Pump Performance Monitoring User Manual

Whole application is divided into four parts.

1. Configure assets
2. Models training
3. Asset analysis
4. Alarms report

Home Page

When you open the application, this (Figure 1.0) would be home page. On the left, you can see the side bar menu.

Figure 1.0

1. Configure assets

Click on assets config tab and you will be navigated to configure asset page (Figure 1.1) from where you can configure assets.

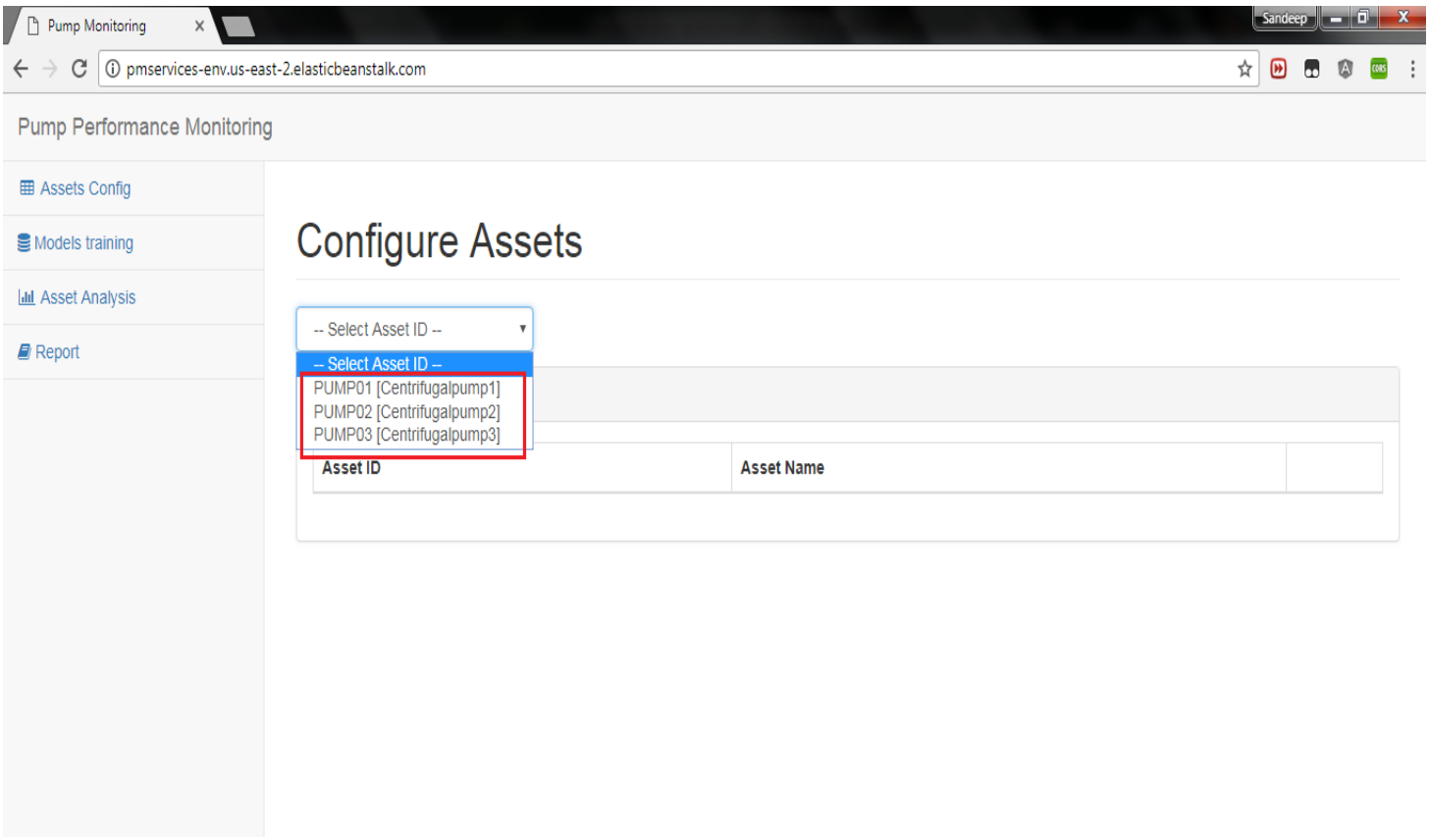


Figure 1.1

1.1. **Configure new asset**

Drop down in Figure 1.1 shows all the engineered assets, you can select any asset.

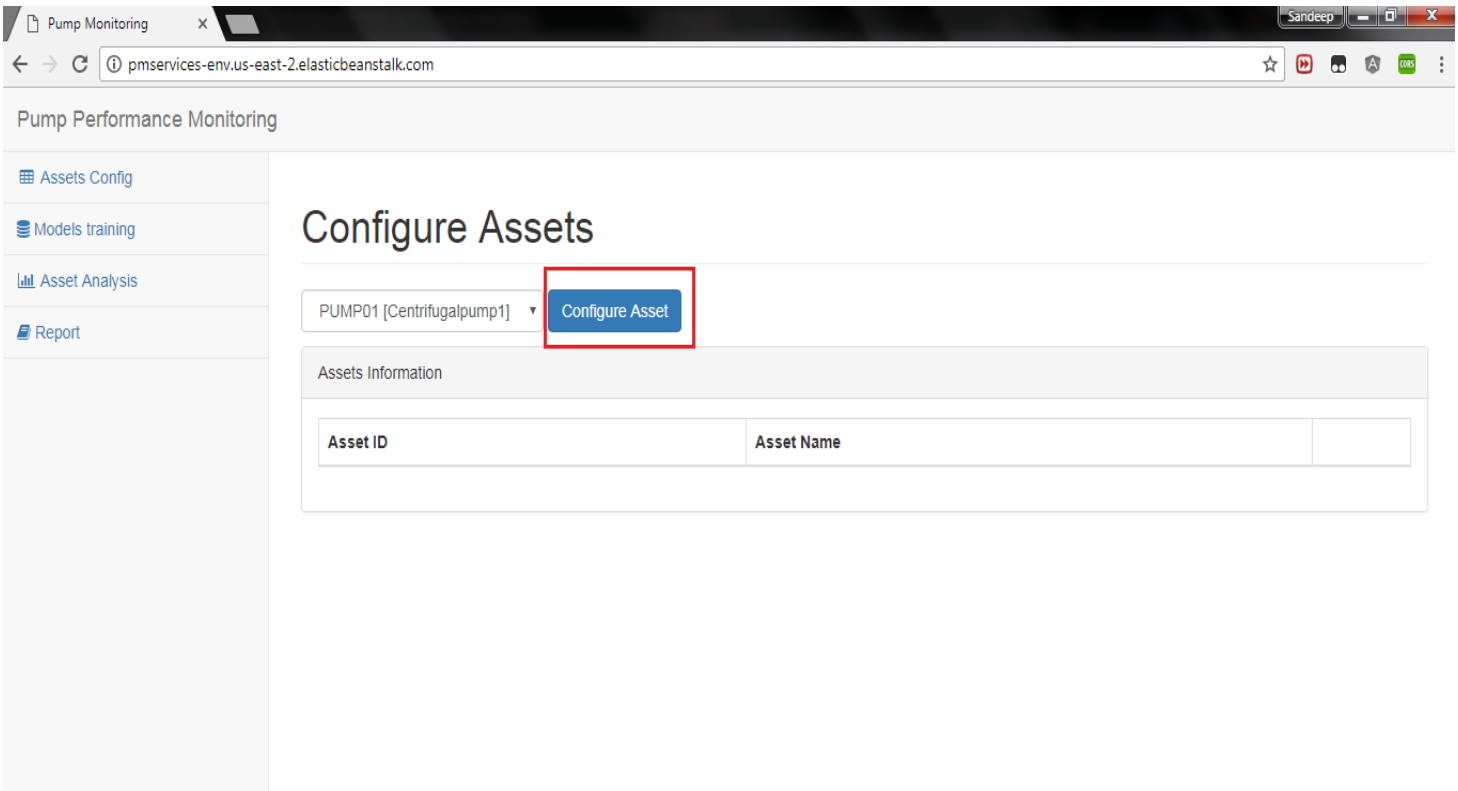


Figure 1.2

When you have selected the asset, a configure asset button is shown (Figure 1.2). Click on this button.

A dialog window (Figure 1.3) will be opened with the engineered values. You can change the values if needed and then click on save changes button.

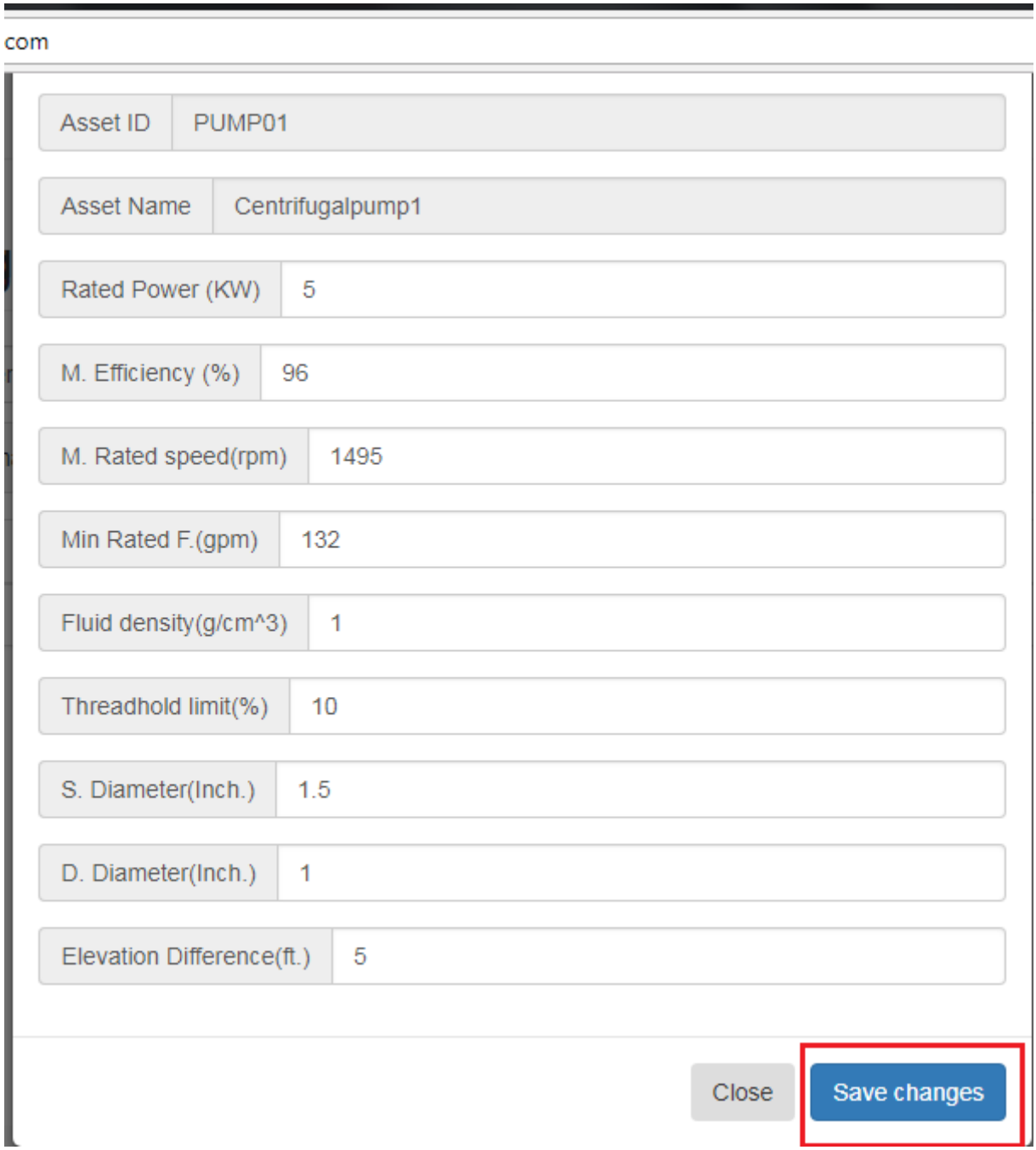


Figure 1.3

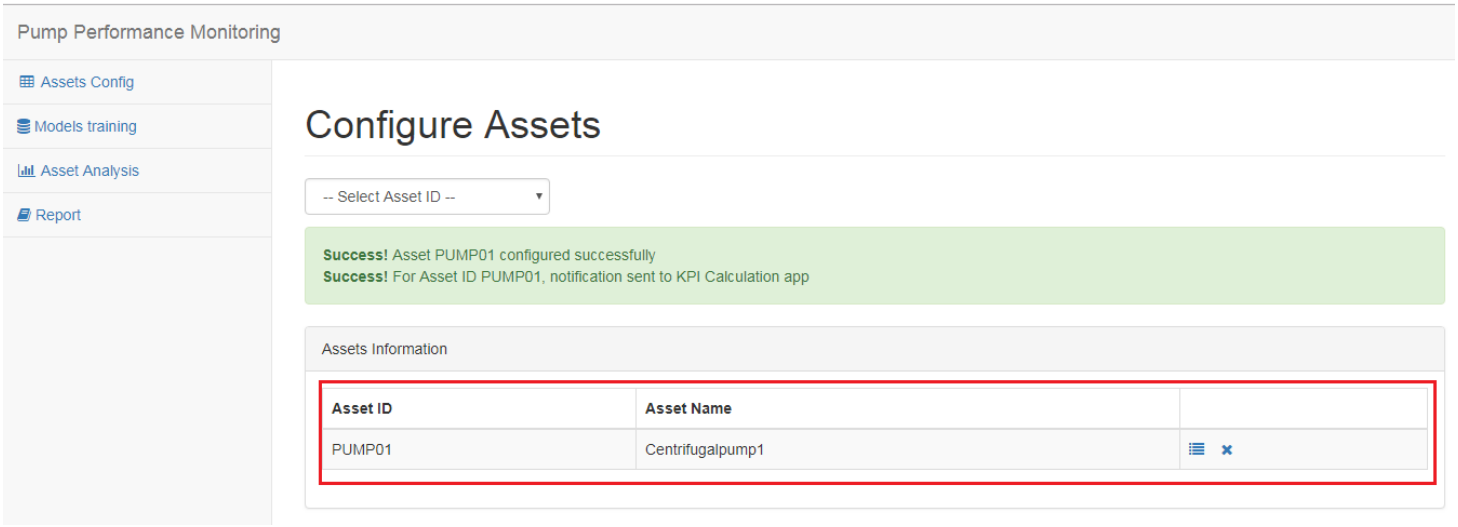


Figure 1.4

Now, you can see the configured asset in the table (Figure 1.4).

