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# International Journal of Engineering and Technology

Vol.3, No.1, February 2011

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**Oct 25, 2022 News!**News | Vol.14, No. 4 has been published with online version. [\[Click\]](#)

**Jul 19, 2022 News!**Vol.14, No. 3 has been published with online version. [\[Click\]](#)

## General Information

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# International Journal of Engineering and Technology

Discontinued in Scopus as of 2017

COUNTRY	SUBJECT AREA AND CATEGORY	PUBLISHER	H-INDEX
<p>India</p>  <p>Universities and research institutions in India</p>  <p>Media Ranking in India</p>	<p>Chemical Engineering Fluid Flow and Transfer Processes</p> <p>Engineering Aerospace Engineering Engineering (miscellaneous) Mechanical Engineering</p>	<p>Engg Journals Publications</p>	<p><b>27</b></p>

PUBLICATION TYPE	ISSN	COVERAGE
Journals	09754024, 23198613	2009-2017

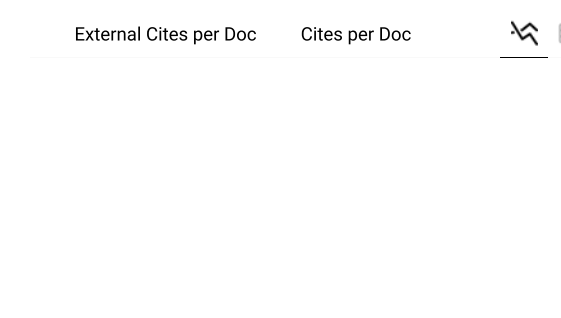
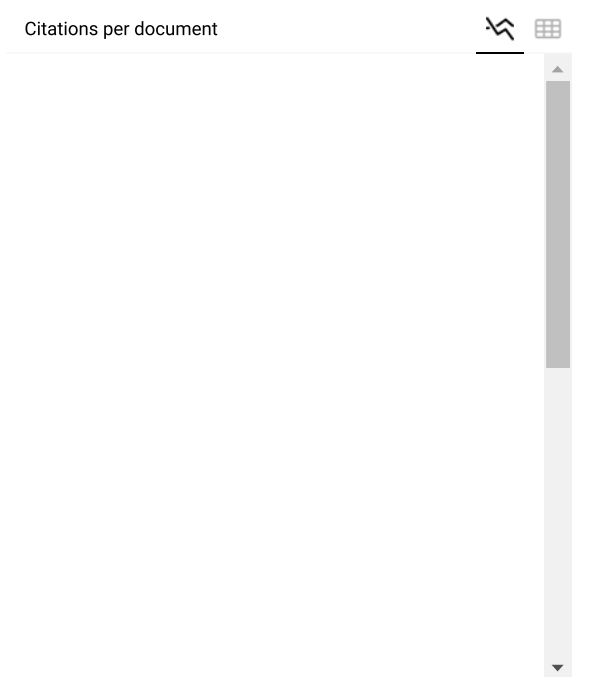
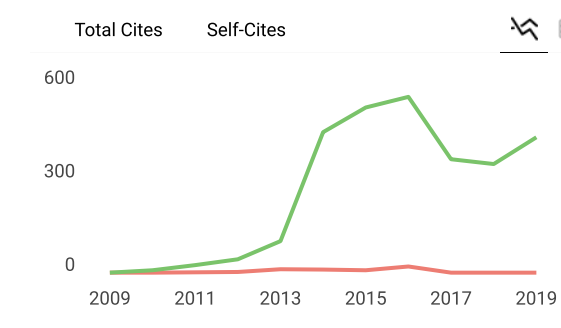
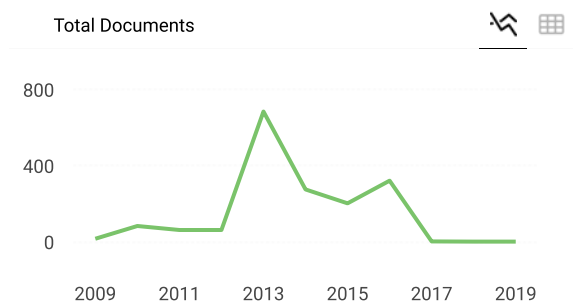
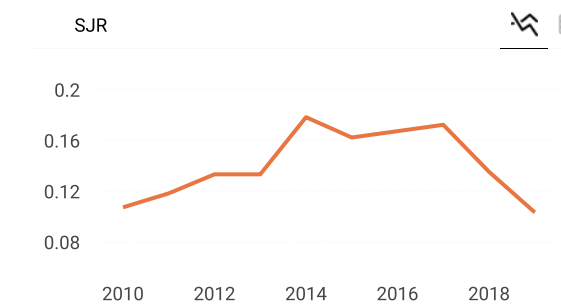
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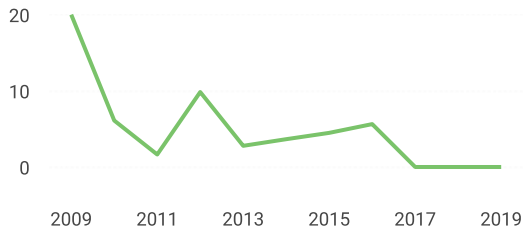


