

SDS
2.0

Smart Digital Systems

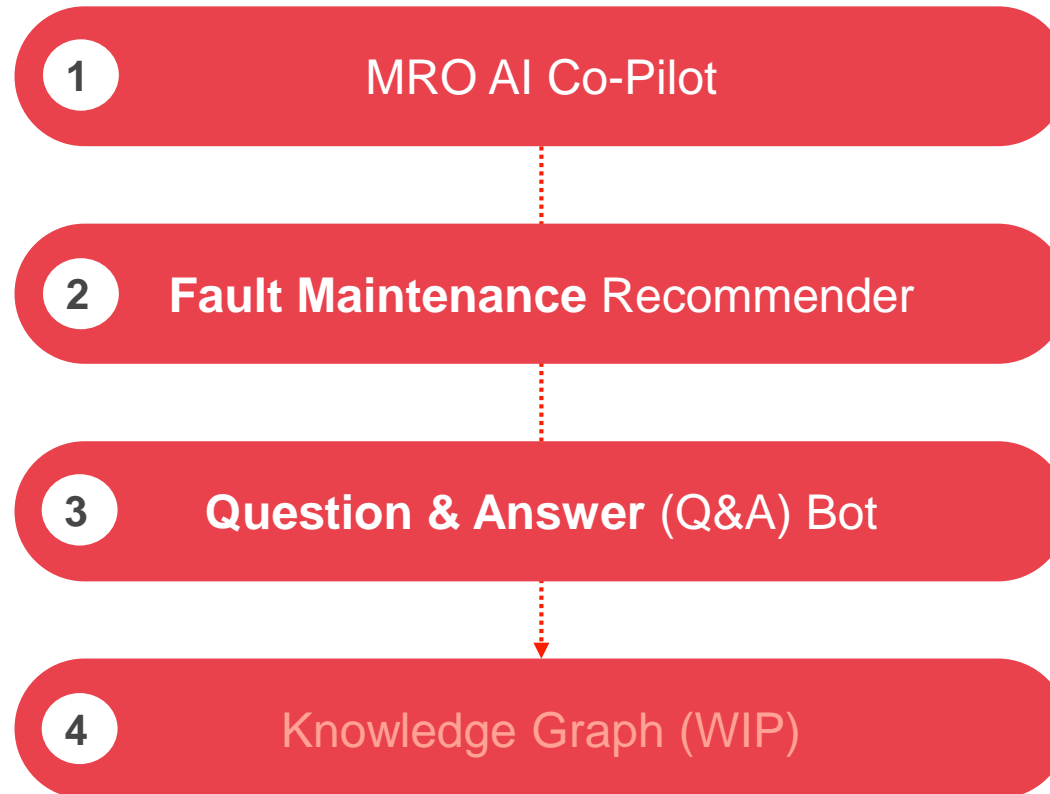
User Guide for Engineers | Using the Q&A Bot and Fault Maintenance Recommender



Co-Confidential

18th March 2024, Release 4 v1.0

Agenda



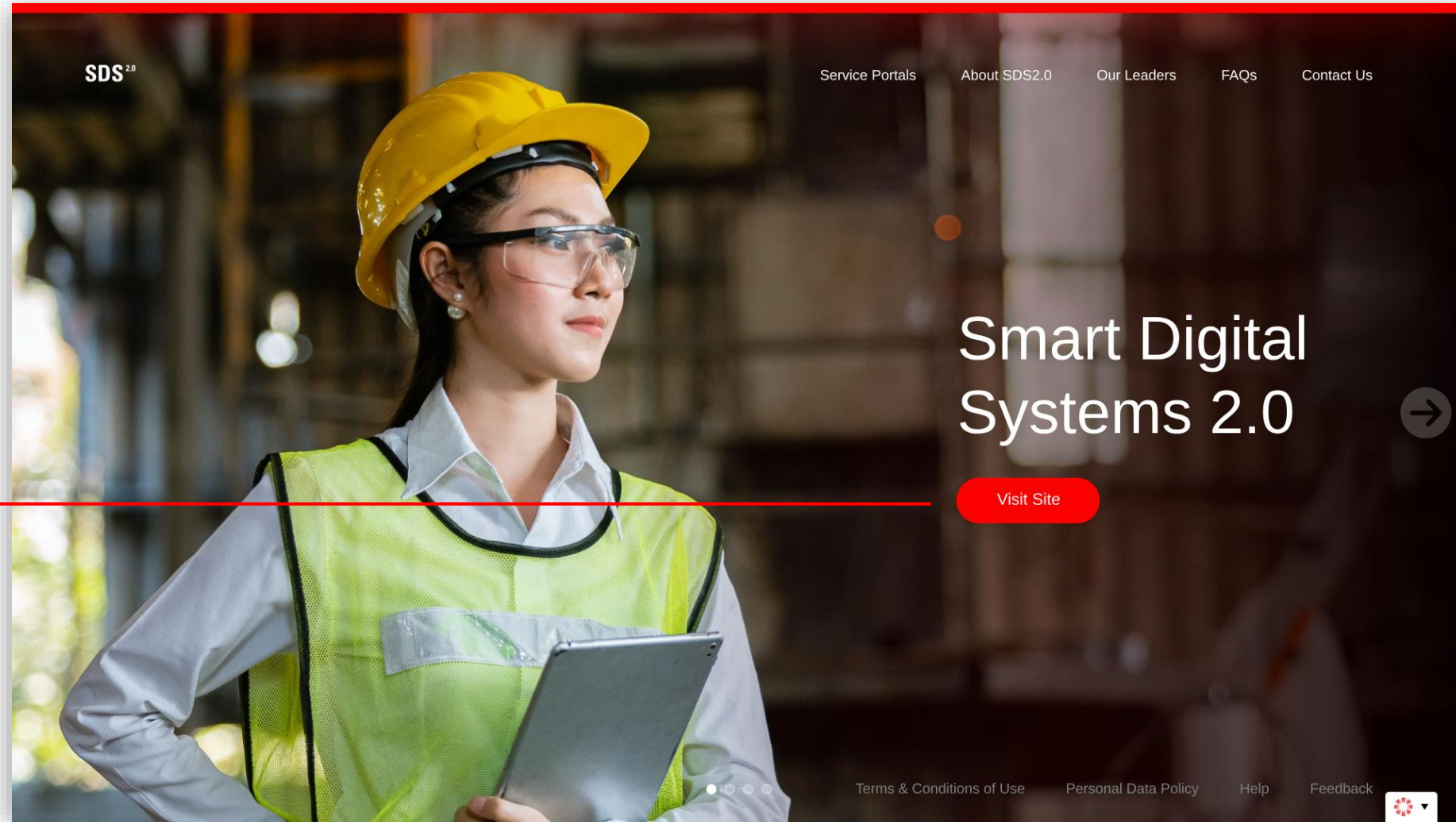
MRO AI Co-Pilot

Step 1: Go to SDS Website

To access SDS2.0:

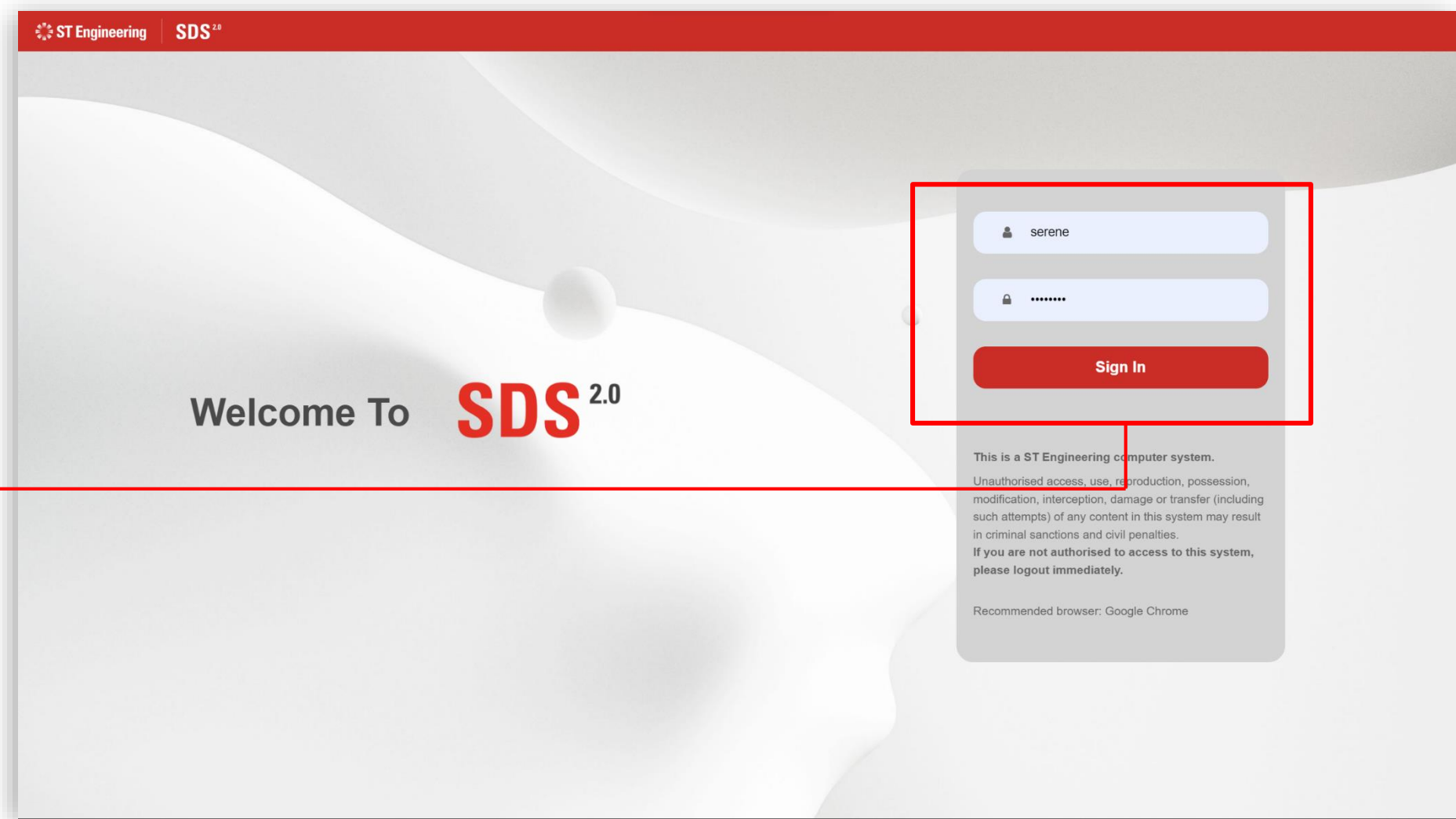
<https://sds.stengg.com>

Then select **Visit Site**





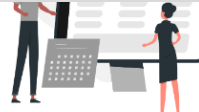




Step 2: Enter username and password

Enter your username
and Password here
and click **Sign In**.



