Cross belt drives • Belt length • Contact angle or angle of lap • Torque transmitted by belt • Power transmitted by belt • Force on bearing • Number of plies • Power to overcome gravity • Power to overcome friction • Power and the head pulley • Efficiency 	

Implementation August 2021




Eastcape Midlands College Lesson Plan

Check understanding of driving and driven pulley with clarification questions and student demos	When I'm rotating this pulley, my hand is now the power source making this the driving pulley . Is the driven pulley rotating in the same direction as the driving pulley ? If the pulley I'm rotating is the driving pulley - What do we call the other pulley? <p>Student 1</p> 1. Turn the big pulley clockwise (to the right) What's happening to the direction of the little pulley? clockwise 2. Turn the small pulley anti-clockwise (to the left) what's happening to the direction of the big pulley? Anti-clockwise <p>Student 2</p> 3. Please provide power to this flat belt drive by rotating one of the pulleys. What do we call the pulley you are rotating with your hand? Driving pulley Notice how the belt is transferring power to the other pulley? What do we call the other pulley? Driven pulley
Teacher demo and explanation of effective diameter	Effective diameter of the pulleys is used to calculate mean velocity of the belt. Refer to the calculation in your text book on Pg45. Let us use capital D to represent the diameter of the large pulley and lower case d to represent the diameter of the small pulley. Write D and d on the board. To make sure we remember it is the pulley diameter we will add a lower case 'p'. For my calculation I need the measurement of D_p - Which pulley do I need to measure?
Check understanding of effective diameter with clarification questions and student demos	Please come up and measure it for me. Write value for D_p on the board. For my calculation I need d_p - Which pulley do I need to measure?
Higher Order Thinking Skills – analytical thinking skills	Please measure d_p for me Write value for d_p on the board I will give you the thickness of belt. $t = 0.6\text{mm}$
Student application activities	Ask a volunteer to read the formula for effective diameter from the text book . Ask the students what unit is D_e calculated in – metres . What units did we measure the diameters in – millimeters When we substitute those measurements into the formula we need to convert them. Ask the students to tell you what values to substitute into the formula.

$$D_p = 100\text{mm} \quad 0,1\text{m}$$

$$d_p = 20\text{mm} \quad 0,02\text{m}$$

$$t = 0,6\text{mm} \quad 0,0006\text{m}$$

$$D_e = D_p + \frac{t}{2} + \frac{t}{2}$$

$$D_e = D_p + t$$

$$D_e = 0,1 + 0,0006$$

$$= 0,1006\text{m}$$

$$d_e = d_p + \frac{t}{2} + \frac{t}{2}$$

$$= 0,02\text{m} + 0,0006$$

$$= 0,0206\text{m}$$

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