FIND SIMILAR JOURNALS ?

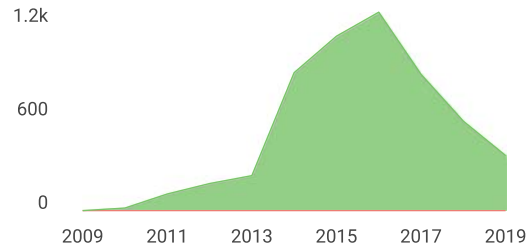
<p>1 <b>Journal of Manufacturing Processes</b> NLD</p> <p><b>28%</b> similarity</p>	<p>2 <b>International Journal of Mechanical and Production</b> IND</p> <p><b>23%</b> similarity</p>	<p>3 <b>Journal of Materials Processing Technology</b> NLD</p> <p><b>22%</b> similarity</p>	<p>4 <b>International Journal of Materials and Production</b> GBR</p> <p><b>21%</b> similarity</p>
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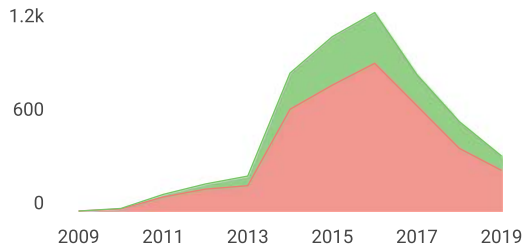
% International Collaboration



Citable documents



Cited documents



**International Journal of Engineering and Technology**

Not yet assigned quartile

**SJR 2021**  
0

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**E Enrique Huamani** 2 years ago

Dear SCIMAGO, I wanted to ask you why you did not consider the IJETT newspaper, which is currently indexed in SCOPUS, on your list.

Kind regards

reply



**Melanie Ortiz** 2 years ago

Dear Enrique,

Thank you for contacting us. As you probably already know, our data come from Scopus,

SCImago Team

they annually send us an update of the data (around April / May every year). In the SCImago Journal & Country Rank all the information that we have available of the journals is shown. Therefore, if you didn't localize the journal in the search engine, it means that Scopus / Elsevier has not provided us with the corresponding data.

We suggest you contact with Scopus support regarding this matter here:

[https://service.elsevier.com/app/answers/detail/a\\_id/14883/kw/scimago/supporthub/scopus/](https://service.elsevier.com/app/answers/detail/a_id/14883/kw/scimago/supporthub/scopus/)

Best Regards, SCImago Team

**A** **Alicia Alva Mantari** 2 years ago

Estimados , anteriormente se vio que la revista tuvo en el 2019, hasta octubre, porque no tiene calificacion en octubre ?

Atte

Alicia Alva

reply



**Melanie Ortiz** 2 years ago

SCImago Team

Dear Alicia,

Thank you for contacting us. Could you please expand a little bit on your comment?

Best Regards, SCImago Team

**S** **Sarath Herath** 3 years ago

I am planning to publish my research paper for my PHD. My professor's name Dr Siong Choy Chong at MSU Malaysia. could you please let me know how should I proceed .Your web is out of order and can not access the page. Please let me know the presentation format and citation Method etc  
reg Sarath

reply



**Melanie Ortiz** 3 years ago

SCImago Team

Dear Sarath,

thank you for contacting us.

We are sorry to tell you that SCImago Journal & Country Rank is not a journal. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus.

Unfortunately, we cannot help you with your request.

Best Regards, SCImago Team



**kevin arga** 3 years ago



dear scimago team,

I already check International Journal of Engineering and Technology in a few website.