Step 3: View Site

Select **Enter Portal** link under **MRO AI Co-Pilot** section

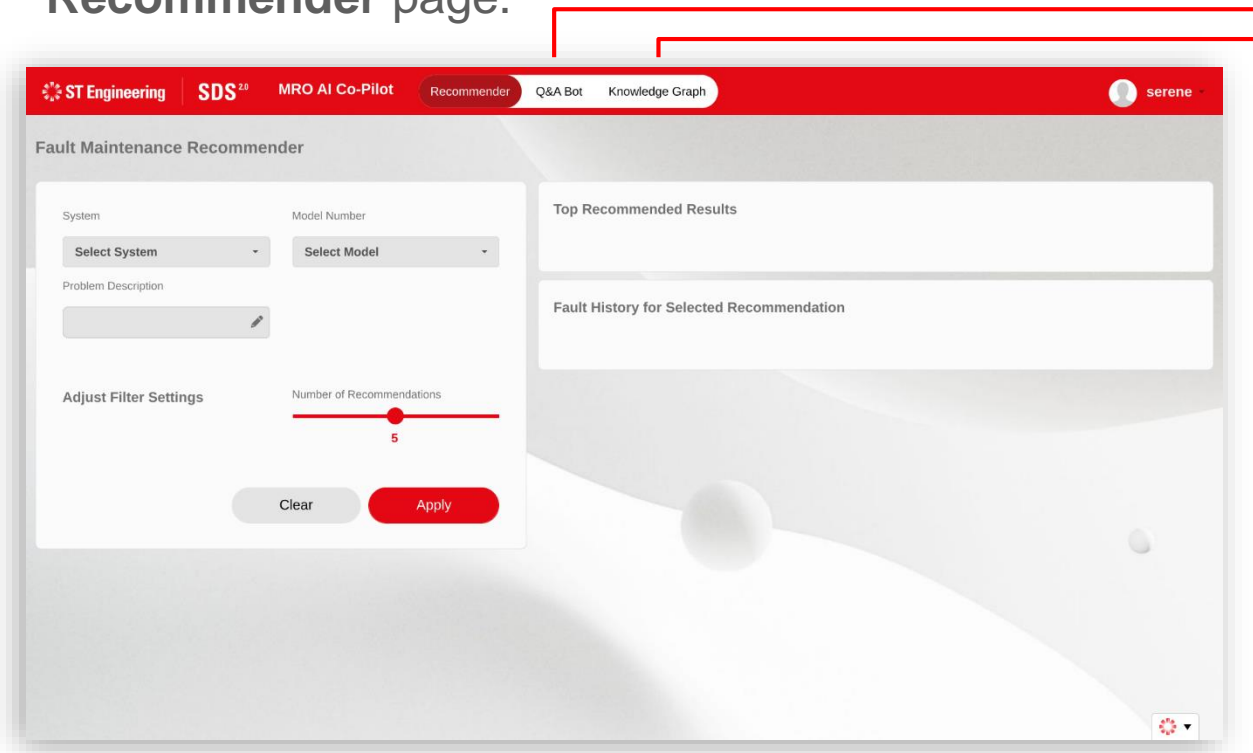
 <ul style="list-style-type: none"> • Raise service requests • Cancel service requests • Monitor status of service requests • Download service requests <p>Enter Portal</p>	 <ul style="list-style-type: none"> • Inhouse & Onsite Service Request Extraction • Updating & Importing of MO/SO/YT3 Values <p>Enter Portal</p>	 <ul style="list-style-type: none"> • Process Service Requests • Monitor & Edit Status of Requests • Task Assignments to Engineers <p>Enter Portal</p>	 <p>(*for administrative users only)</p> <ul style="list-style-type: none"> • Credential Reset or Change • Device Pairing Authentication <p>Enter Portal</p>
<p>Equipment Transit</p>  <ul style="list-style-type: none"> • Monitor Equipment Inflow / Outflow • Allocation of Equipments to Engineering Teams <p>Enter Portal</p>	<p>MRO AI Co-pilot</p>  <ul style="list-style-type: none"> • Formulate rectification action • Investigate root cause and more ... <p>Enter Portal</p>	<p>Helpdesk System Support</p>  <ul style="list-style-type: none"> • Create or Process Change Requests • Request Assignment to Engineers • Log FRACA, Incidents & Helpdesk Requests <p>Enter Portal</p>	



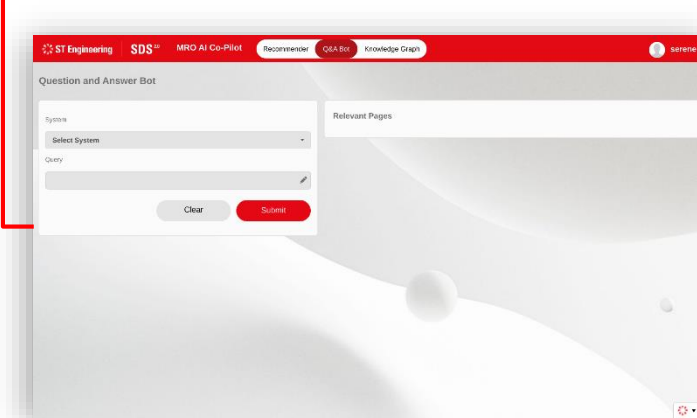
Navigation

It will first direct you to the **Fault Maintenance Recommender** page.

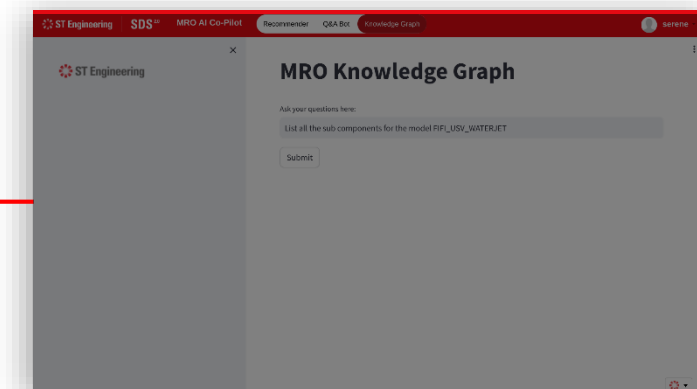
Select the links from the navigation bar to go to **Q&A Bot** or **Knowledge Graph** page