1.2. Asset's engineering information

You can view the engineering information of the asset by clicking on icon (Figure 1.5).

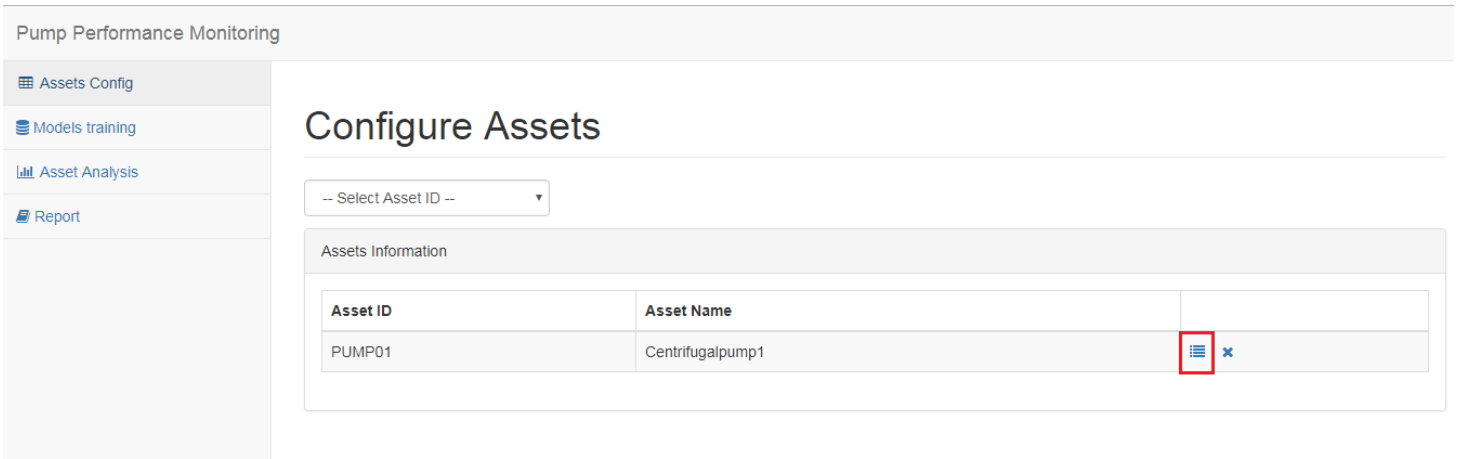


Figure 1.5

Figure 1.6 shows the engineering information of the asset.

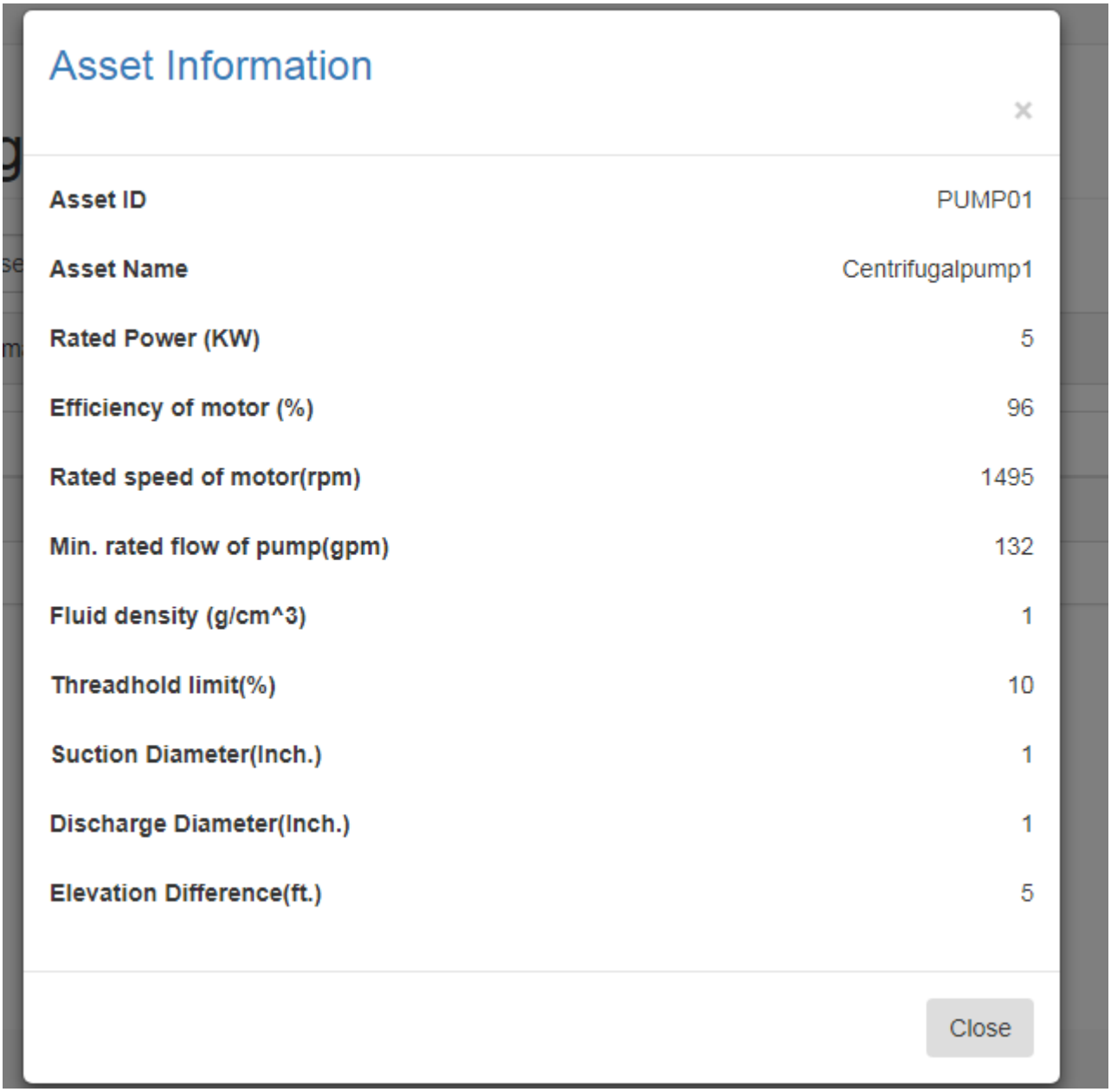


Figure 1.6

1.3. Delete asset

You can also delete the asset by clicking the delete button (Figure 1.7).

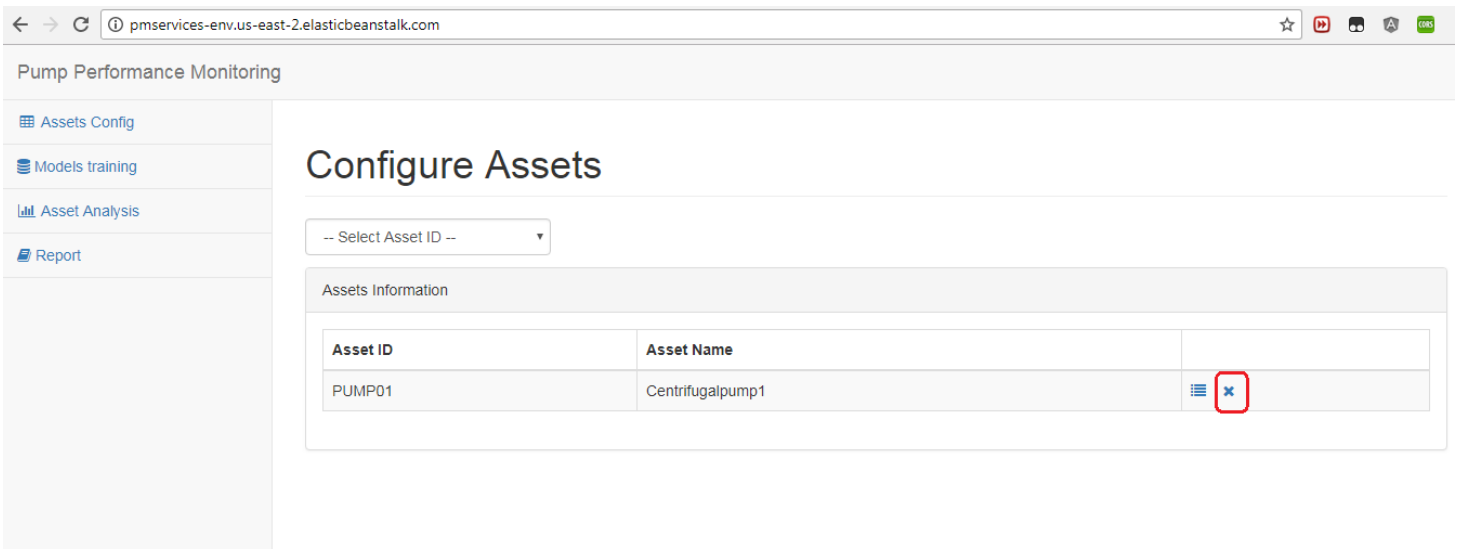


Figure 1.7

2. Asset analysis

Click on asset analysis tab to see the analysis details of the asset.

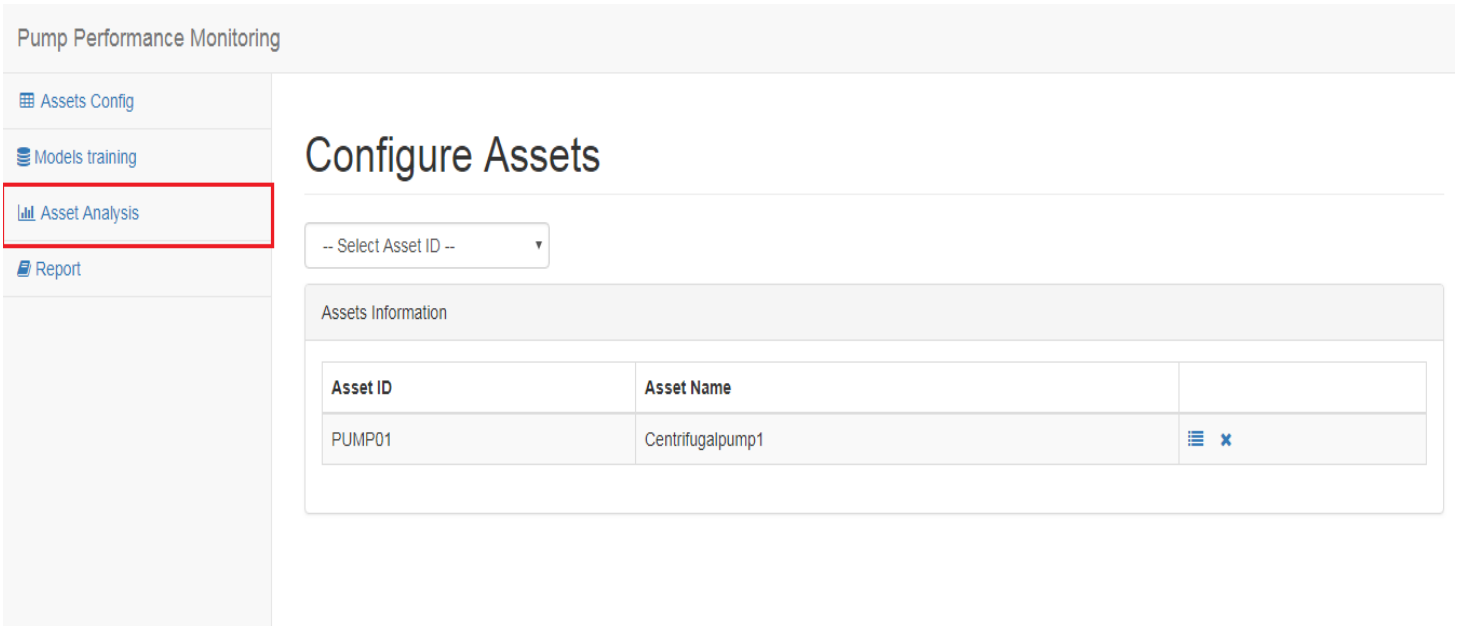


Figure 2.0

2.1. Select asset for analysis

Drop down in Figure 2.1 shows all the assets which can be analyzed, you can select any of the them.