- 1) from <https://www.scimagojr.com/>, this journal indexed by scopus (Q3)
- 2) from <https://www.scopus.com/>, this journal is inactive from scopus since October 2019
- 3) from <https://beallslist.net/>, this journal is not predator

please help, which one is the most accurate information about this journal? thank you

reply



**Melanie Ortiz** 3 years ago

SCImago Team

Dear Kevin,

This journal seems not to be indexed in Scopus since 2018 (See Coverage):  
<https://www.scopus.com/sourceid/21100200832>

In SCImago, you can see that the Coverage in Scopus was cancelled as of 2016 (These data comes directly from Scopus and were sent in their annual update). We understand that since the date indicated by Scopus/Elsevier (2016) the journal is no longer indexed in its database. While the citation window is still active, we can show indicators of the journal.

Bealls List offers the possibility to check Journal's title but also the Publisher.

If you need more information about this journal, we suggest you to contact directly with Scopus support here:

[https://service.elsevier.com/app/answers/detail/a\\_id/14883/kw/scimago/supporthub/scopus/](https://service.elsevier.com/app/answers/detail/a_id/14883/kw/scimago/supporthub/scopus/)

Best Regards, SCImago Team



**kevin arga** 3 years ago

dear scimago team,

Please provide to me an updated information about this journal. I want to publish a paper in this journal while i reading the previous comments !!! How can i be a sure that this journal is not a fake journal or not scopus indexed?

thank you

reply



**Melanie Ortiz** 3 years ago

Dear Kevin,

Thank you for contacting us.

SJR is a portal with scientometric indicators of journals indexed in Scopus.

Unfortunately, we can not help you with your request.

For more information about predatory journals/publishers you can check the link below:

<https://beallslist.weebly.com/>.

Best regards, SCImago Team

A **ali** 3 years ago

Coverage 2009-2016 (cancelled)????!!!!

why cancellsd.

MANUSCRIPT NO: IJET19-11-02-065

Date: 2-July-2019

Hi I already published an article in this journal but it is not internationally accepted because Allameh University does not accept this journal as Scopus. Please guide me and email me the relevant documentation to submit to my university

reply

A **ali** 3 years ago

I have a recent publication in this journal " International Journal of Engineering and Technology",ofbellow so

My question is about the current rank of this journal in Sc imago. As I can see it shows rank Q3 under the year 2017. Is it true that Sc-imago rank of this is Q 3 ? But what is the meaning of the phrase on top of the page which says Coverage: "2009-2019 (Cancelled)" ?

Success Factors for Smart Schools Emphasizing the Role of Information Technology: A Case Study

August 2019International Journal of Engineering and Technology 11(4):731-739

DOI: 10.21817/ijet/2019/v11i4/191104065

I will appreciate your early answer in my e-mail.

Sincerely

A **ali** 3 years ago

dear scimago team,

I already check International Journal of Engineering and Technology in a few website.

- 1) from <https://www.scimagojr.com/>, this journal indexed by scopus (Q3)
- 2) from <https://www.scopus.com/>, this journal is inactive from scopus since October 2019
- 3) from <https://beallslist.net/>, this journal is not predator

please help, which one is the most accurate information about this journal? thank you



**Melanie Ortiz** 3 years ago

SCImago Team

Dear Ali,

Thank you for contacting us. Please read comments above.

Best Regards, SCImago Team



**Melanie Ortiz** 3 years ago

SCImago Team

Dear Ali,

thank you for contacting us.

Sorry to tell you that SCImago Journal & Country Rank is not a journal. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus. Our data comes from Scopus/Elsevier, which offers an annual copy of their database. We understand that since the date indicated by Scopus/Elsevier the journal is no longer indexed in its database. Unfortunately, we cannot help you with your request, we suggest you to contact the journal's editorial staff , so they could inform you more deeply. Best Regards, SCImago Team

| **Imran Khan** 3 years ago

Dear Sir/Madam

This journal (ISSN: 23198613, 09754024) is cancelled between 2009-2016. If I published a paper in this journal in 2017. Will my paper be considered in SCOPUS indexed journal?

reply



**Melanie Ortiz** 3 years ago

SCImago Team

Dear Imran, thank you very much for your comment. Unfortunately, we cannot help you with your request, we suggest you to contact the journal's editorial staff so they could inform you more deeply. Best Regards, SCImago Team