Fault Maintenance Recommender



Question & Answer (Q&A) Bot

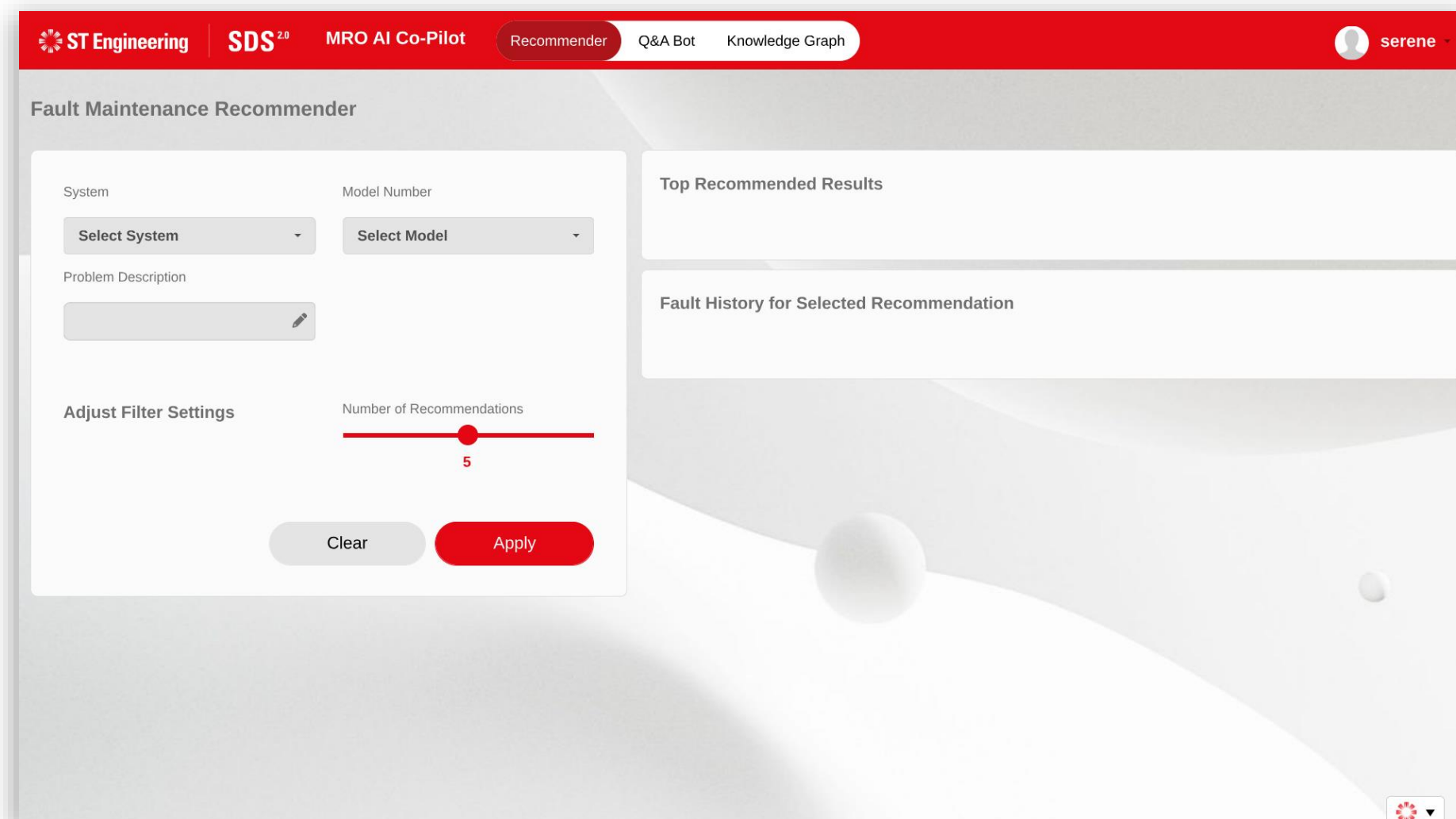


Knowledge Graph (WIP)

Fault Maintenance Recommender

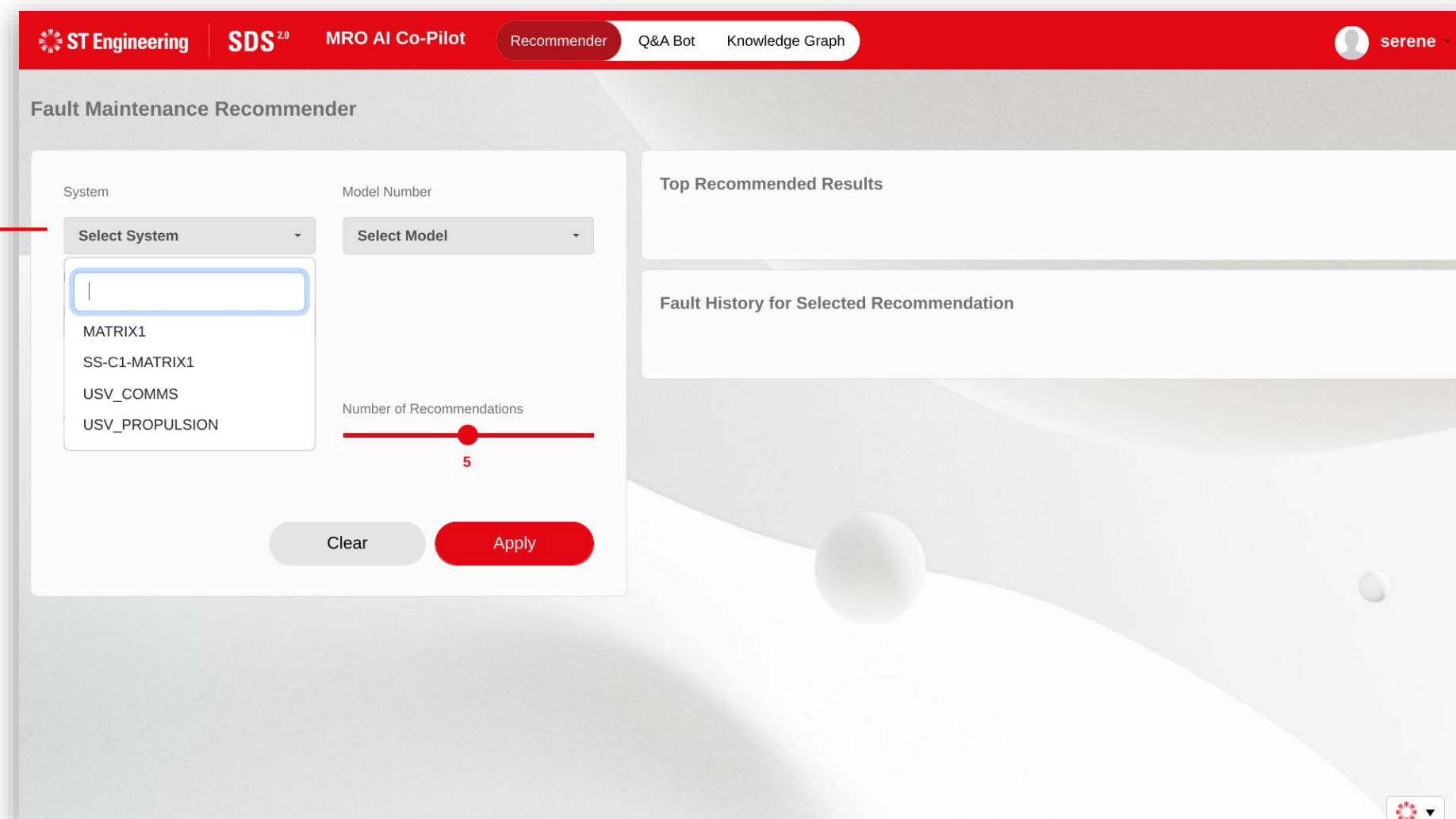
About Fault Maintenance Recommender

The recommender pinpoints the most probable root cause of failure in a defective system and proposed appropriate rectification action based on user's description of the failure symptoms.



Step 1: Select the system(s)

Select the system(s)
that you want to check.



The screenshot shows the 'Fault Maintenance Recommender' web application interface. At the top, there is a red navigation bar with the ST Engineering logo, 'SDS 2.0', 'MRO AI Co-Pilot', and three tabs: 'Recommender' (active), 'Q&A Bot', and 'Knowledge Graph'. A user profile icon for 'serene' is in the top right. The main content area is titled 'Fault Maintenance Recommender' and contains a form with the following elements:

- System:** A dropdown menu labeled 'Select System' with a list of options: MATRIX1, SS-C1-MATRIX1, USV_COMMS, and USV_PROPULSION. A red line points to this dropdown from the text on the left.
- Model Number:** A dropdown menu labeled 'Select Model'.
- Number of Recommendations:** A slider control set to the value 5.
- Buttons:** 'Clear' and 'Apply' buttons.

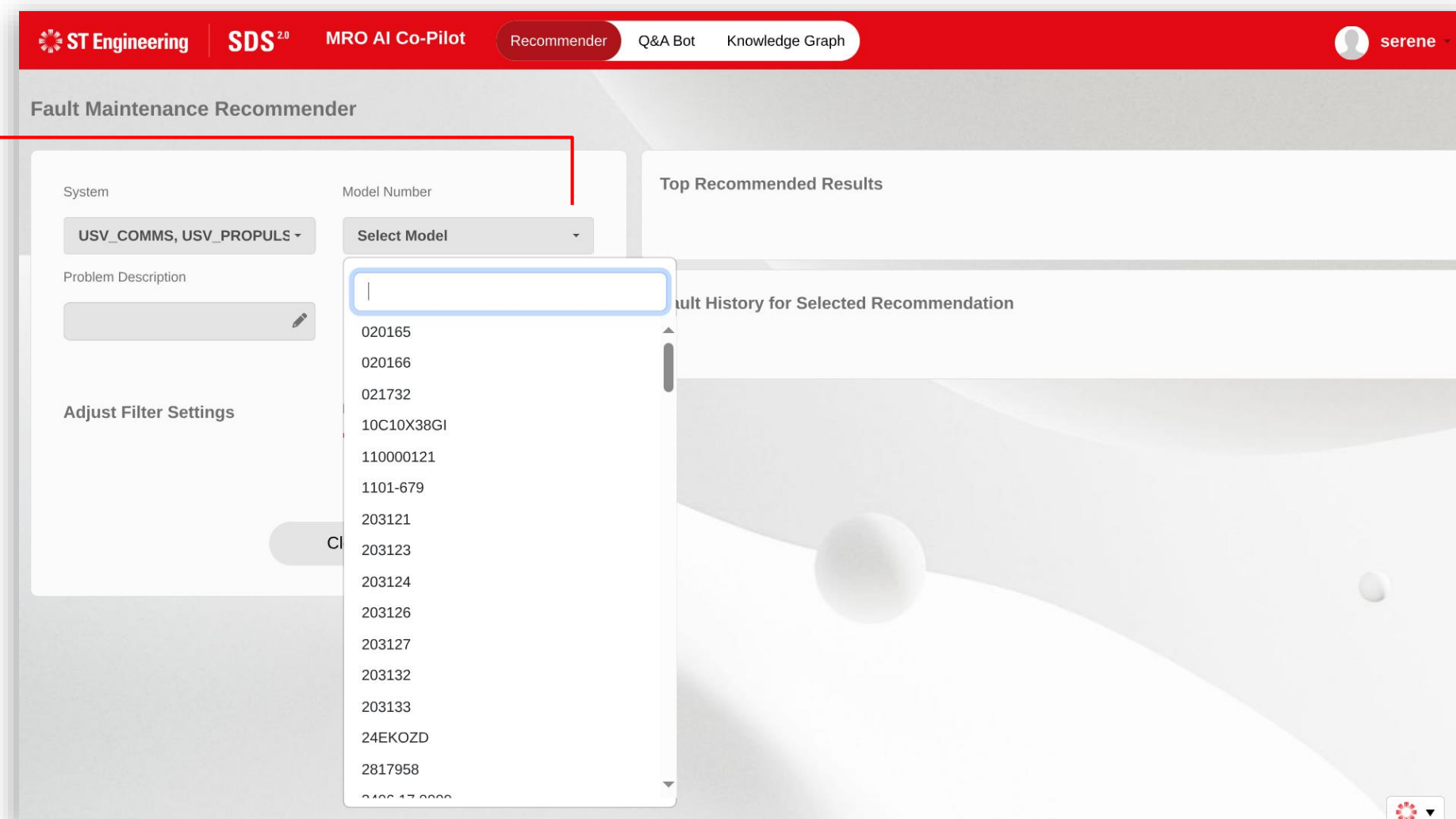
On the right side of the interface, there are two empty white boxes with the following titles:

- Top Recommended Results
- Fault History for Selected Recommendation



Step 2: Select the model no.(s)

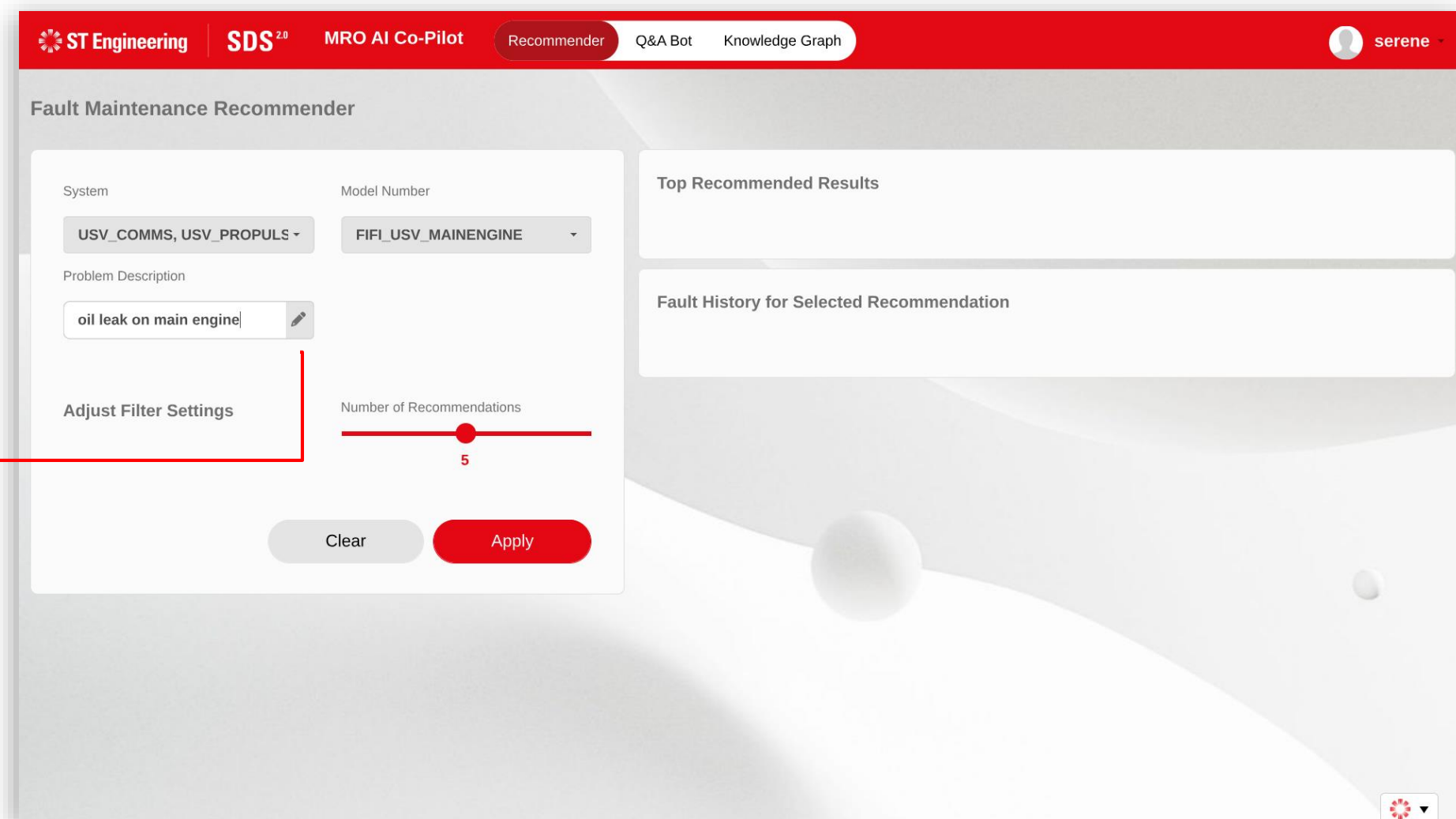
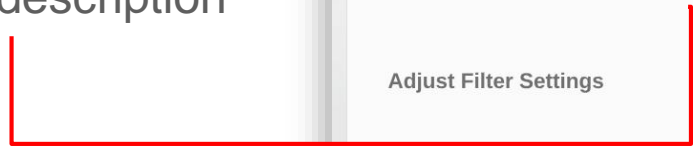
Select the model no.(s)
of the system(s).



The screenshot displays the 'Fault Maintenance Recommender' interface. At the top, there is a navigation bar with the ST Engineering logo, 'SDS 2.0', 'MRO AI Co-Pilot', and buttons for 'Recommender', 'Q&A Bot', and 'Knowledge Graph'. A user profile 'serene' is visible in the top right. The main interface is titled 'Fault Maintenance Recommender' and contains several input fields: 'System' (set to 'USV_COMMS, USV_PROPULS'), 'Model Number' (with a 'Select Model' dropdown), 'Problem Description', and 'Adjust Filter Settings'. A red box highlights the 'Model Number' dropdown, which is currently open, showing a list of model numbers: 020165, 020166, 021732, 10C10X38GI, 110000121, 1101-679, 203121, 203123, 203124, 203126, 203127, 203132, 203133, 24EKOZD, 2817958, and 2420 17 0000. To the right of the dropdown, there are sections for 'Top Recommended Results' and 'Fault History for Selected Recommendation'. A 'Clear' button is partially visible at the bottom of the input area.