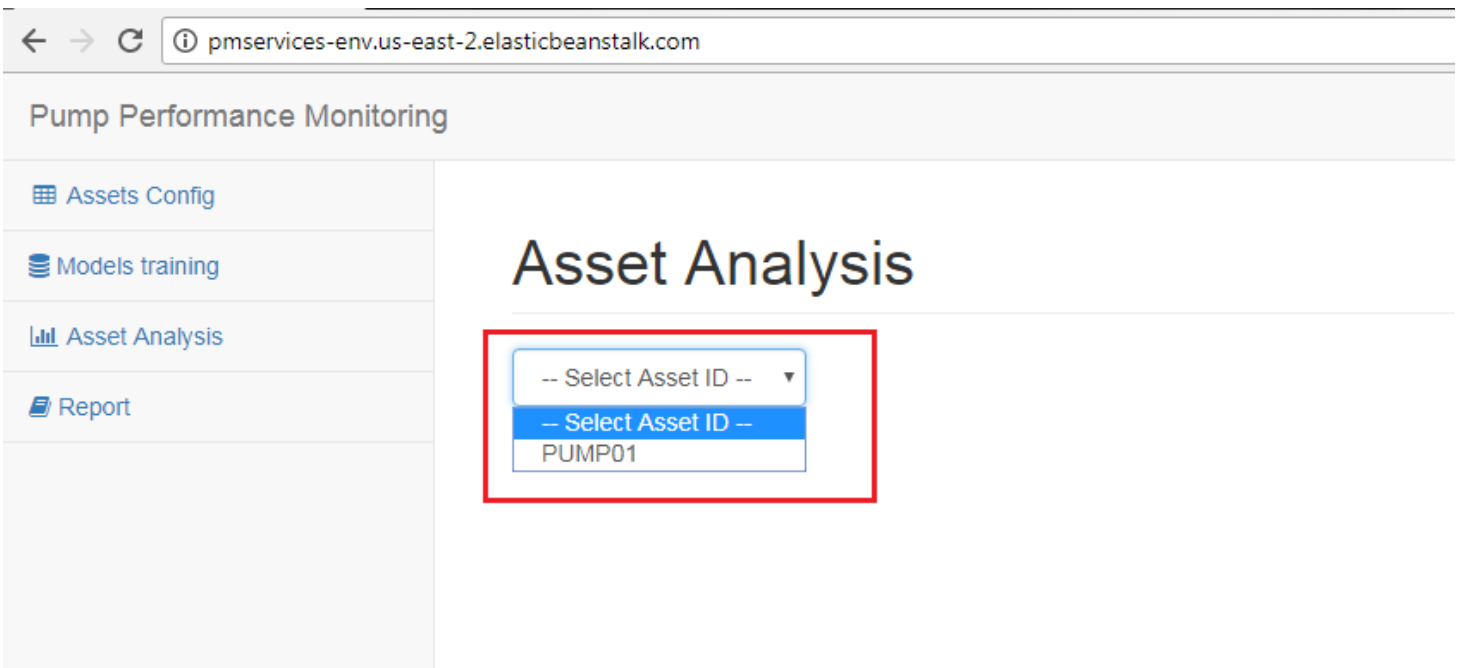


Figure 2.1

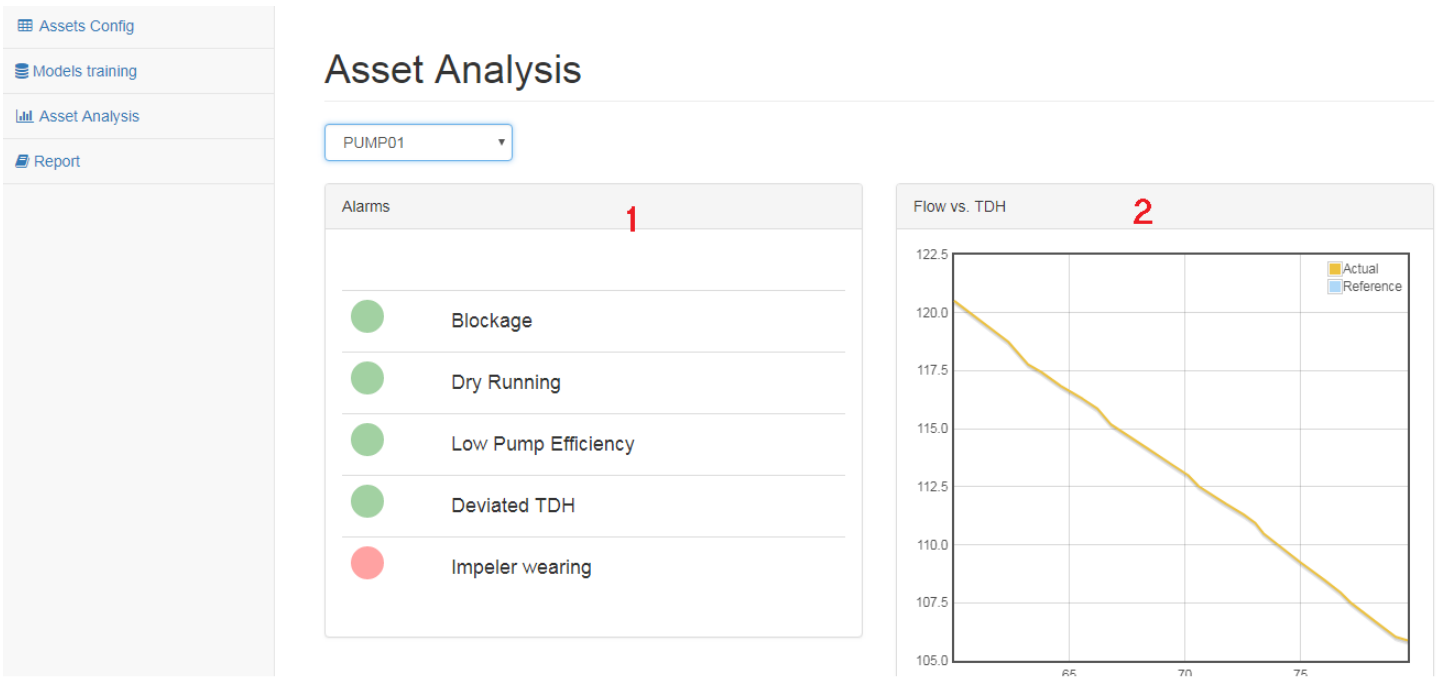
In asset analysis page (Figure 2.2) there are 4 sections.

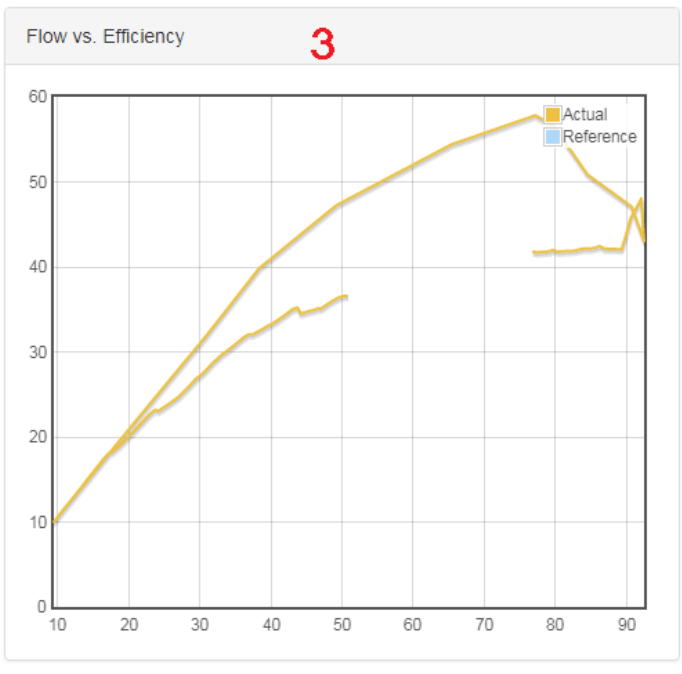
Section 1: Displays alarms of the respective pump. Red indicates that respective alarm is in raised state and green indicates that there is no alarm.

Section 2: Displays flow vs. TDH. Yellow line plots the actual state of the pump and blue line indicates the reference curve.

Section 3: Displays flow vs. efficiency plot. Similar to flow vs. TDH plot, Yellow line plots the actual state of the pump and blue line indicates the reference curve.

Section 4: Displays the vibration curve of the pump. It is a plot between frequency vs. amplitude. Similar to other graphs, Yellow line plots the actual state of the pump and blue line indicates the reference curve.





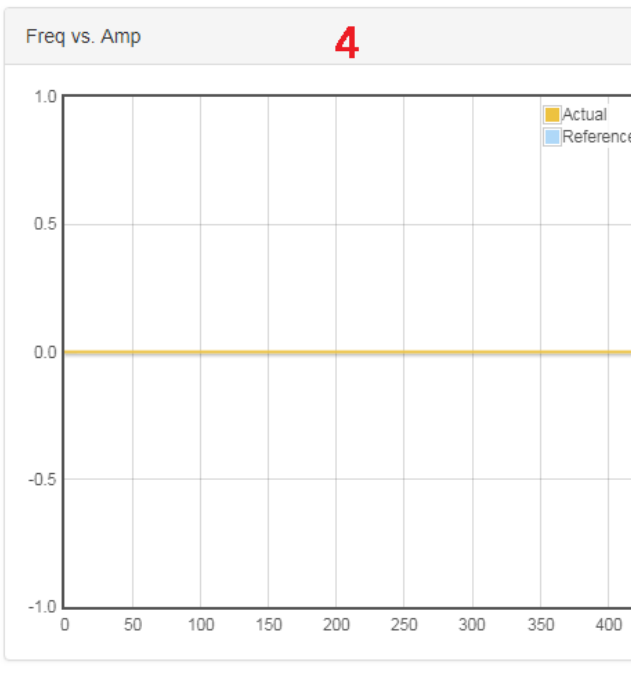


Figure 2.2

3. Models training

Click on model training tab to train the model, It will redirect you to model training page (Figure 3.0).

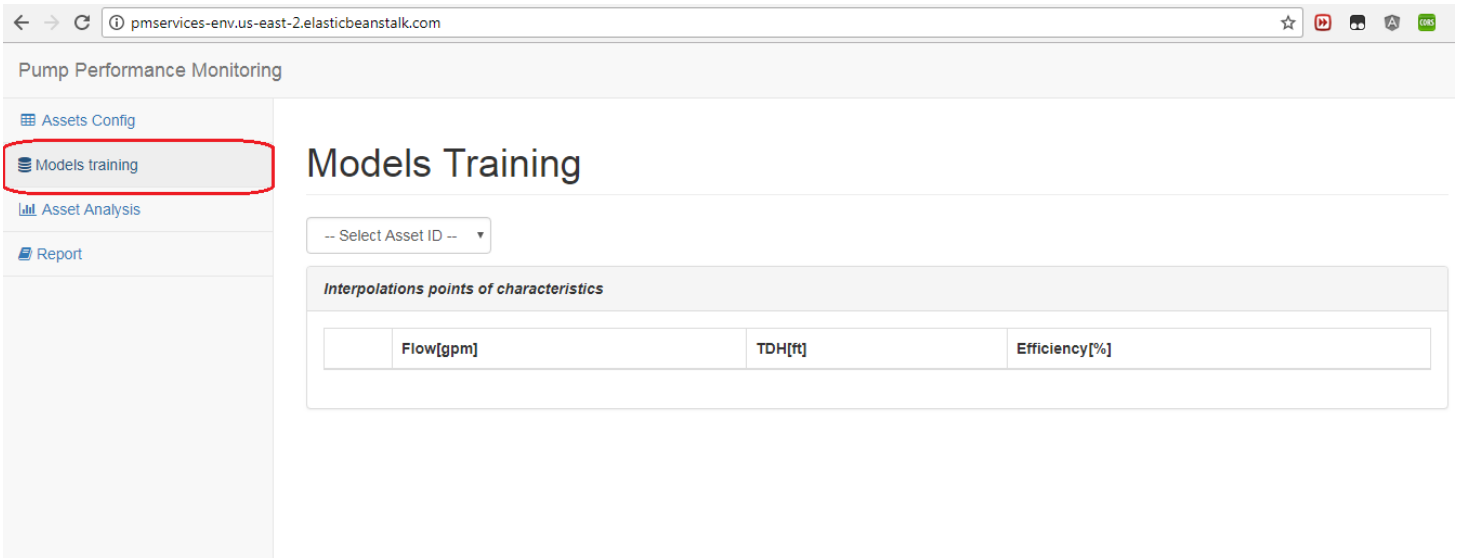


Figure 3.0

3.1. Select Asset for training

Drop down in Figure 3.1 shows available assets for training.

