A-EYE

Pricing
Technology, Manufacturing

Medium difficulty
Interviewer-Led Case

This case focuses on determining the value and pricing for an AI visual anomaly detection system for a wind-turbine blade manufacturer. This case tests all elements of the interview scorecard, with an emphasis on numeracy.

Problem definition

Your client (A-EYE) has developed an extremely efficient AI visual anomaly detection (VAD) system that can detect manufacturing defects. A wind turbine manufacturer (Breeze) is interested in the solution.

The anomaly detection system can detect defects (e.g., nicks and scratches) on a wind turbine during the manufacturing process and automatically flag the defect. A-EYE is specifically interested in using its solution to minimize defects during the layering of carbon fiber on the wind turbine blades for Breeze.

This is A-EYE's first wind turbine blade client, and they need your help in pricing the solution.

Question 1 (Structuring)

What are key considerations when looking to price this solution?

Additional information

If asked at this stage or later, please share that:

- Breeze's horizontal axis wind turbines have 3 blades each 52 meters (170 ft) in length, each manufactured using 30 layers of carbon fiber composite material over a steel scaffolding.
- The VAD system uses a camera on a fixed rail to inspect the entire length of the wind turbine blade – this camera input is then fed into the AI model and notifies workers of any defect.
- A-EYE's goal is to become the largest player in the industry (i.e., have the largest market share) and become a long-term partner to top players like Breeze within the sustainability and renewable space.
- Breeze is located in Oslo, Norway, and A-EYE is located in Montreal, Canada.
- A-EYE is a small-medium-sized AI company with ~100 employees.

Guidance for interviewer

Candidates may default to putting down the 3 main types of pricing methods (e.g., Willingness to Pay, Cost, Competition). It is recommended to push them to specify how they would assess each driver, in a way that is highly tailored to the client's product and situation.

Possible answer

1. *What is Breeze's willingness to pay for the VAD solution?*
    a. *Amount Breeze could pay*
        i. *What is Breeze's current cost and benefit from the status quo?*
        ii. *What is Breeze's net benefit from A-EYE's VAD solution?*
            - *Decrease in costs (less manual inspection labor, less turbine blade rework, fewer returns from end customers)*
            - *Increase in revenue (improved end customer satisfaction, increased capacity given freed up time from fewer reworks*
    b. *Payment model they could accept (based on their current tools, and finances)*
        i. *Subscription model*
        ii. *One-off investment to buy equipment and license*

2. *What are A-EYE's costs to cover and profit ambitions?*
    a. *Variable costs to implement the VAD solution for Breeze?*
        i. *Installation*
        ii. *Recurring cost of running the model*
    b. *Fixed central costs*
        i. *Admin*
        ii. *R&D*
        iii. *Sales & Marketing*
        iv. *Etc*
    c. *Profit margin ambition*

3. *What are the competitive pressures that A-EYE faces*
    a. *Are there any competitors offering a similar product? If yes, what is their pricing/effectiveness?*
    b. *Are any competitors developing similar products ready to be launched soon?*
    c. *Do we have competitive moats? Barriers to entry?*

Question 2 (Numeracy)

Each wind turbine blade produced by Breeze contains 30 layers of carbon fiber applied over a steel scaffolding. Currently, Breeze's inspection team examines each layer of carbon fiber for defects during the manufacturing process. If defects are detected early (i.e., before hardening of the fiber), the defect can be fixed and there are no additional costs. If the defect is detected late (i.e., after the fiber has hardened), the last 3 layers of carbon fiber must be reapplied, generating additional costs.

How much does Breeze's current annual blade rework cost?

Additional information

Provide the below information if requested by the candidate

- Breeze manufactures 200 wind turbine blades a year.
- Assume that the cost of a wind turbine blade only consists of the scaffolding and the carbon fiber layers, ignore all other costs.
- The cost of reworking a layer of carbon fiber is the total cost of the carbon fiber in the blade divided by the total number of layers in the blade.

Guidance to Interviewer

- Provide Exhibits 1 and 2 to the candidate.
- This is a great question for candidates to demonstrate their quantitative thought process and to push them on any assumptions they may hold.