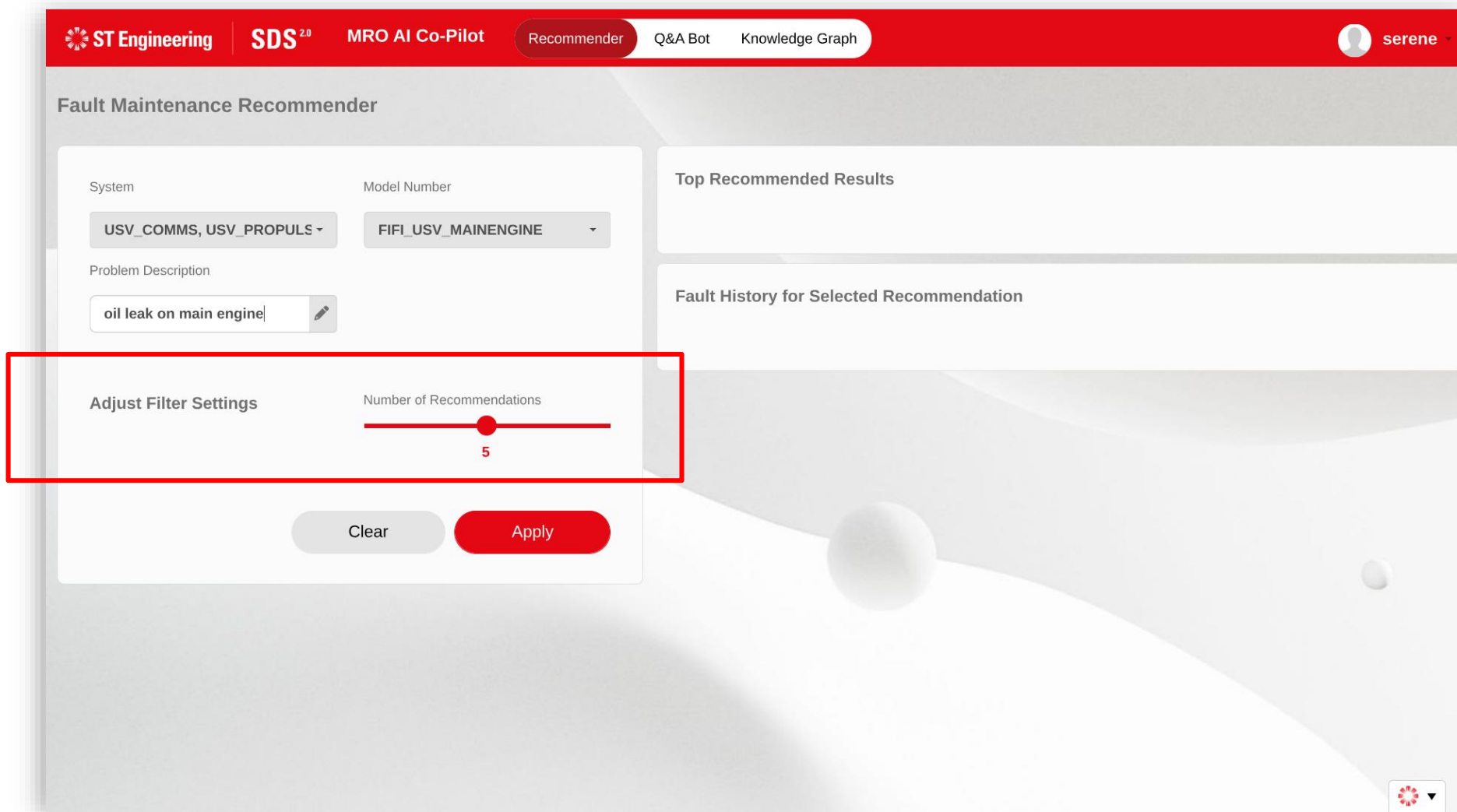
Step 3: Enter the keywords of the fault

Enter the keywords of the fault in the textbox under the problem description



Step 4: No. of recommendations to be displayed

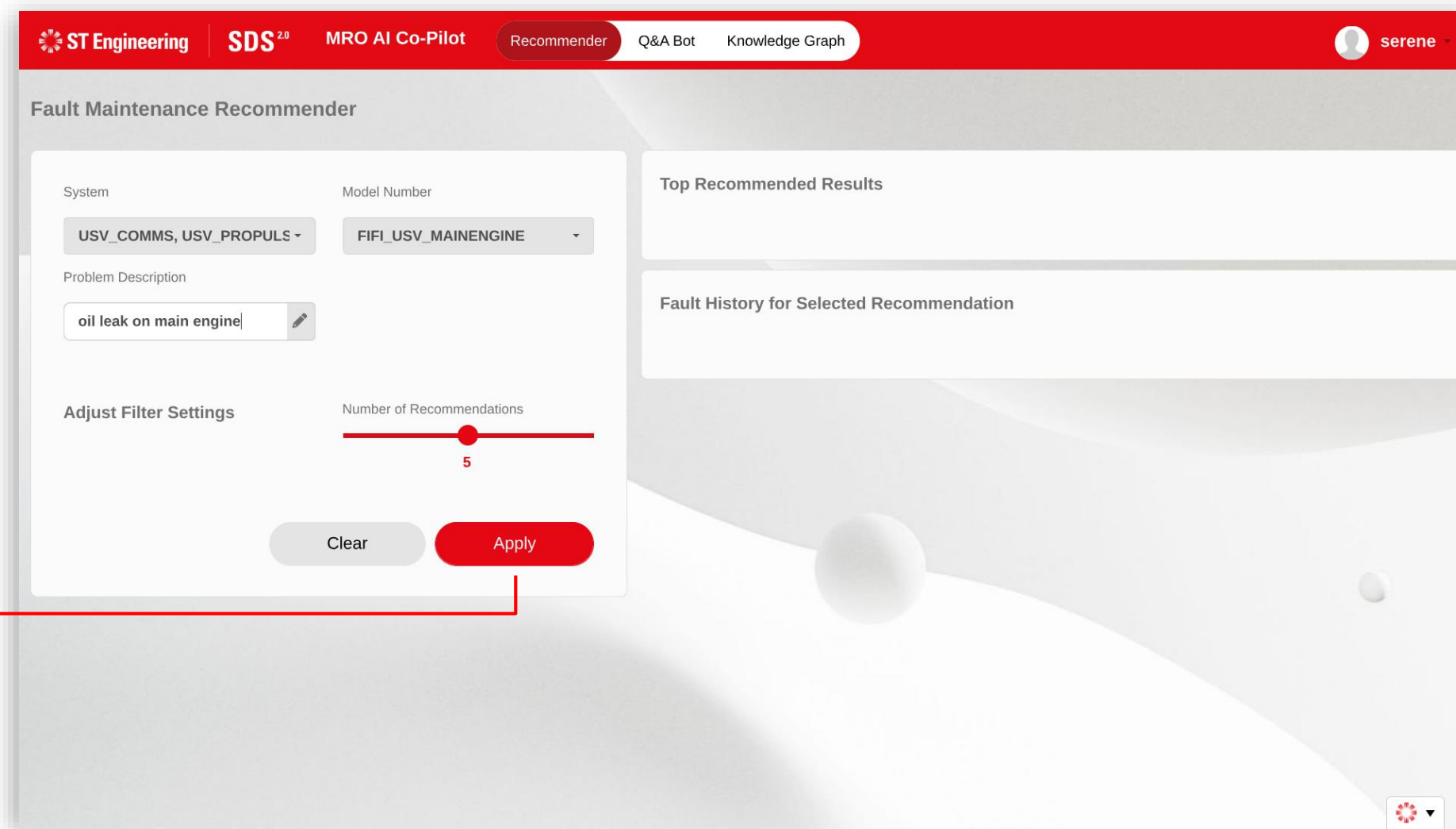
You can change the no. of recommendations or default display as 5.



The screenshot displays the 'Fault Maintenance Recommender' interface. The top navigation bar includes the ST Engineering logo, 'SDS 2.0', 'MRO AI Co-Pilot', and tabs for 'Recommender', 'Q&A Bot', and 'Knowledge Graph'. The user profile 'serene' is visible in the top right. The main content area is titled 'Fault Maintenance Recommender' and contains several sections: 'System' (USV_COMMS, USV_PROPULS), 'Model Number' (FIFI_USV_MAINENGINE), and 'Problem Description' (oil leak on main engine). A red box highlights the 'Adjust Filter Settings' section, which includes a slider for 'Number of Recommendations' set to 5. Below the slider are 'Clear' and 'Apply' buttons. To the right, there are sections for 'Top Recommended Results' and 'Fault History for Selected Recommendation'.

Step 5: Apply the search filter

Tap **Apply** button
to view the results.



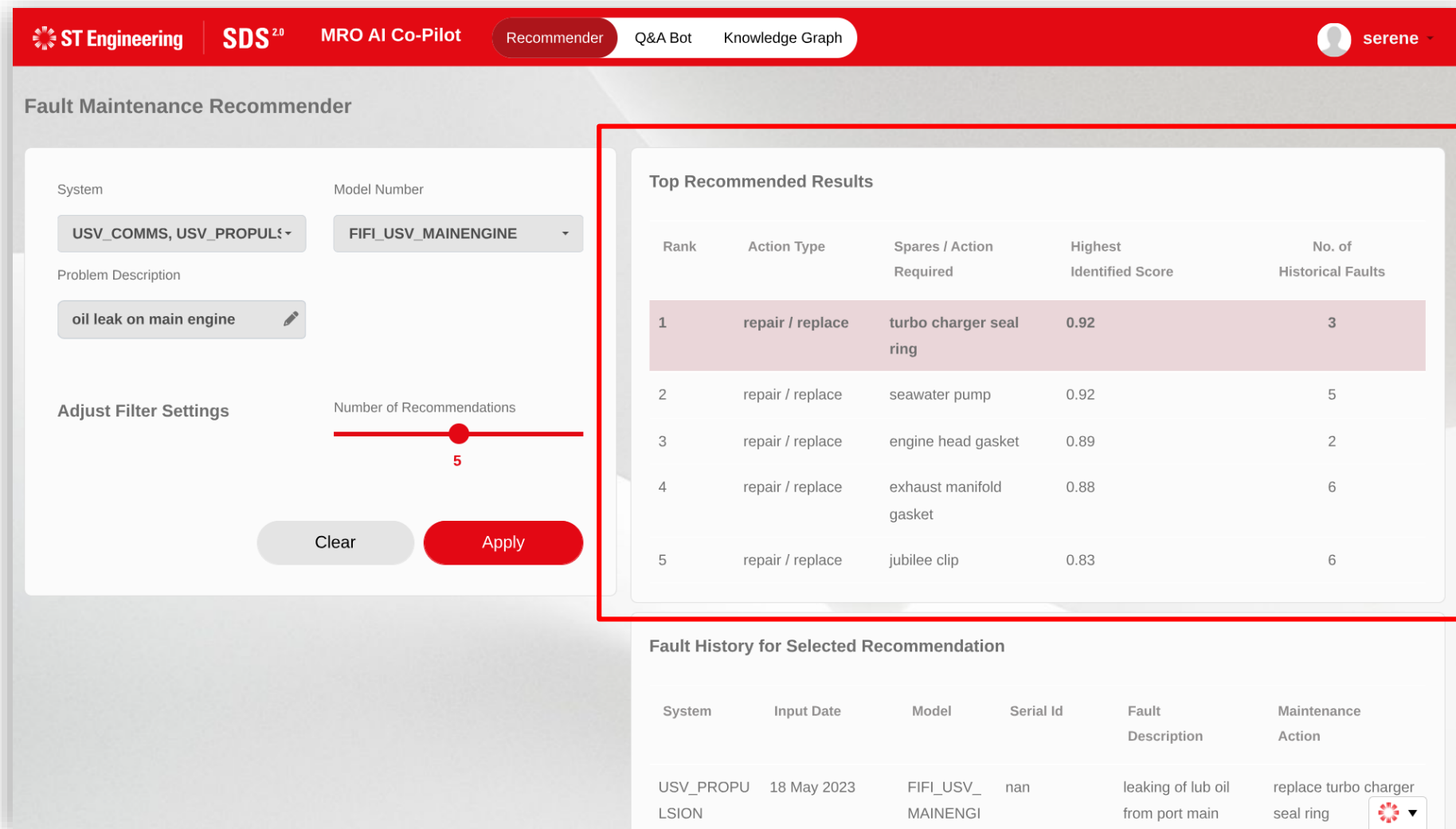
The screenshot displays the 'Fault Maintenance Recommender' interface. At the top, there is a navigation bar with the ST Engineering logo, 'SDS 2.0', 'MRO AI Co-Pilot', and three tabs: 'Recommender' (selected), 'Q&A Bot', and 'Knowledge Graph'. A user profile icon labeled 'serene' is in the top right. The main content area is titled 'Fault Maintenance Recommender' and contains a search form with the following fields:

- System:** A dropdown menu showing 'USV_COMMS, USV_PROPULS'.
- Model Number:** A dropdown menu showing 'FIFI_USV_MAINENGINE'.
- Problem Description:** A text input field containing 'oil leak on main engine' with a clear icon.
- Adjust Filter Settings:** A section containing a slider for 'Number of Recommendations' set to 5, and two buttons: 'Clear' and 'Apply'.