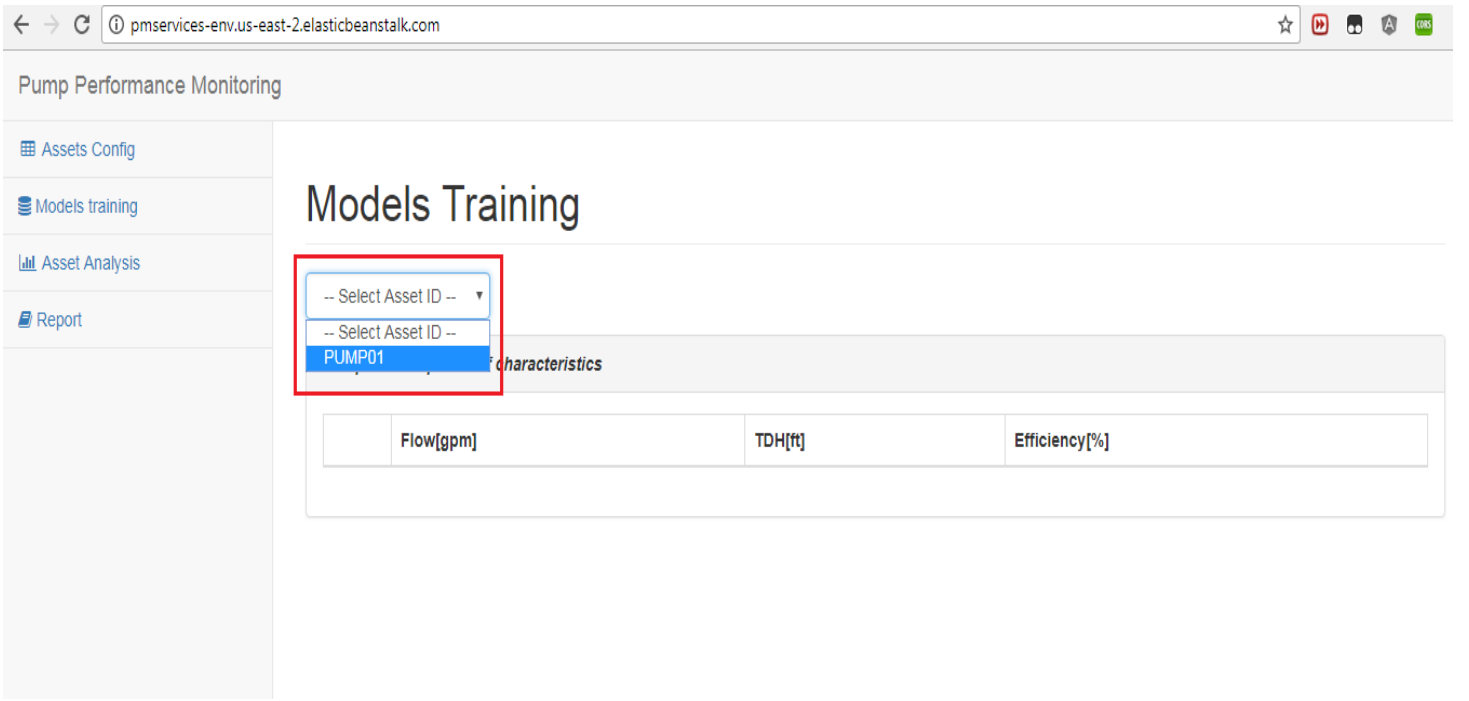


Figure 3.1

There are two ways (Figure 3.2) to feed the training data into the system.

1. Bulk uploads of training data from an xml file.

2. Adding a single record.

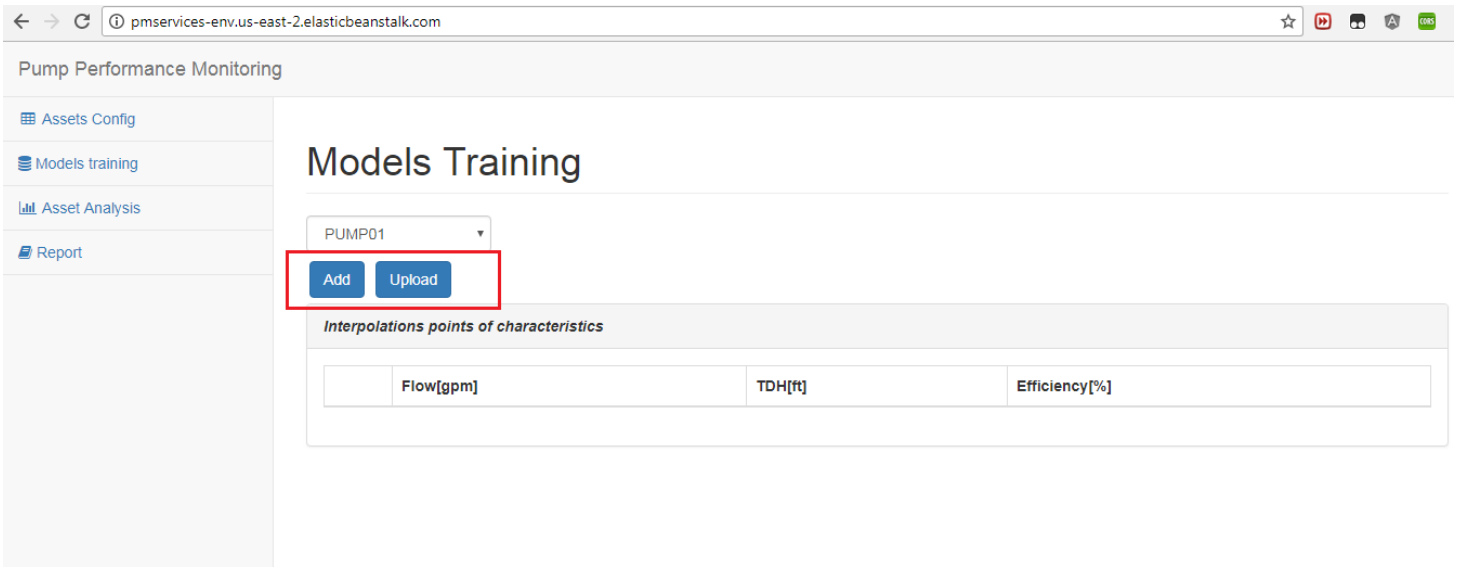


Figure 3.2

1. Bulk uploads of training data from an xml file

a. Click on upload

b. Choose file

c. click on upload

a. Click on upload

In figure 3.3 you can see a upload button, click on this button, it will open a dialog to choose an xml file.

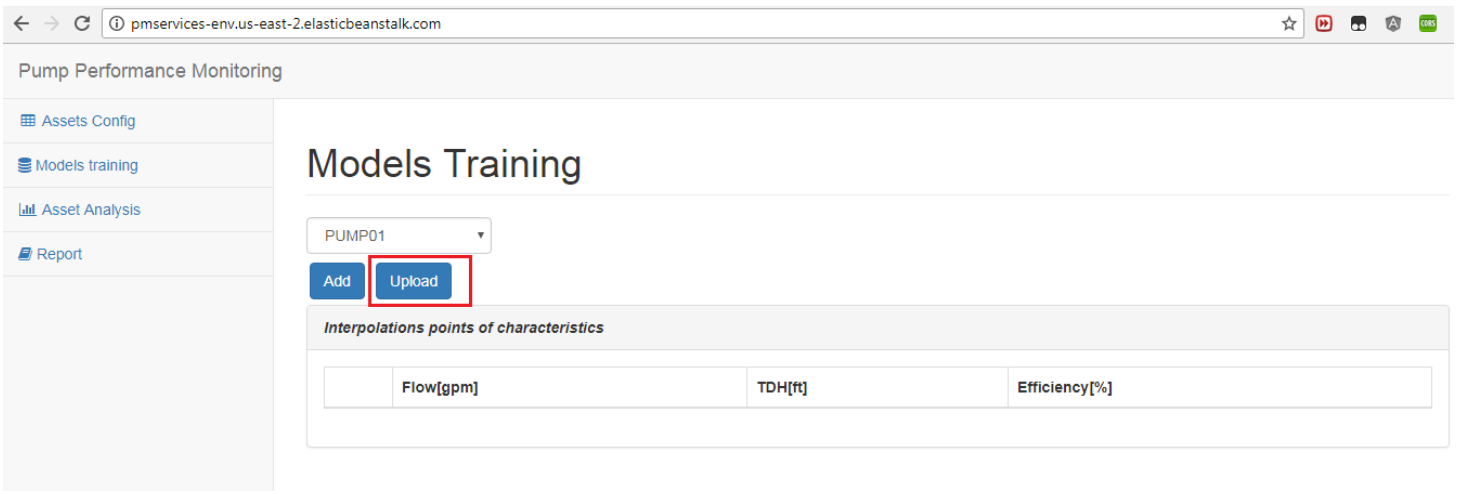


Figure 3.3

b. Choose a file

Figure 3.4 shows a dialog, which has a choose file button. Click on this button to choose an xml file from your system.

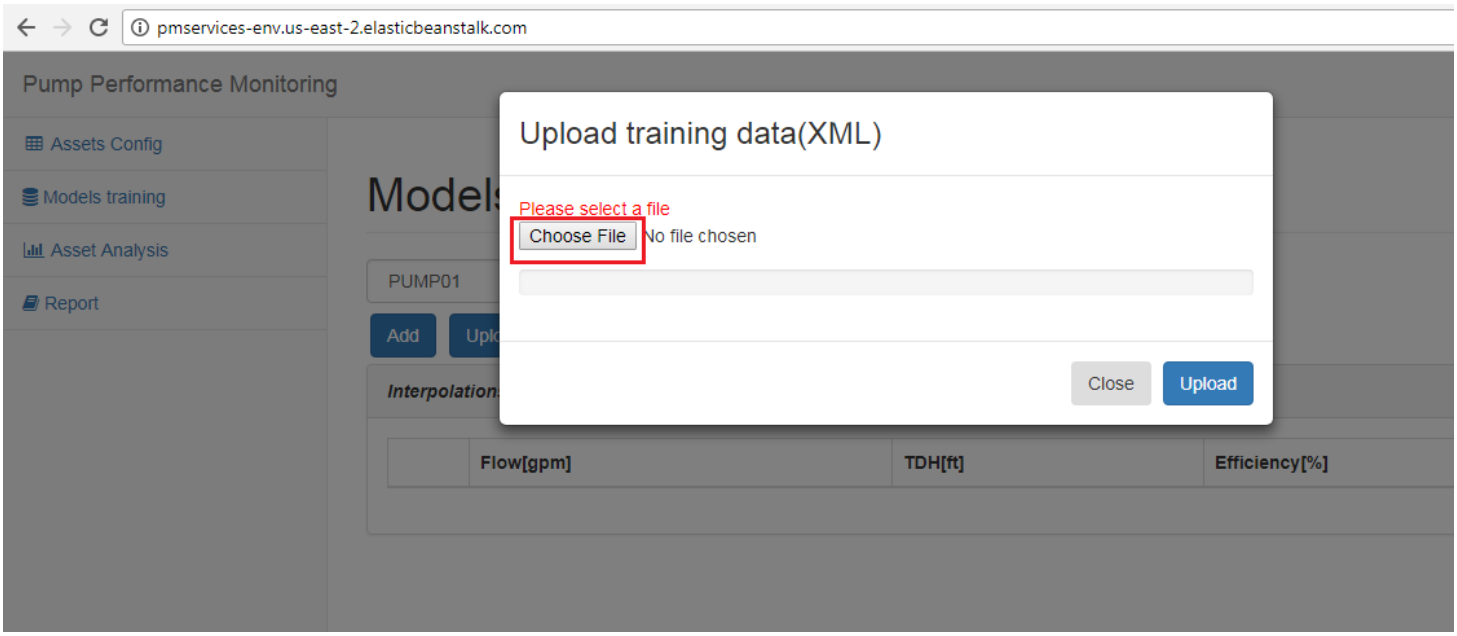


Figure 3.4

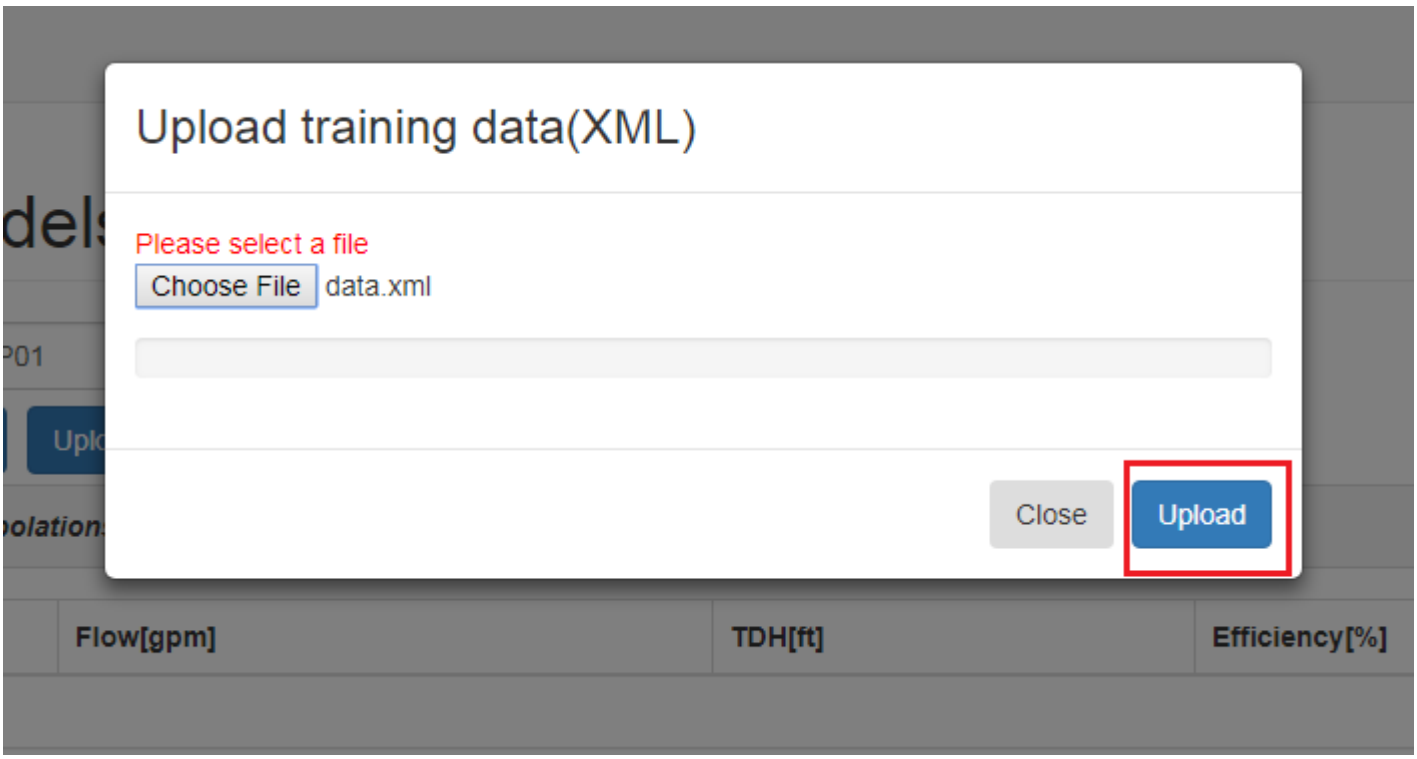


Figure 3.5

Once you have chosen the xml file you can click on upload button. Now training data gets uploaded.