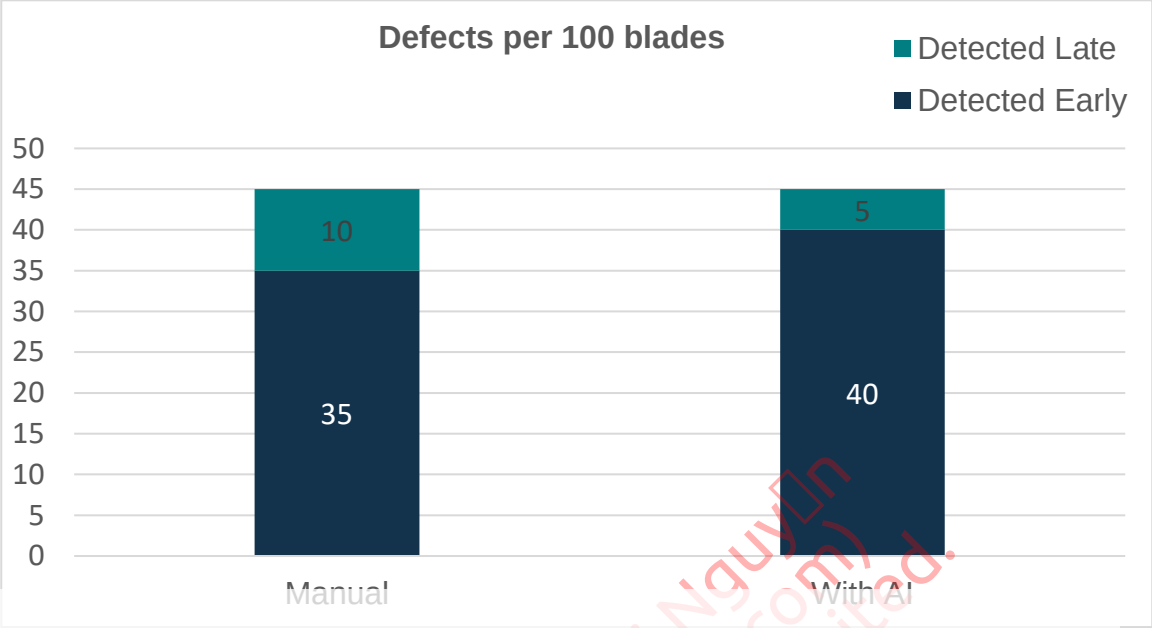
Possible Answer

1. *The annual cost of rework is $5.4 million. Annual cost of rework = cost per rework x number of reworks per year.*

2. *Cost per rework = cost per layer of carbon fiber x number of layers reworked*
   a. *Cost per layer of carbon fiber = [cost of blade – cost of blade scaffolding] / [# layers of carbon fibre per blade] = ($3,500,000 - $800,000)/30 = = $90,000*
   b. *For every rework you need to redo the last 3 layers of carbon fiber; therefore the cost per rework = $90,000 per layer X 3 layers = $270,000*

3. *Number of reworks per year = average rework*
    a. *Early defects are irrelevant as they do not incur additional costs*
    b. *Late defects: 10 per 100 blades (from Exhibit 1)*
    c. *Average reworks per blade = 10/100 = 0.1*
    d. *Blades produced per year = 200*
    e. *Number of reworks per year = 0.1 x 200 = 20*
4. *Annual cost of rework = cost per rework x number of reworks per year = $270,000 x 20 = $5,400,000*

Exhibit 1: # of Carbon Fiber Defects Detected E



(*) Note: Defects detected early refer to defects identified before hardening. Detected late refer to defects identified after the carbon fiber has set, requiring 3 carbon fiber layers to be reworked.

Exhibit 2: Manufacturing Costs

Item	Value	Unit
Total Manufacturing Cost per Blade	$3,500,000	$
Cost of Blade Scaffolding	$800,000	$
Number of Layers of carbon fiber	30	Layers
# of layers refinished per rework	3	Layers

Question 3 (Numeracy)

What price should A-EYE charge for an annual subscription, if their aim is to deliver Breeze total savings of 25% vs current costs?

Additional information

The candidate should ask for this information as they lay out their approach. If they do not, prompt them to identify any other costs they might need to consider.

- Breeze currently pays $300K per year to staff a 4 person QA crew to conduct manual inspections
- The AI VAD model costs $0 to maintain
- There is an installation cost for the AI VAD equipment and services to train the model, totalling $1 Million in one-time costs, which will be incurred by Breeze. We can assume that they will be amortized over 10 years (ignore cost of capital)
- We can assume that Breeze's volume and costs will stay constant for the foreseeable future

Guidance to Interviewer

This is a very similar calculation to Question 2 - a strong candidate would understand that the only key variable changing is the Average Detection Efficiency.

Candidates should be guided towards pricing via max willingness to pay (WTP) based on the lifetime value (LTV) of the solution but also take into account A-Eye's goal of delivering a minimum of 25% cost savings for Breeze.