Below the search form, there are two empty white boxes: 'Top Recommended Results' and 'Fault History for Selected Recommendation'. A red line originates from the 'Apply' button and points to the text on the left side of the slide.

Top recommended results

It will display the **Top Recommended Results** ranked by the highest identified score to the lowest identified score.



The screenshot shows the 'Fault Maintenance Recommender' interface. The top navigation bar includes the ST Engineering logo, 'SDS 2.0', 'MRO AI Co-Pilot', and tabs for 'Recommender', 'Q&A Bot', and 'Knowledge Graph'. The user profile 'serene' is visible in the top right.

The main interface is titled 'Fault Maintenance Recommender' and contains several input fields:

- System:** USV_COMMS, USV_PROPULS
- Model Number:** FIFI_USV_MAINENGINE
- Problem Description:** oil leak on main engine
- Adjust Filter Settings:** A slider for 'Number of Recommendations' is set to 5.

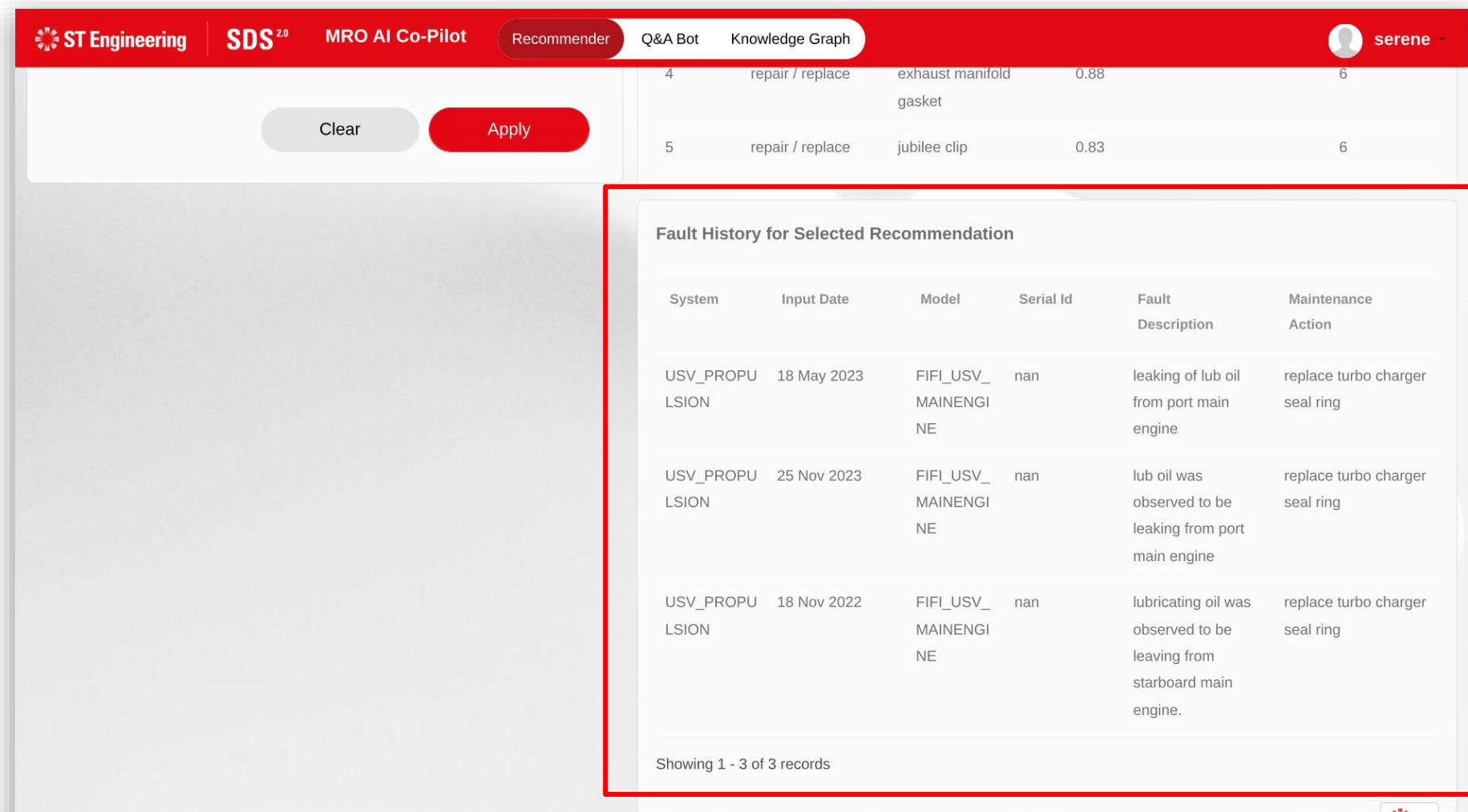
The 'Top Recommended Results' table is highlighted with a red border and contains the following data:

Rank	Action Type	Spares / Action Required	Highest Identified Score	No. of Historical Faults
1	repair / replace	turbo charger seal ring	0.92	3
2	repair / replace	seawater pump	0.92	5
3	repair / replace	engine head gasket	0.89	2
4	repair / replace	exhaust manifold gasket	0.88	6
5	repair / replace	jubilee clip	0.83	6

Below the table is a section for 'Fault History for Selected Recommendation' with a table containing columns for System, Input Date, Model, Serial Id, Fault Description, and Maintenance Action.

Fault history for selected recommendation

It will also display **Fault History for Selected Recommendation** based on the user inputs.



The screenshot shows the ST Engineering SDS 2.0 MRO AI Co-Pilot Recommender interface. At the top, there is a navigation bar with the ST Engineering logo, SDS 2.0, MRO AI Co-Pilot, and a 'Recommender' tab. Below the navigation bar, there are 'Clear' and 'Apply' buttons. The main content area displays a table with two rows of recommendations. The second row is selected, and a modal window titled 'Fault History for Selected Recommendation' is open, showing a table of fault history records.

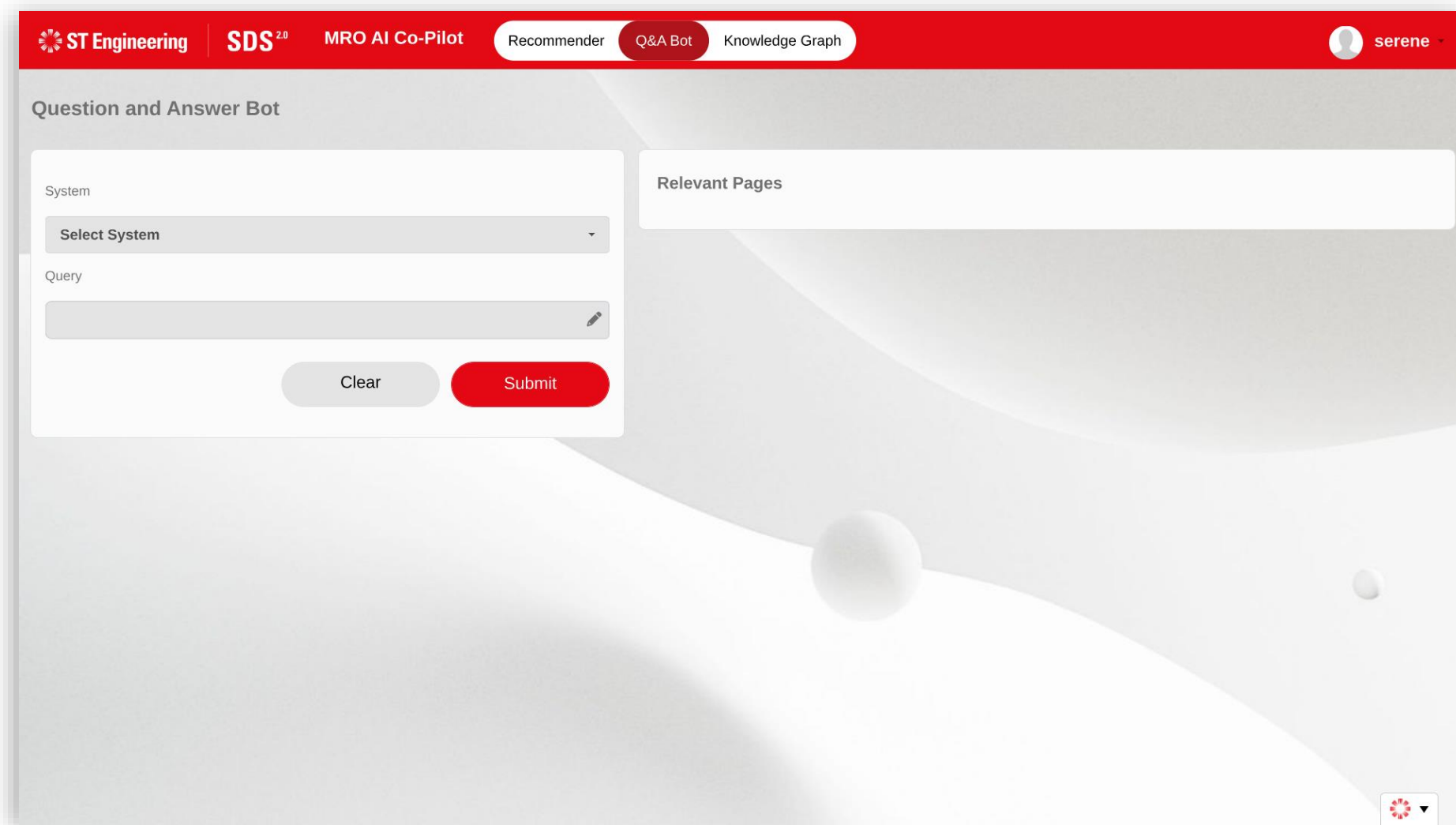
System	Input Date	Model	Serial Id	Fault Description	Maintenance Action
USV_PROPULSION	18 May 2023	FIFI_USV_MAINENGINE	nan	leaking of lub oil from port main engine	replace turbo charger seal ring
USV_PROPULSION	25 Nov 2023	FIFI_USV_MAINENGINE	nan	lub oil was observed to be leaking from port main engine	replace turbo charger seal ring
USV_PROPULSION	18 Nov 2022	FIFI_USV_MAINENGINE	nan	lubricating oil was observed to be leaving from starboard main engine.	replace turbo charger seal ring