Uploaded data will be shown in the table (Figure 3.6).

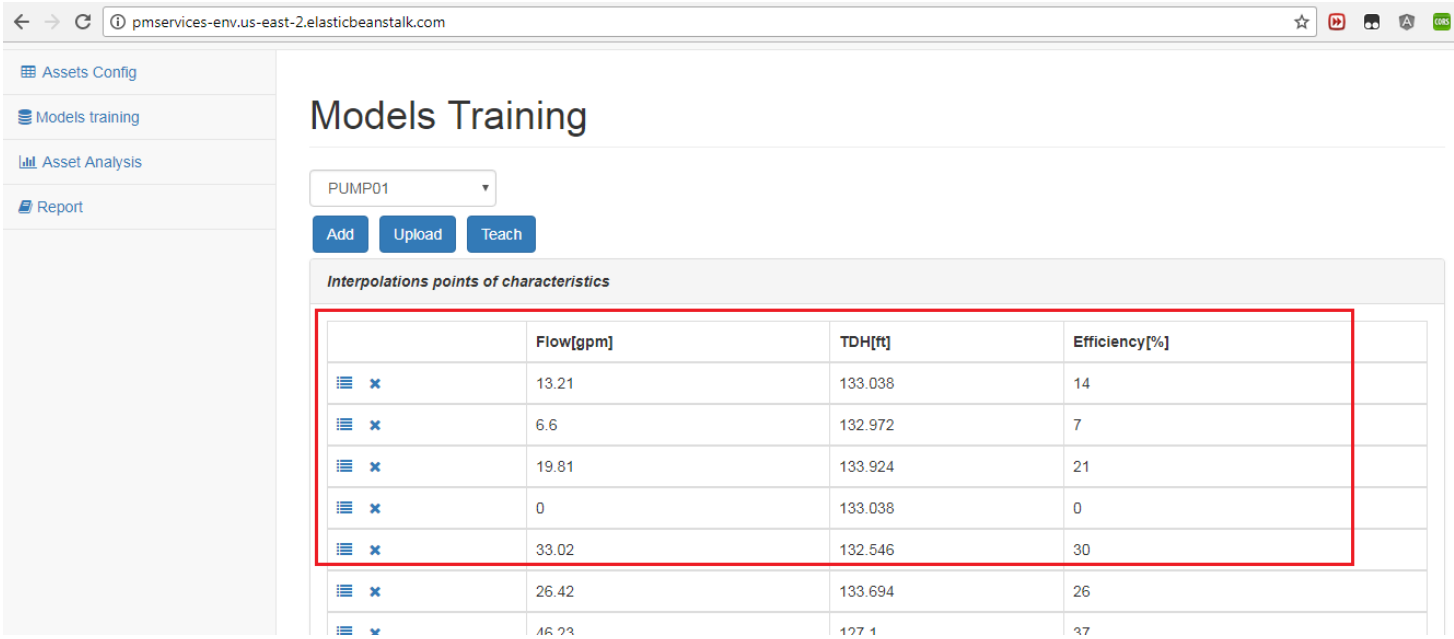


Figure 3.6

A record can be deleted by clicking the cross button (Figure 3.7).

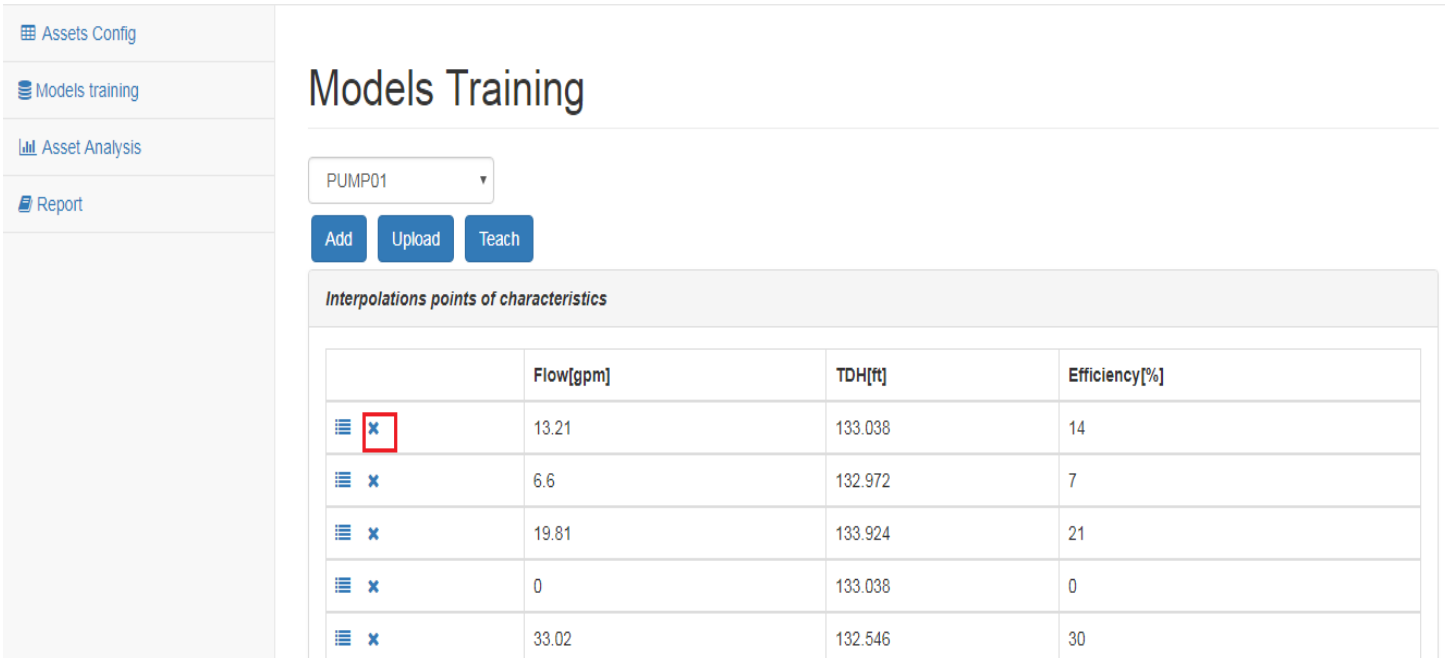


Figure 3.7

2. Add a single record

Click on Add button (Figure 3.8), a dialog will open (Figure 3.9). You can enter values and then click on add button. A new record will be added successfully.

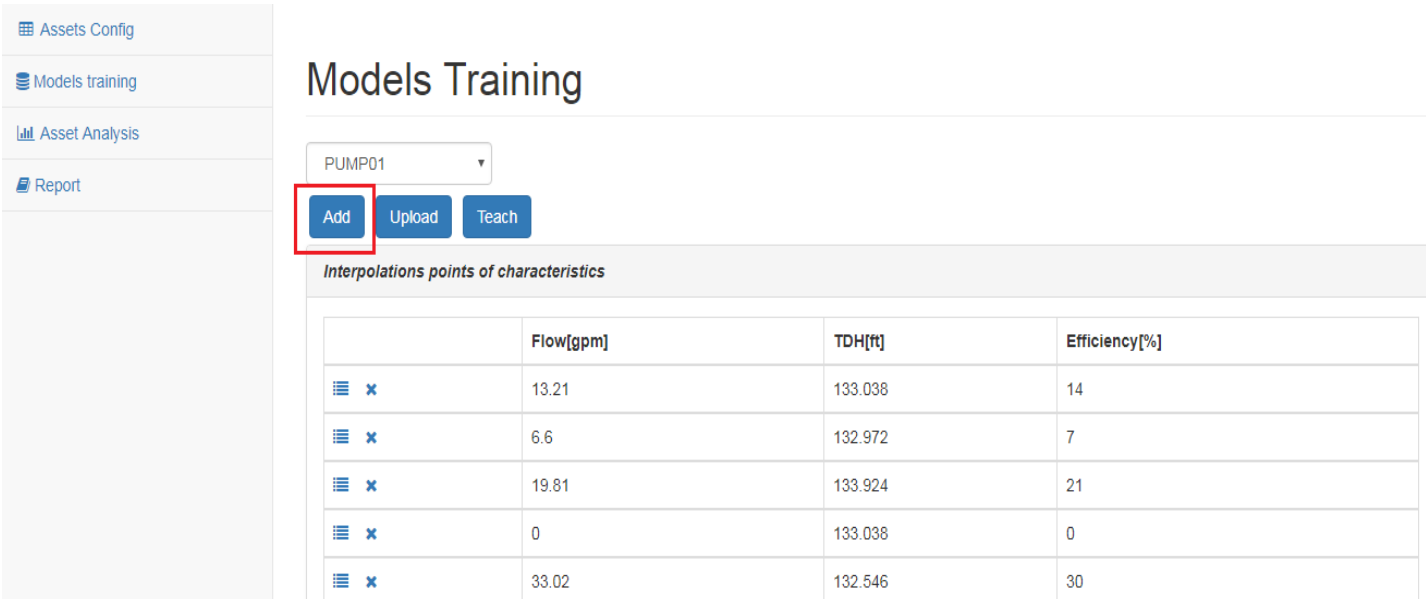


Figure 3.8

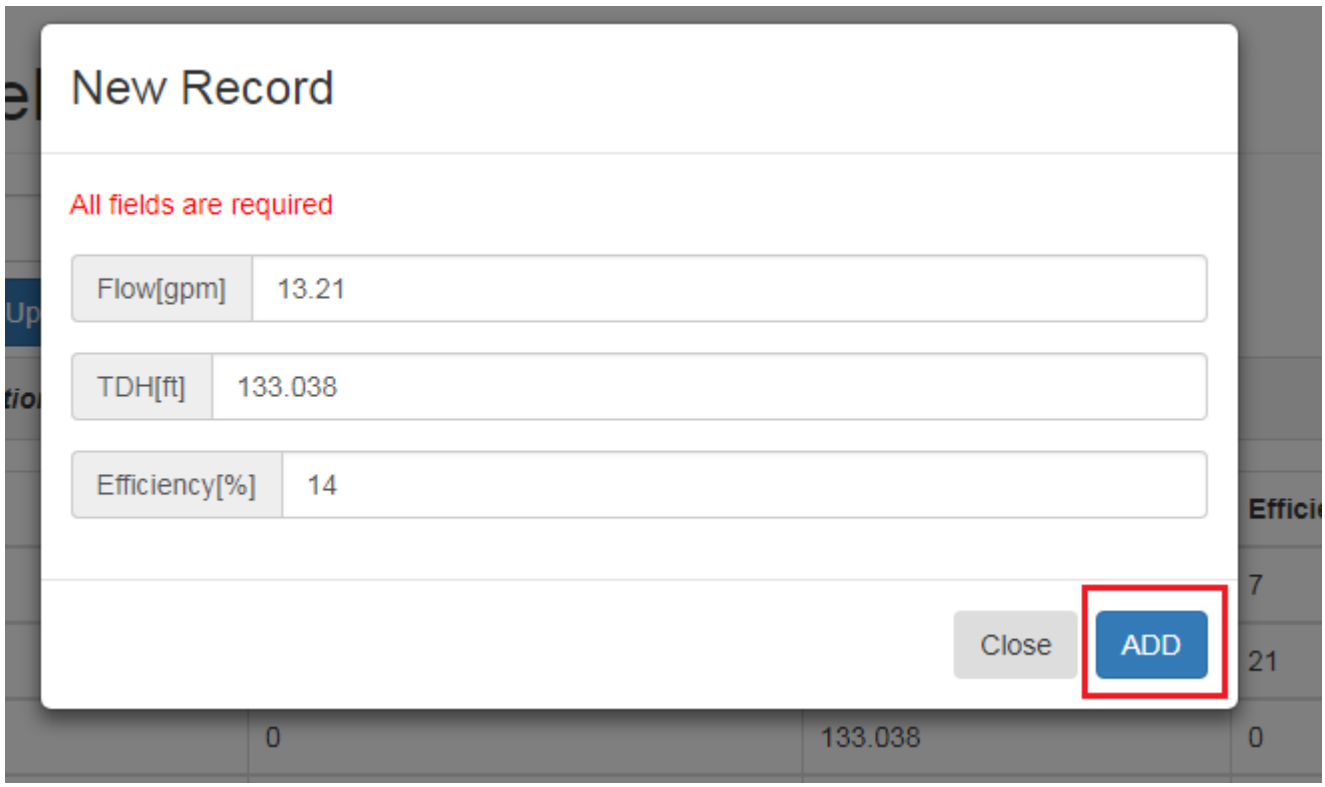


Figure 3.9

You can see newly added record in the table (Figure 3.10).

	6.6	132.972	7
	19.81	133.924	21
	0	133.038	0
	33.02	132.546	30
	26.42	133.694	26
	46.23	127.1	37
	49.63	130.052	34
	59.43	120.604	40
	66.04	116.437	41
	52.83	124.18	38
	72.65	111.647	42
	92.46	96.916	42
	89.85	101.575	42
	79.25	106.365	42
	96.87	164.042	100
	13.21	133.038	14

Figure 3.10

You can also edit a record. To edit a record, click on edit icon (Figure 3.11).