Possible Answer

1. *A-Eye can charge up to $1,475,000 for the license.*
   a. *To meet A-Eye's goal of providing 25% cost savings to Breeze (originally $5,400,000 in rework costs per year plus $300,000 in labor), A-Eye would need to reduce the total cost to $4,275,000 ($5,700,000 x 75%).*
   b. *Cost of the software license = New total annual costs - new costs of rework - amortization of the implementation*
2. *New costs of rework:*
   a. *To get the new annual rework costs, we can look at the late reworks per 100, i.e., 5/100 = 0.05. We could take the shortcut of dividing the previous reworks by 50% to get $2,700,000.*
   b. *The full equation is average reworks needed per blade using AI VAD (0.05) multiplied by blades per year (200) multiplied by cost per rework ($270,000) leading to ~$2,700,000 in annual rework costs under AI VAD (0.05 x 200 x $270,000 = $2,700,000). There is no more labor cost to consider.*

3. *Amortization of the implementation: the annua*
   ($1,000,000/10 years).

4. *Cost of the software license*: *therefore A-Eye can charge up to $1,475,000 for the license ($4,275,000 - $2,700,000 - $100,000).*

5. *In addition to the 25% cost savings, A-Eye's VAD may provide additional benefits. These include*
   a) *Fewer delivery time delays caused by rework*
   b) *Higher customer satisfaction from manufacturing quality*

6. *As a next step, the candidate could suggest incorporating the benefits mentioned above or checking if there are competitors with similar pricing that should be assessed.*

Question 4 (Creativity)

A competitor is expected to enter the market with a similarly priced solution. What are some ways that A-EYE can protect market share?

Additional information

- Candidate has many options to choose from when answering this question. Test for comprehensiveness.
- While lowering price is an option, it's not ideal since cost-of-service delivery for A-EYE is near zero and you could assume the same for the new competitor. This could lead to a price war.

Possible answer

1. *Retain Existing Clients*
   a. *Lock in existing clients with long-term contracts*
   b. *Make switching difficult:*
      i. *Integrate within other software involved in the manufacturing process*
      ii. *Ensure the model improves based on historical data*
      iii. *Limit data export options*
   c. *Compete*
      i. *Improve the performance of our solution*
      ii. *Deliver outstanding customer service*
      iii. *Add new features*
      iv. *Develop solutions for other parts of the manufacturing process (e.g., steel scaffolding manufacturing process)*
   d. *Lower prices*
2. *Increase sales & marketing efforts*
3. *Join forces with the competitor (e.g., partnership, acquisition, merger)*
4. *Diversify: develop new applications*

Question 5 (Creativity)

What are some other areas that A-EYE can apply and market their AI VAD technology?

Additional information

A-EYE's VAD solution can easily identify defects – the AI model learns by intaking images of the "good" state and compares real data against that "good" state to identify any differences.

Guidance to Interviewer

Candidates have a lot of options around areas the client can implement their solution – this question should allow them to demonstrate their creativity and communication skills.

Possible answer

1. *Manufacturing defects related*
   a. *Sustainability Related*
      i. *Solar Panels*
      ii. *Batteries*
   b. *Other manufacturing industries*
      i. *Defence and space*
      ii. *Electronics*
      iii. *Automotive*
      iv. *Energy*
      v. *Consumer*
      vi. *Other advanced industries*
2. *Object identification and classification*
   a. *Process industries*
      i. *Waste management*
      ii. *Agriculture*
      iii. *Food production*
      iv. *Medical Scans (e.g., X-Ray)*
      v. *Sustainability (e.g., emission control)*
   b. *Applications*
      i. *Self-driving Cars*
      ii. *Augmented reality*
      iii. *Smart cities*

Question 6 (Synthesis)

What is your overall recommendation at this stage?

Possible answer

We were asked by A-EYE to help them price their new Visual Anomaly Detection solution for their client Breeze.

By evaluating the benefit generated by the VAD solution, the willingness to pay by Breeze, and A-Eye's goal of 25% cost savings for their client, we have identified an optimum price of $1.475M in annual subscription fees. This ignores additional benefits such as reduced delivery delay and increased customer satisfaction, which could also be included to guide the price point..

To address the competition in this space, A-EYE should consider options to protect its existing business. These could include negotiating longer-term contracts, making switching more difficult for customers, and improving our solution to offer better value. They could also consider lowering prices.

A-EYE could also look to expand its market share into new customer segments, specifically other manufacturing processes, inside and outside the sustainability space, as well as in process industries and innovative applications.