Showing 1 - 3 of 3 records

Question & Answer (Q&A) Bot

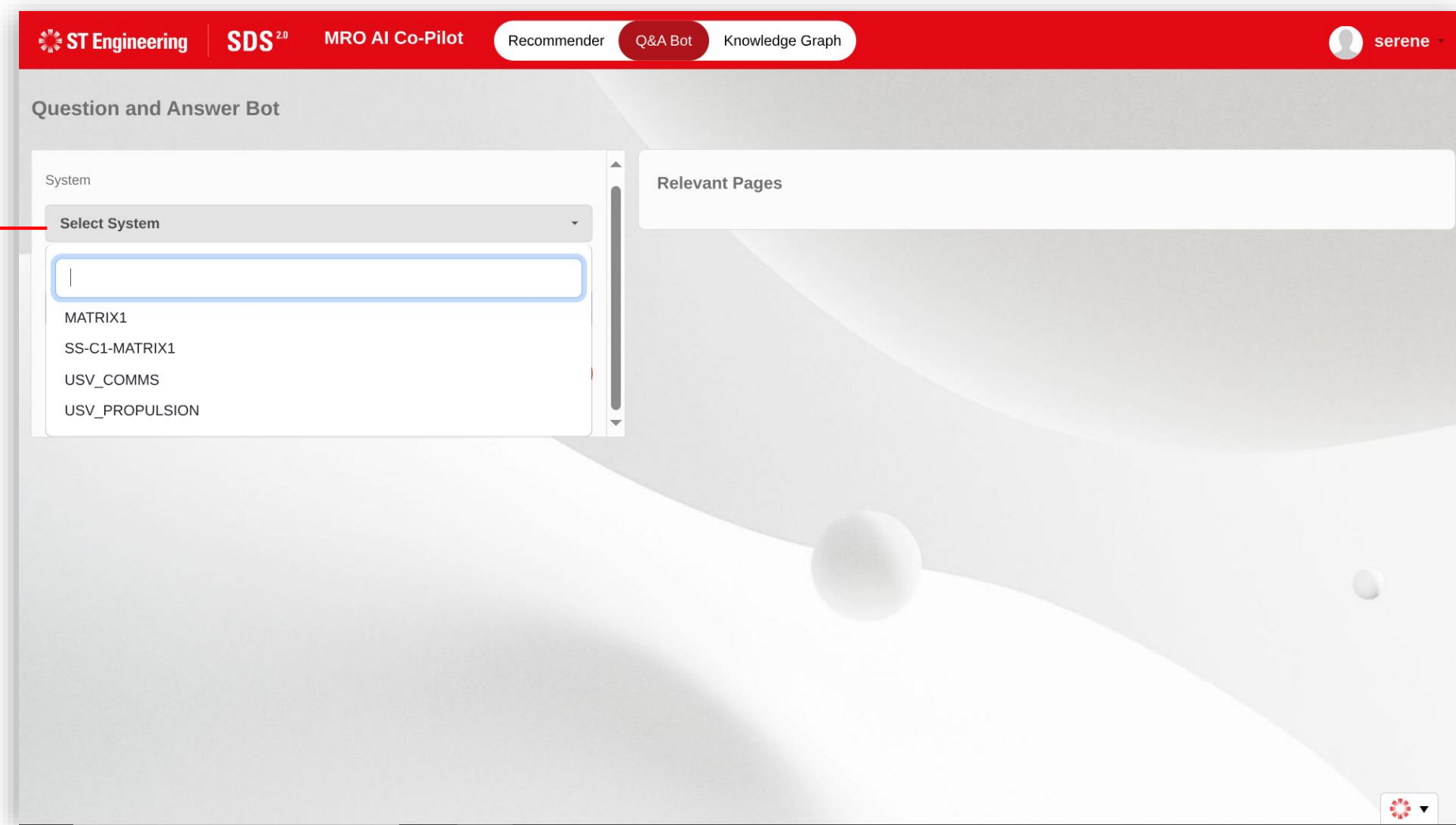
About Q&A bot

A Q&A bot assists engineers by providing quick and accurate answers to their questions, streamlining troubleshooting processes and enhancing productivity.



Step 1: Select the System(s)

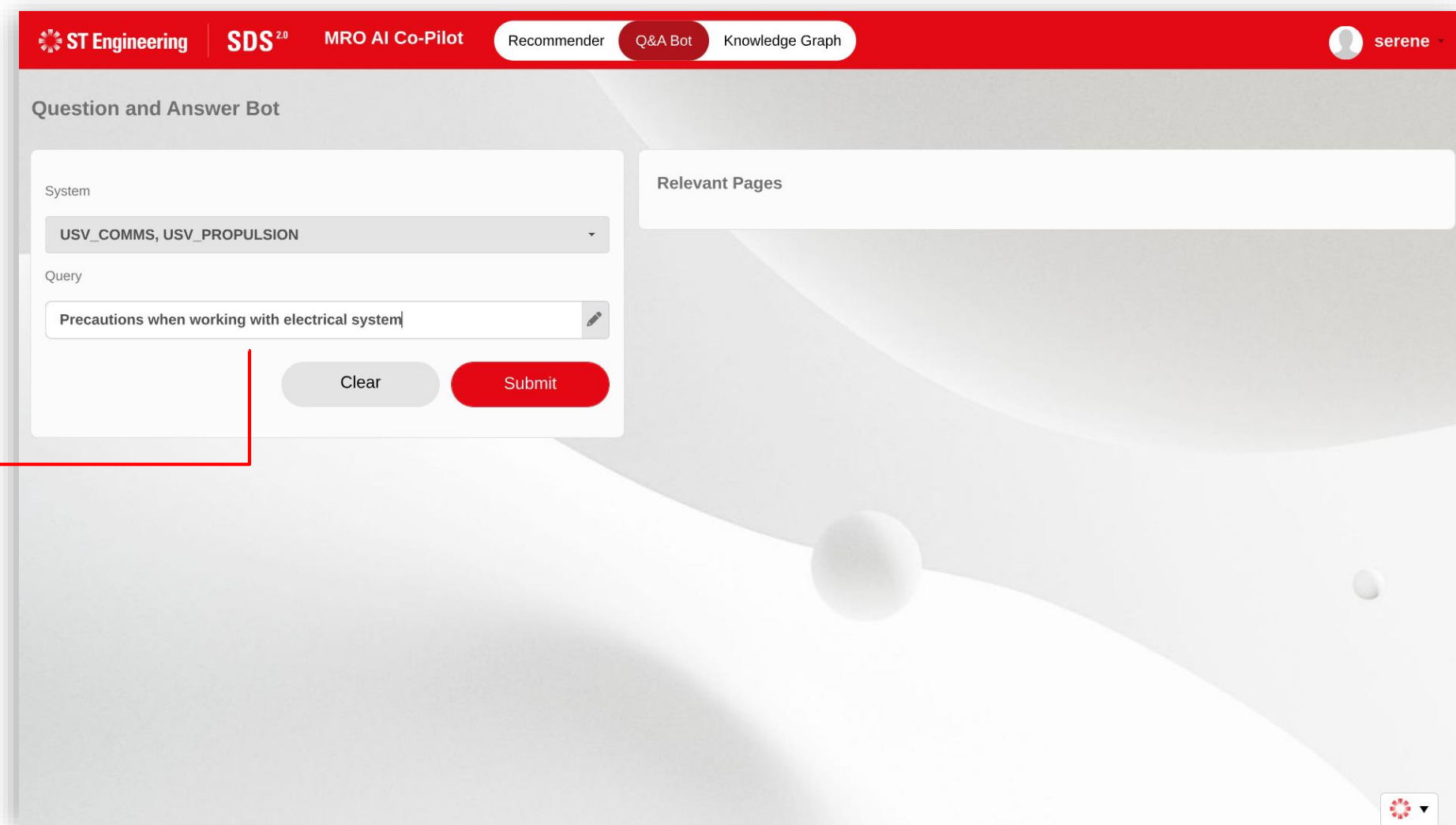
Select the system(s)
that you want to check.