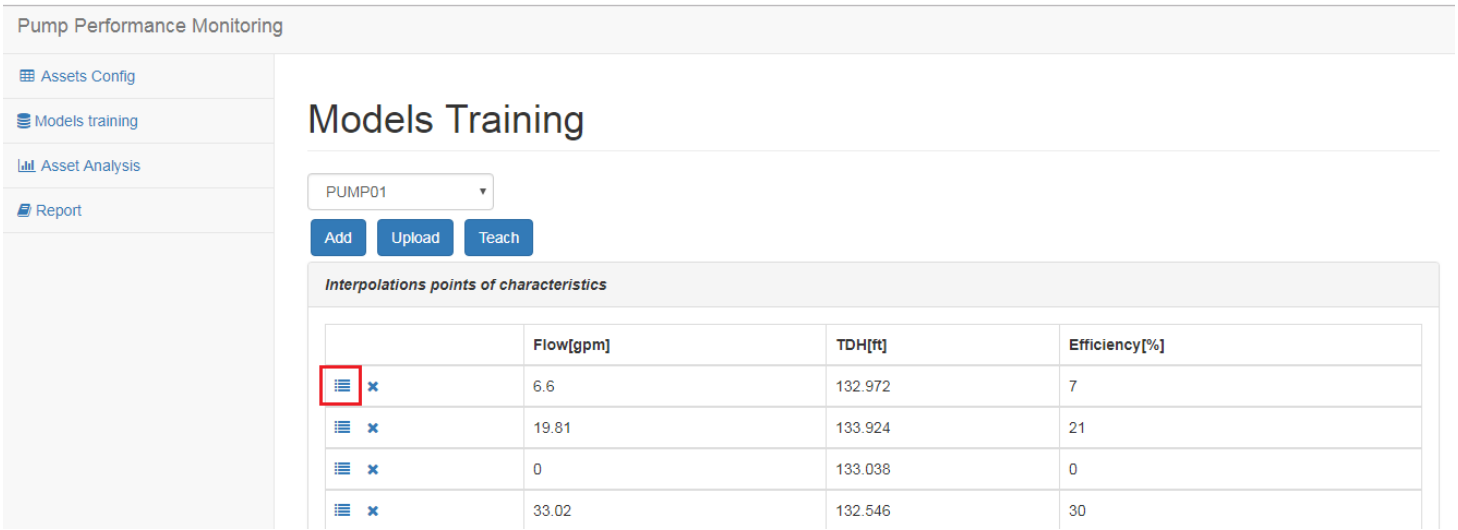


Figure 3.11

A dialog will open (Figure 3.12) filled with existing values of the record. You can modify these values. After modifying the values click the update button.

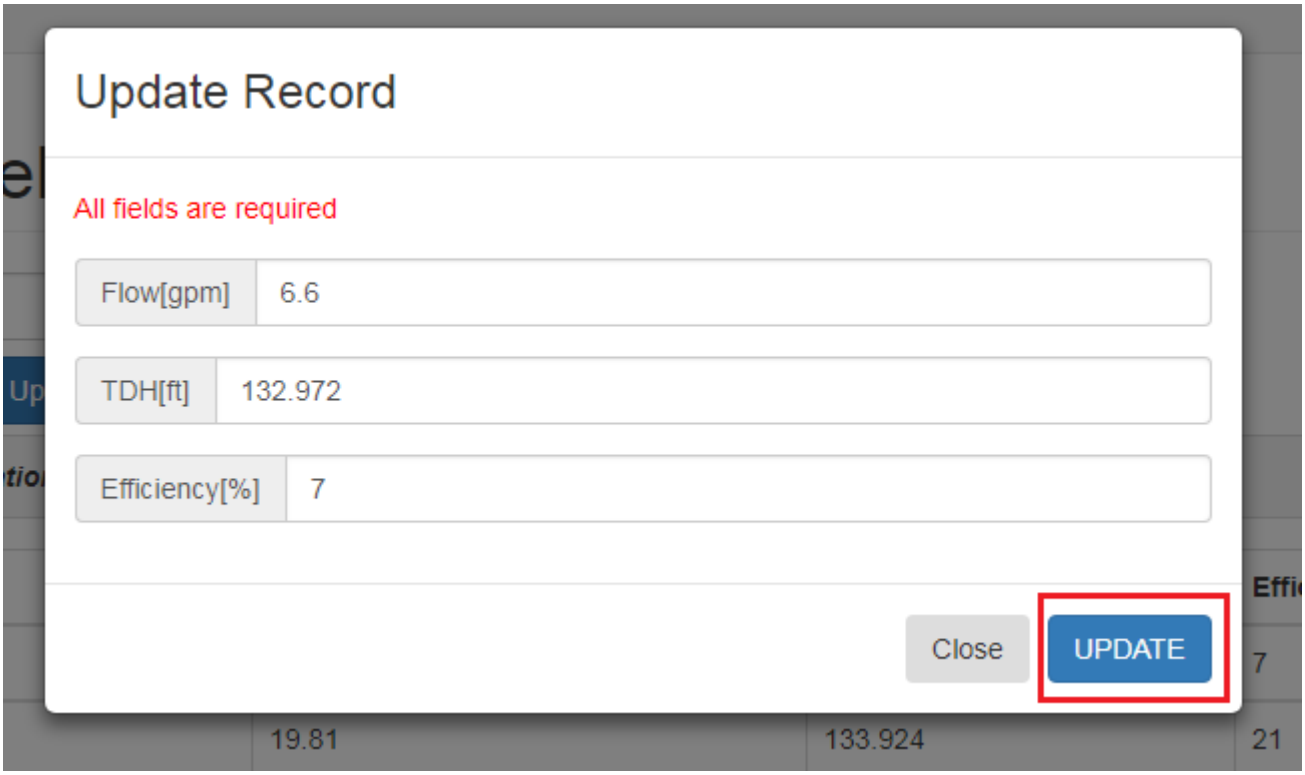


Figure 3.12

After uploading the data from an xml file or adding record one by one, you can teach the model.

Click on teach button (Figure 3.13). It may take 2-3 minutes.

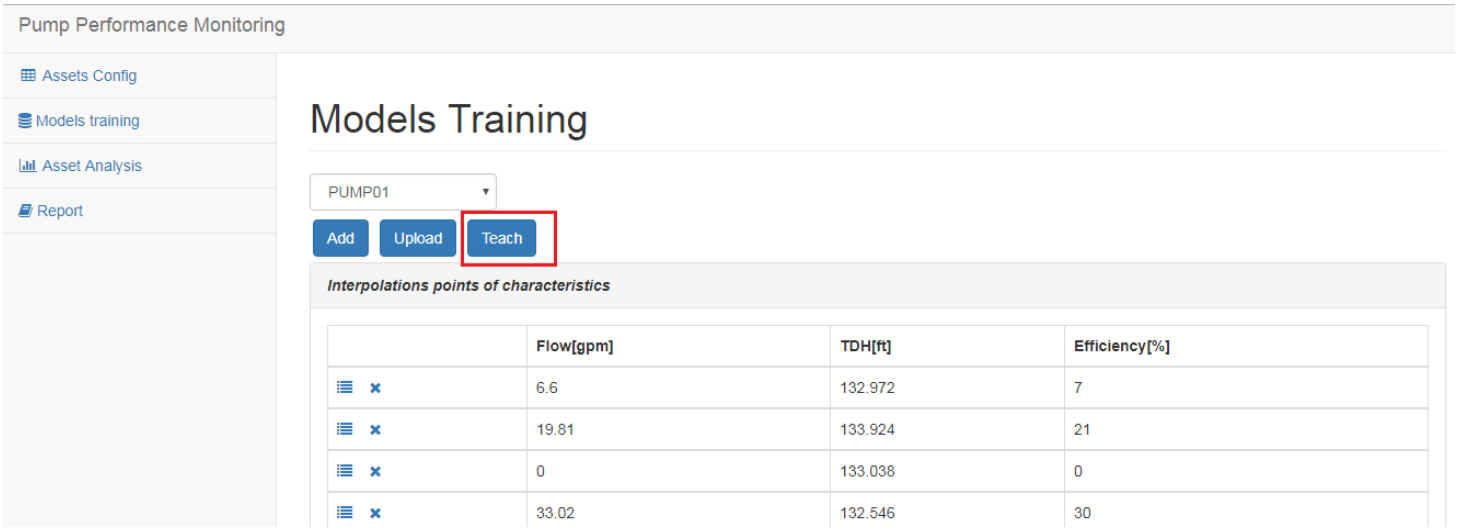


Figure 3.13

Figure 3.14 shows the model training processing.

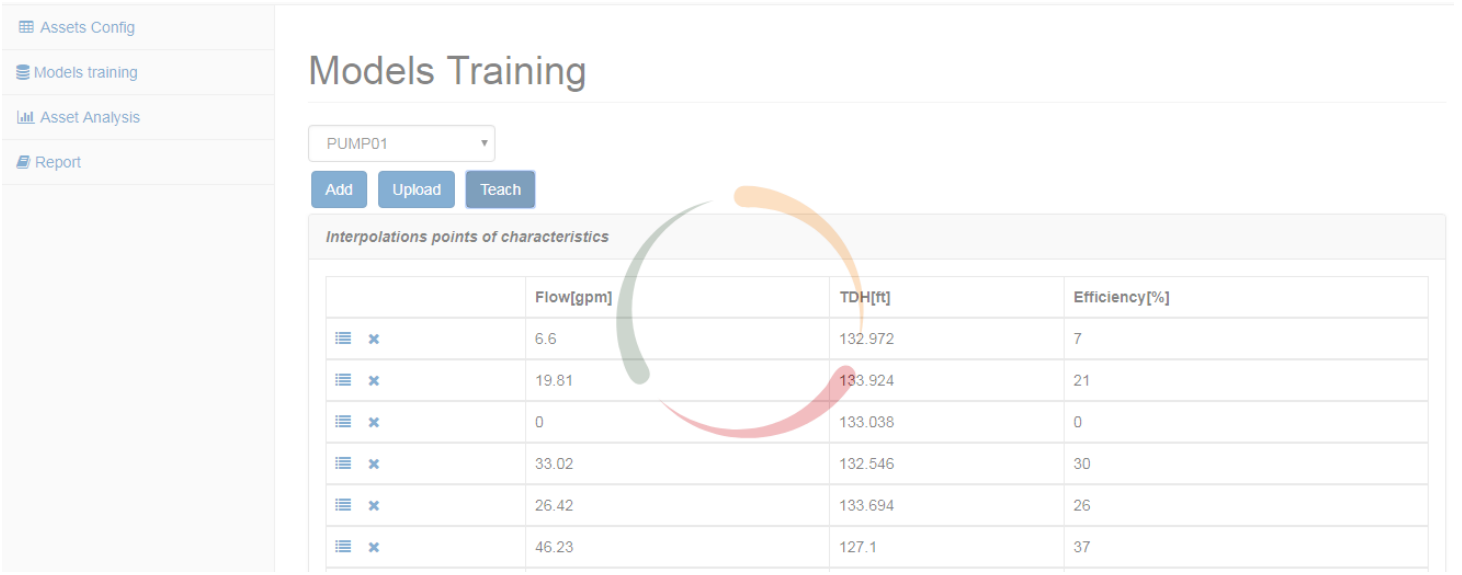


Figure 3.14

After successful teaching of the model, a message will be displayed that the model is trained successfully.

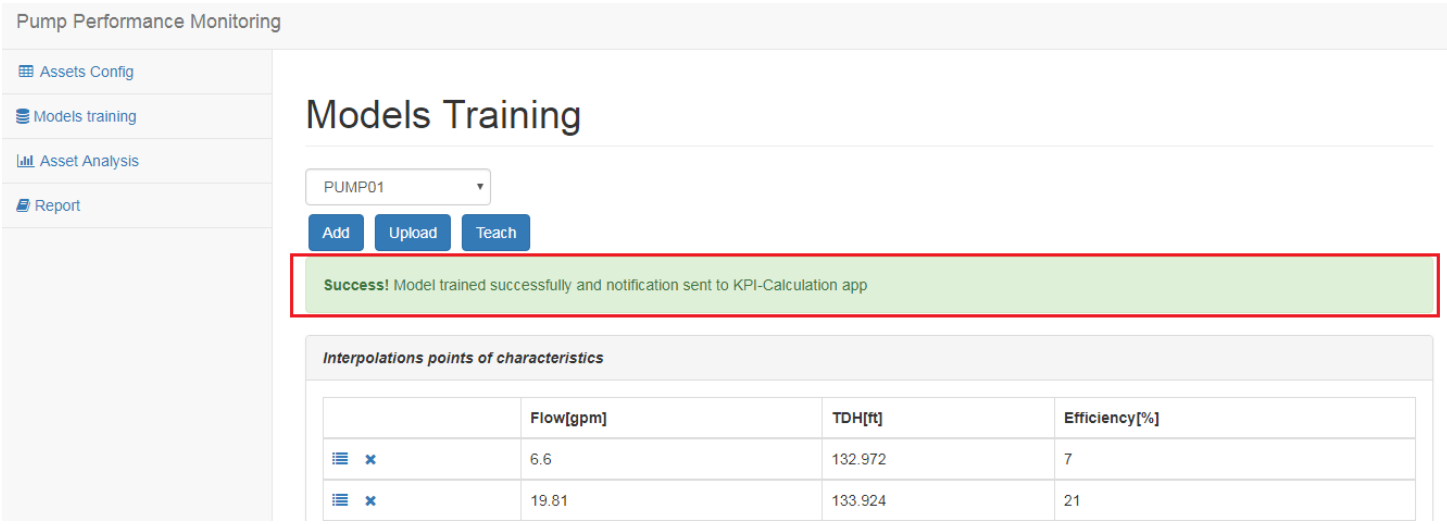


Figure 3.15

Click on analysis tab and select the asset for which you have trained the model. Now you can see in Figure 3.16 and 3.17 that reference values (blue) are plotted along the actual values (yellow).

Alarms can also be noticed in figure 3.16.

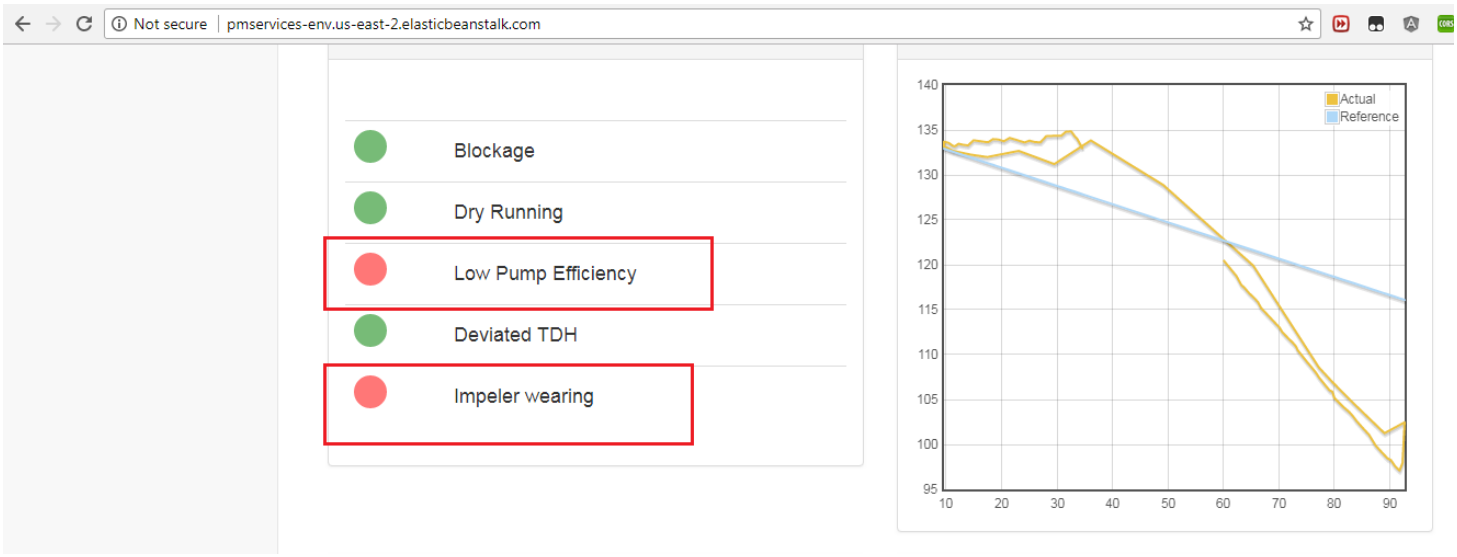
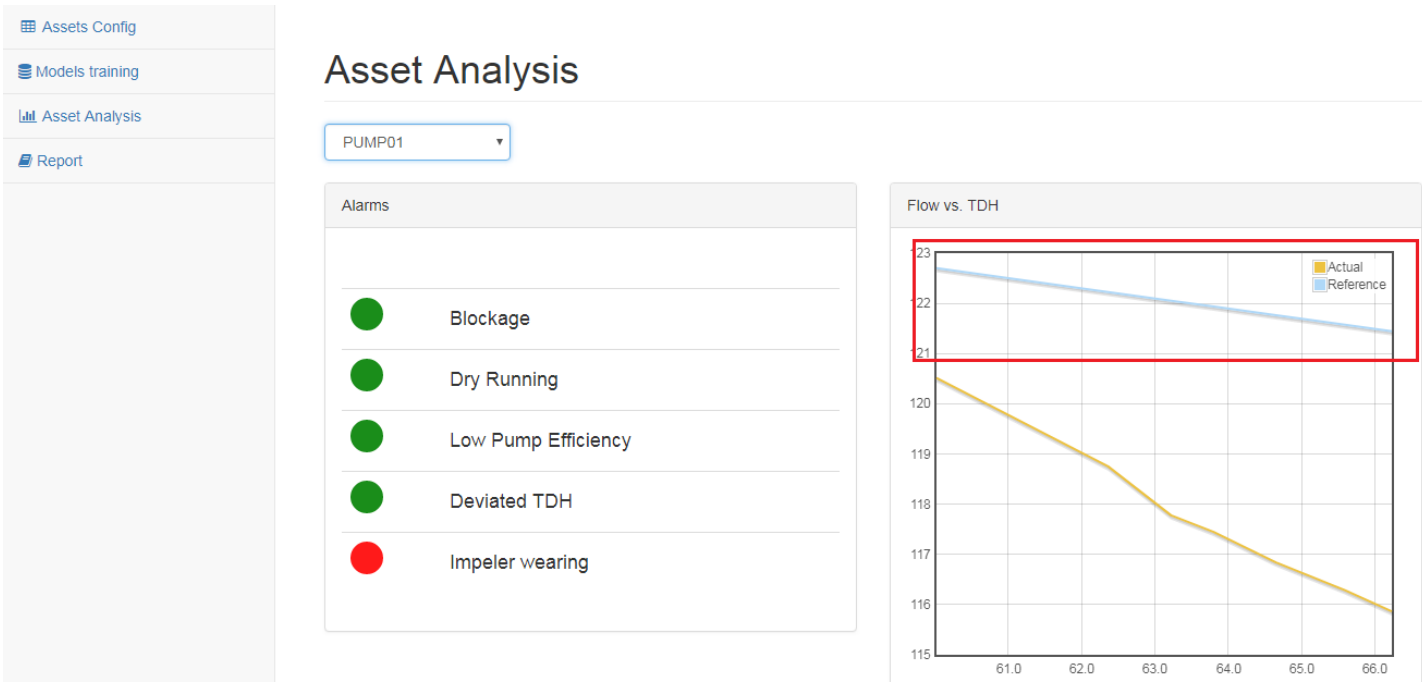

Not secure
pmservices-env.us-east-2.elasticbeanstalk.com
Blockage
Dry Running
Low Pump Efficiency
Deviated TDH
Impeler wearing
Actual
Reference
140
135
130
125
120
115
110
105
100
95
10
20
30
40
50
60
70
80
90

Figure 3.16


Assets Config
Models training
Asset Analysis
Report
Asset Analysis
PUMP01
Alarms
Blockage
Dry Running
Low Pump Efficiency
Deviated TDH
Impeler wearing
Flow vs. TDH
Actual
Reference
23
22
21
120
119
118
117
116
115
61.0
62.0
63.0
64.0
65.0
66.0

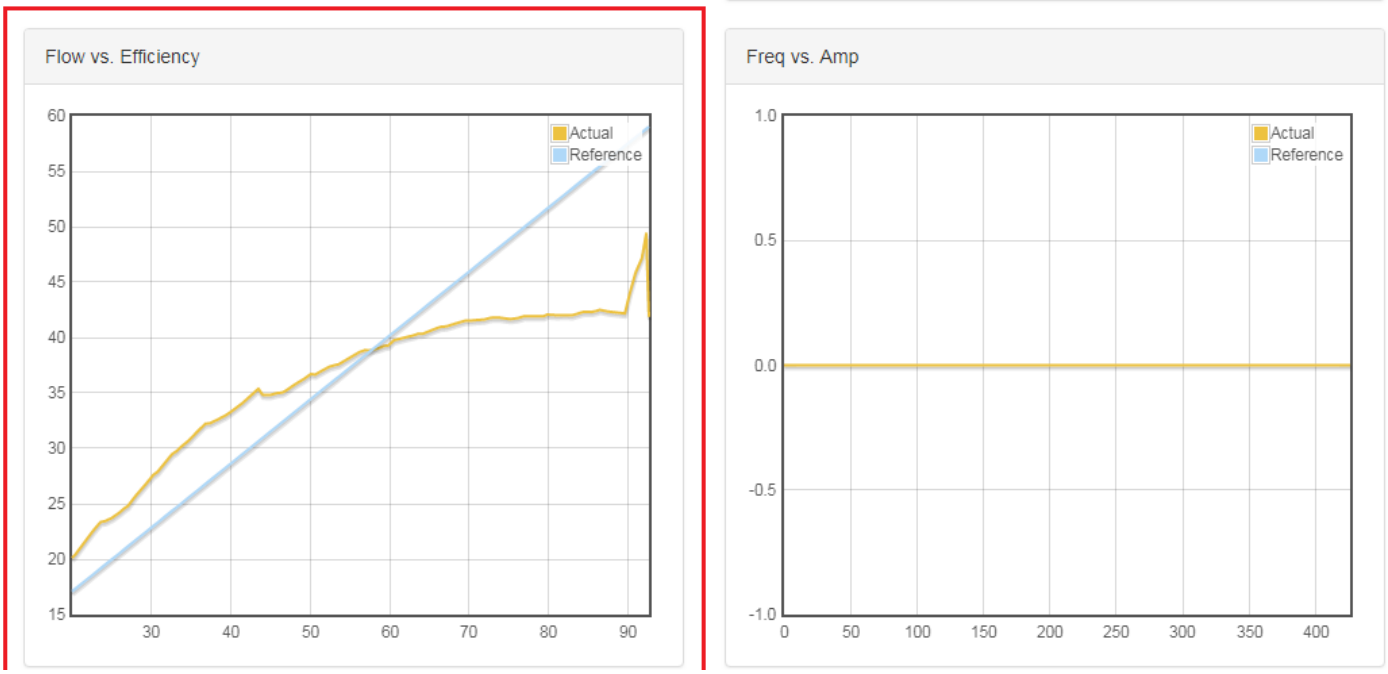


Figure 3.17

4. Alarms report

Click on reports tab (Figure 4.0) to see the alarms of configured assets. It will redirect you to alarms report page.

Figure 4.0

Figure 4.1 shows a drop down, which contained all the configured assets. You can choose any one of them to see the report.

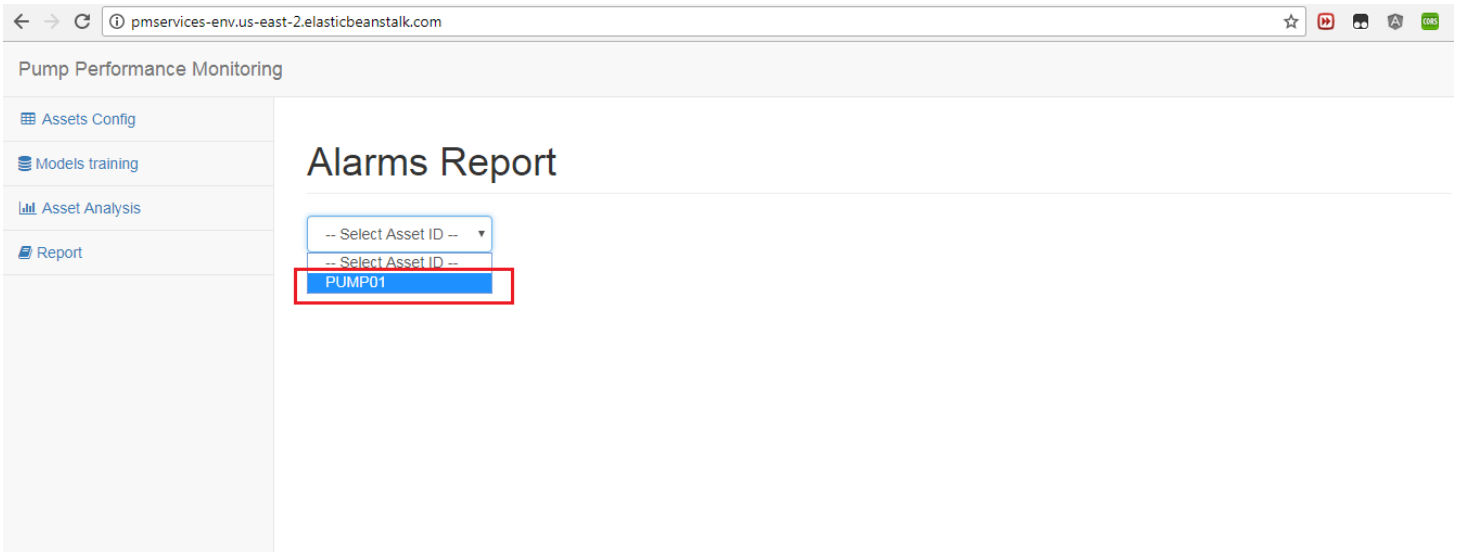


Figure 4.1

Once you have chosen the configured asset, it will ask you to select the duration for which you want to see the report (Figure 4.2).