The screenshot shows the 'Question and Answer Bot' interface. At the top, there is a red navigation bar with the ST Engineering logo, 'SDS 2.0', 'MRO AI Co-Pilot', and three tabs: 'Recommender', 'Q&A Bot' (which is active), and 'Knowledge Graph'. A user profile icon for 'serene' is in the top right. Below the navigation bar, the title 'Question and Answer Bot' is displayed. The main content area features a 'System' dropdown menu with the text 'Select System' and a list of system names: 'MATRIX1', 'SS-C1-MATRIX1', 'USV_COMMS', and 'USV_PROPULSION'. A red line points from the text 'Select the system(s) that you want to check.' to the dropdown menu. To the right of the dropdown is a 'Relevant Pages' section, which is currently empty. The background of the interface is a light gray with a subtle 3D effect of a sphere.

Step 2: Enter the keywords

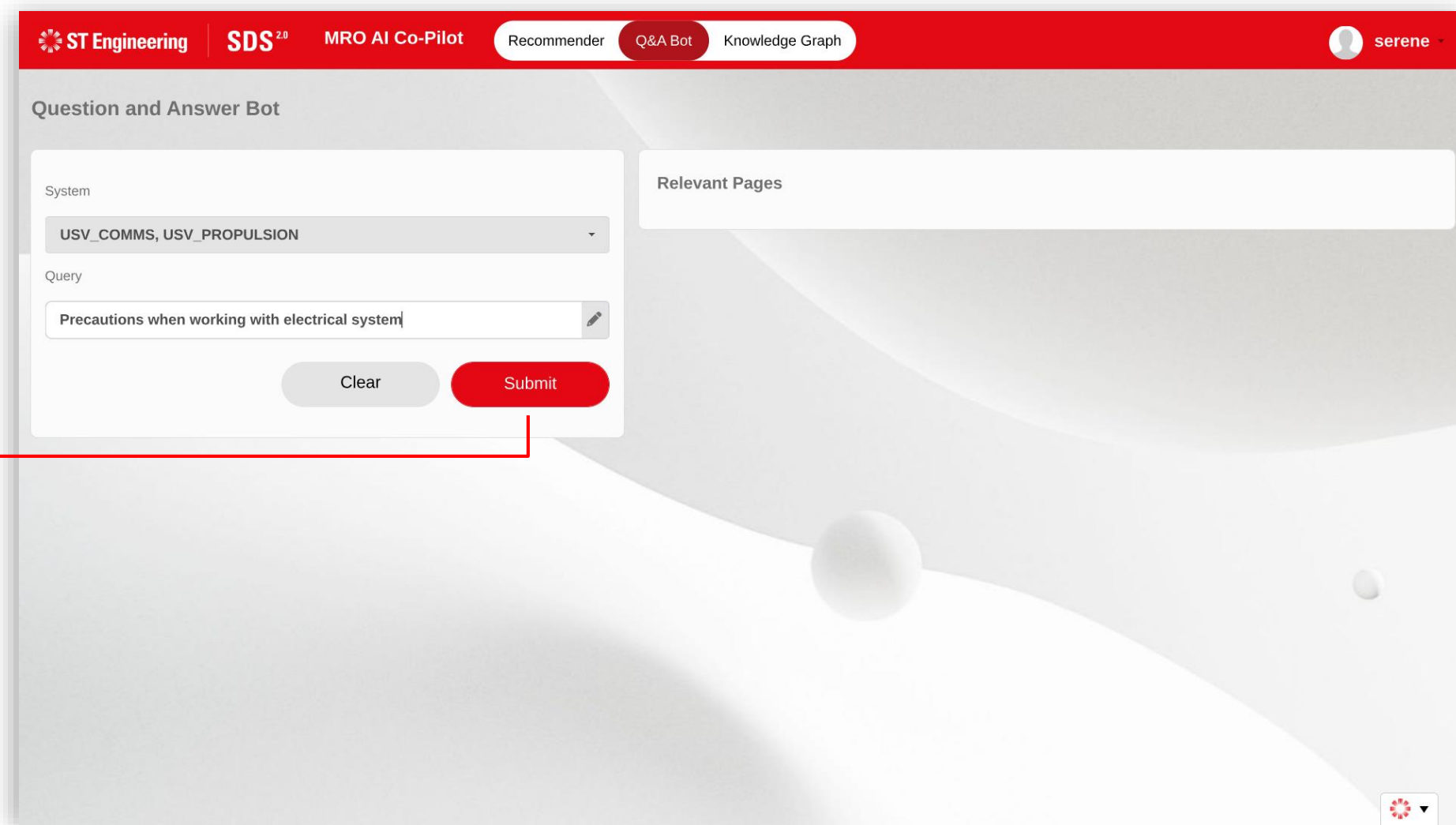
Enter the keywords in
the textbox under Query



The screenshot shows the 'Question and Answer Bot' interface. At the top, there is a red navigation bar with the ST Engineering logo, 'SDS 2.0', 'MRO AI Co-Pilot', and three tabs: 'Recommender', 'Q&A Bot' (which is selected), and 'Knowledge Graph'. A user profile icon for 'serene' is visible in the top right. Below the navigation bar, the main content area is titled 'Question and Answer Bot'. It features a 'System' dropdown menu set to 'USV_COMMS, USV_PROPULSION'. Below that is a 'Query' input field containing the text 'Precautions when working with electrical system'. A red box highlights this input field. To the right of the input field are 'Clear' and 'Submit' buttons. Further right is a 'Relevant Pages' section, which is currently empty. The background of the interface is a light gray with abstract white and red geometric shapes.

Step 3: Submit query inputs to view results

Tap **Submit** button
to view the results.



The screenshot shows the 'Question and Answer Bot' interface. At the top, there is a red navigation bar with the ST Engineering logo, 'SDS 2.0', 'MRO AI Co-Pilot', and three tabs: 'Recommender', 'Q&A Bot' (which is active), and 'Knowledge Graph'. A user profile icon for 'serene' is in the top right. Below the navigation bar, the title 'Question and Answer Bot' is displayed. The main content area is divided into two sections. On the left, there is a form with a 'System' dropdown menu set to 'USV_COMMS, USV_PROPULSION' and a 'Query' text input field containing 'Precautions when working with electrical system'. Below the query field are two buttons: 'Clear' and 'Submit'. A red box highlights the 'Submit' button, and a red line connects it to the text on the left. On the right, there is a section titled 'Relevant Pages' which is currently empty.

Q&A Bot Answer

Based on user inputs, the Q&A bot will generate the

1 Q&A Bot Answer extracted from the manuals and provide the

2 Relevant Excerpts where the answer was retrieved from.

1 Relevant pages

The screenshot displays the ST Engineering Q&A Bot interface. At the top, the navigation bar includes 'ST Engineering', 'SDS 2.0', 'MRO AI Co-Pilot', and tabs for 'Recommender', 'Q&A Bot', and 'Graph Query'. The user 'usv_demo_mgr' is logged in.

The main interface is titled 'Question and Answer Bot'. It shows a 'System' dropdown set to 'USV_PROPULSION'. The 'Query' field contains the text: 'Precautions when working with electrical system'. Below the query field are 'Clear' and 'Submit' buttons.

The 'Your Query' section shows: 'Your Query: Precautions when working with electrical system'.

The 'Q&A Bot Answer' section provides the following response:

Q&A Bot Answer: To ensure safe and effective work on the electrical system of the engine, it is important to follow certain precautions. According to the context given, these precautions include:

1. Ensure that all batteries are firmly connected before starting the engine. Do not disconnect the batteries while the engine is running.
2. Do not start the engine unless all connections to the electronic control unit are in place.
3. Do not use a boost-charger to start the engine. Instead, only render starting assistance with separate batteries. Remember to disconnect the batteries before boost-charging them.
4. When performing electric welding work, make sure to disconnect the batteries first and connect both cables (+ and -) firmly together.
5. Do not disconnect or connect the connections of the control unit unless the electrical system is switched off. Be careful when connecting the control unit to its electrical power supply to avoid cross-polarity, which can cause irreparable damage to the control unit.
6. Tighten connections on the injection system to the prescribed tightening torques.
7. Remove control units if they are expected to be exposed to temperatures in excess of 80u00b0C (e.g., drying ovens).
8. Use only suitable test cables for taking measurements on plug connections.
9. Telephones and radios not connected to an external aerial can lead to malfunctions in the on-board electronics and thereby impair the operational safety of the engine.
10. Follow the instructions for connecting all electrical connections as marked, and secure the wiring harness with cable ties at the previously marked attachment points. Tighten and cut cable ties using the Cable tie pliers.
11. For additional electrical connections, position the connectors (1 to 4) and lock them accordingly. These connectors correspond to the charge-air pressure plug connection, charge-air temperature plug connection, coolant level plug connection, and coolant pressure plug connection, respectively.

The 'Relevant Pages' section on the right shows two excerpts from the manual:

- No. 1**
Chapter: INTRODUCTION
Section: Regulations for preventing accidents leading to injury to personnel
- No. 2**
Chapter: ENGINE ELECTRICS
Section: Connecting the oil pressure, oil temperature and coolant pressure plug connections
- No. 3**
Chapter: ENGINE ELECTRICS
Section: Connecting the charge-air and coolant plug connections

Thank you