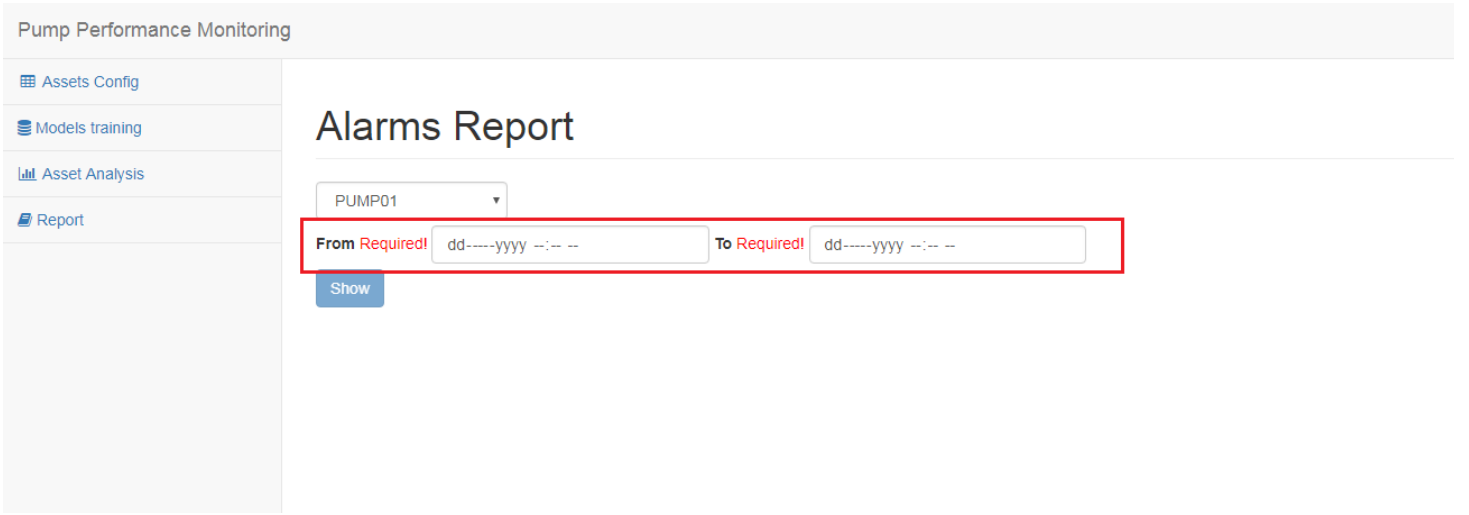


Figure 4.2

After providing the duration, click the show button.

In Figure 4.3, you can see the alarms report for asset PUMP01.

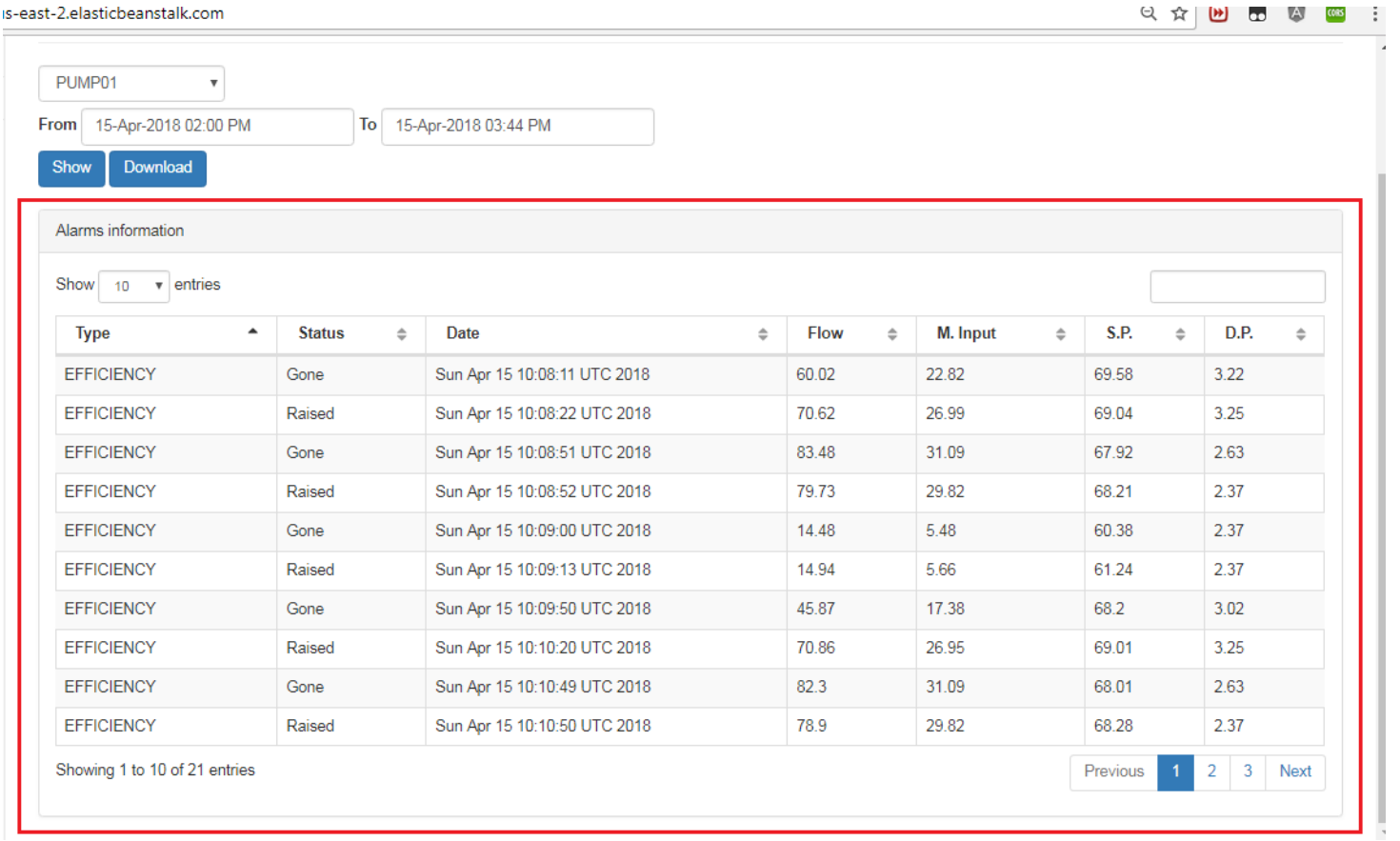


Figure 4.3

In the table, you can perform following actions

1. Search

You can search for anything. If you type “raised” then it will show you all the raised alarms. If you type efficiency then it will show you all the efficiency alarms.

2. Navigate through the pages

You can also navigate through the pages.

3. Modify no of entries shown on one page

You can also modify the no of entries that can be shown on one page.

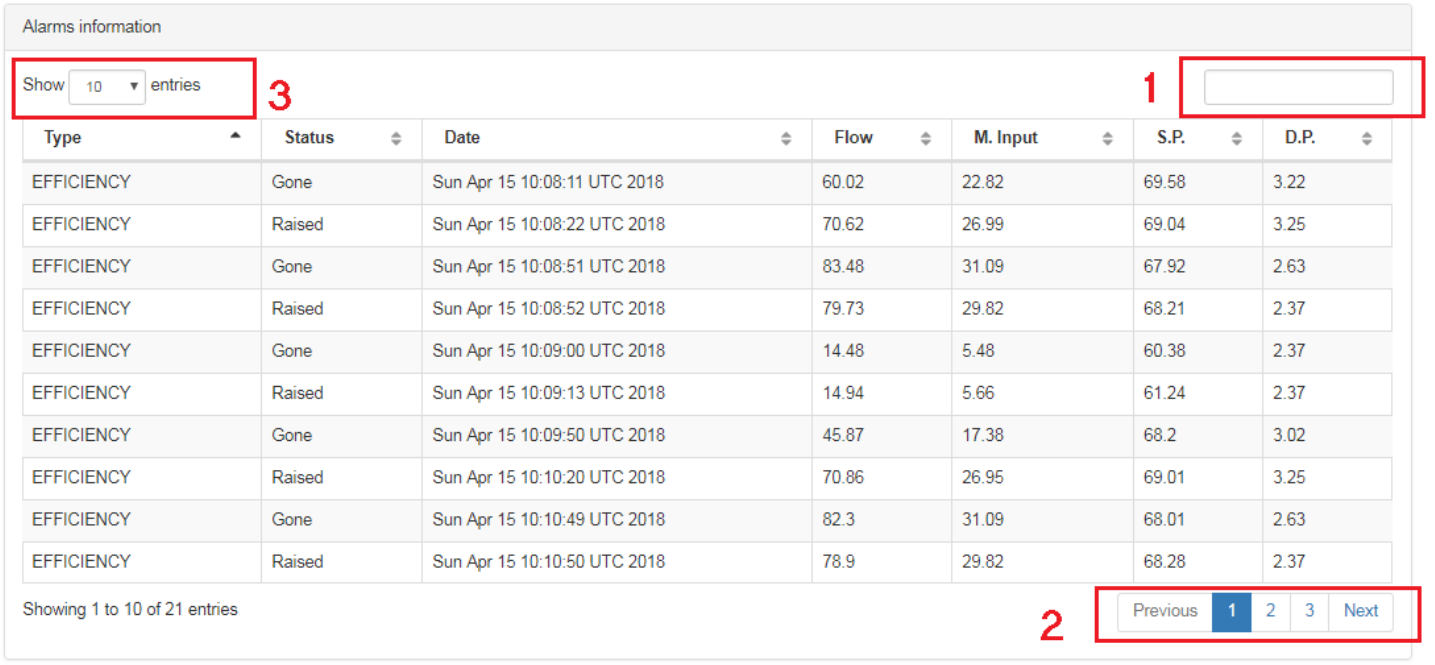


Figure 4.4

You can download the report by clicking Download button (Figure 4.5).

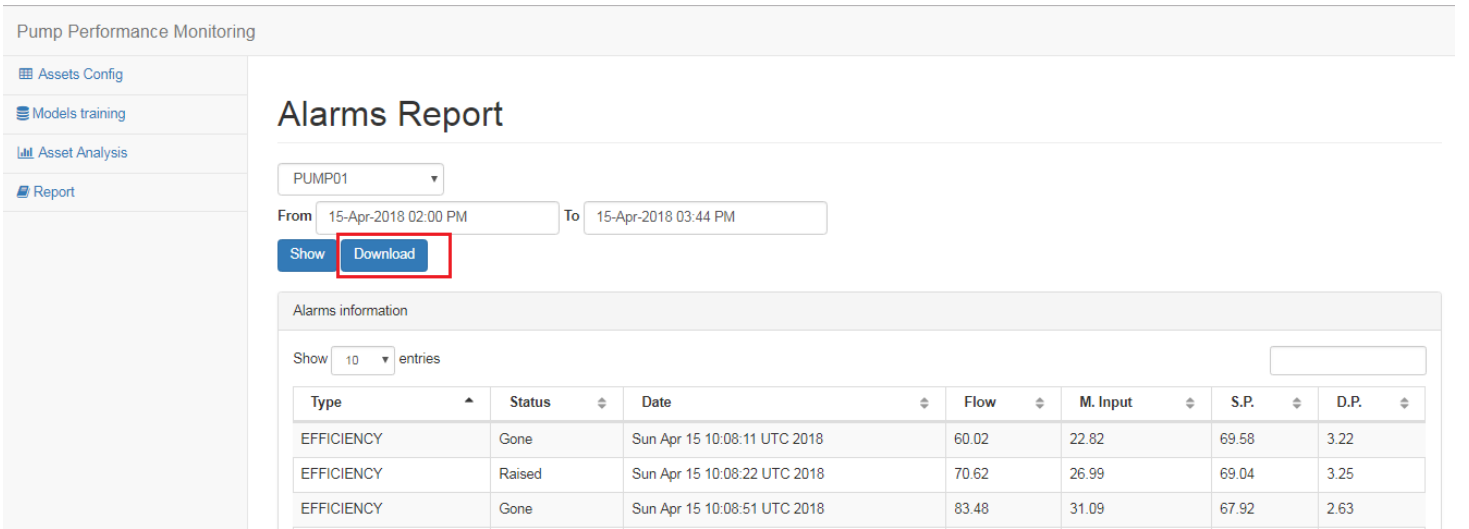


Figure 4.5

Alarms

Asset ID : PUMP01 1

2 From 15.04.2018 - 08:30 : 00
To : 15.04.2018 - 10:14 : 00

Type	Status	Date	Flow	S. P.	D. P.	M. P. I.
IMPELLER WEAR	Raised	15.04.2018 - 09:42 : 53	60.02	22.82	69.58	3.22
TDH	Gone	15.04.2018 - 10:08 : 11	60.02	22.82	69.58	3.22
EFFICIENCY	Gone	15.04.2018 - 10:08 : 11	60.02	22.82	69.58	3.22
EFFICIENCY	Raised	15.04.2018 - 10:08 : 22	70.62	26.99	69.04	3.25
TDH	Raised	15.04.2018 - 10:08 : 31	78.38	29.72	68.17	3.26
EFFICIENCY	Gone	15.04.2018 - 10:08 : 51	83.48	31.09	67.92	2.63
TDH	Gone	15.04.2018 - 10:08 : 52	79.73	29.82	68.21	2.37
EFFICIENCY	Raised	15.04.2018 - 10:08 : 52	79.73	29.82	68.21	2.37
EFFICIENCY	Gone	15.04.2018 - 10:09 : 00	14.48	5.48	60.38	2.37
EFFICIENCY	Raised	15.04.2018 - 10:09 : 13	14.94	5.66	61.24	2.37
EFFICIENCY	Gone	15.04.2018 - 10:09 : 50	45.87	17.38	68.2	3.02
EFFICIENCY	Raised	15.04.2018 - 10:10 : 20	70.86	26.95	69.01	3.25
TDH	Raised	15.04.2018 - 10:10 : 28	77.86	29.52	68.24	3.26
EFFICIENCY	Gone	15.04.2018 - 10:10 : 49	82.3	31.09	68.01	2.63
EFFICIENCY	Raised	15.04.2018 - 10:10 : 50	78.9	29.82	68.28	2.37
TDH	Gone	15.04.2018 - 10:10 : 51	76.63	28.95	69.18	2.37
EFFICIENCY	Gone	15.04.2018 - 10:10 : 59	12.83	4.76	59.88	2.37
EFFICIENCY	Raised	15.04.2018 - 10:11 : 12	15.64	5.92	61.46	2.37
TDH	Raised	15.04.2018 - 10:11 : 33	32.92	12.39	71.56	2.78
TDH	Gone	15.04.2018 - 10:11 : 34	33.44	16.43	71.43	2.78

Figure 4.6