D **Do Duc Luu** 3 years ago

I would like to publish my paper in the J.  
How much I need pay?  
How long for Review processing?  
What is the Journal Format?

reply



**Melanie Ortiz** 3 years ago

SCImago Team

Dear user,  
thank you for contacting us.  
Sorry to tell you that SCImago Journal & Country Rank is not a journal. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus.  
Unfortunately, we cannot help you with your request, we suggest you to visit the journal's homepage or contact the journal's editorial staff , so they could inform you more deeply.  
You can see the updated journal's information just above .  
Best Regards, SCImago Team

N **Nigora.M. Tosheva** 3 years ago

спасибо

reply

N **Nigora.M. Tosheva** 3 years ago

Hello editors, we want to cooperate with you. We want to know your prices, requirements and payment methods. waiting for an answer. Thank you in advance.

reply



**Melanie Ortiz** 3 years ago

SCImago Team

Dear Nigora,  
thank you for contacting us.  
Sorry to tell you that SCImago Journal & Country Rank is not a journal. SJR is a portal with scientometric indicators of journals indexed in Elsevier/Scopus.  
Unfortunately, we cannot help you with your request, we suggest you to visit the journal's homepage or contact the journal's editorial staff , so they could inform you more deeply.  
Best Regards, SCImago Team

D **Dr faraj harahsheh** 4 years ago

why you delete my message, this the fact, where is the journal ethics, value to deal with researches, where is Scopus, i pay 400\$ for Scopus, why you waste my time six month waiting without benefit, I advise researchers don't publish with journal.

thank you

reply

**R** **rammos** 4 years ago

I have my article expected as soon to be published in International Journal of Engineering and Technology (IJET) 2019 . I want to ask, is it my article will index by scopus Q3?

Tks.

Ramos

reply

**A** **Abdulkareem Merhej Radhi** 4 years ago

1. Please, Is the published paper in this journal in 2018 is indexed scopus?
2. Is International Journal of Engineering and Technology (UAE) is the same as this journal (International Journal of Engineering and Technology)??

reply

**A** **Abdulkareem Merhej Radhi** 4 years ago

1. Please, Is the published paper in this journal in 2018 is indexed scopus?
2. Is International Journal of Engineering and Technology (UAE) is the same as this journal (International Journal of Engineering and Technology)??

Thanks

reply

**D** **Dr. Kailash Chander madan** 4 years ago

Dear Sir/Madam

I have a recent publication in this journal " International Journal of Engineering and Technology", Vol. 11, No. 2, pp. 304-311. My question is about the current rank of this journal in Sc imago. As I can see it shows rank Q3 under the year 2017. Is it true that Sc-imago rank of this is Q 3 ? But what is the meaning of the phrase on top of the page which says Coverage: "2009-2016 (Cancelled)" ?

I will appreciate your early answer in my e-mail.

Sincerely

Prof. Kailash C. Madan

V **Vishnu Tripathi** 4 years ago

Please, I want to publish a paper in this journal while i reading the previous comment, but I have a doubt How can i be a sure that this journal is scopus indexed because in the home page of your journal is not mentioned. kindly reply me asap.

reply

S **suresh** 4 years ago

Go through the 'About Us'

Y **Yatish Bathla** 4 years ago

I want to publish my paper. But when i click submission page, the window is not responding. I am trying alot but no use. Please help?

One more question, if my paper will be accepted, is it scopus index?

reply

D **dr.falah al-saraireh** 4 years ago

hi sir

i have published one papere in your journal ,can you kindly send the names of editorial board because it is required from me ,but your website is under maintenance .

best regards

reply



**Elena Corera** 4 years ago

SCImago Team

Dear Dr Falah Al-Saraireh,

Please, check comments below.

Best regards,  
SCImago Team

Y **YASIR SAEED** 4 years ago

Dear SCImago Team,

I have been invited to the International Journal of Engineering and Technology(UAE). I went to the website and it appeared that the publisher is "Science Publishing Corporation - Publisher of International Academic Journals." While here the name is the same (International Journal of Engineering and Technology), but the publisher is Engineering Journals Publications. The question is:

Do you think that that International Journal of Engineering and Technology (UAE) is the same as this journal (International Journal of Engineering and Technology)?? Or, is it possible that the same journal name exists in India and United Arab Emirates UAE at the same time?

Regards,  
Yasir

reply



**Elena Corera** 4 years ago

SCImago Team

Dear Yasir,  
thank you very much for your comment, unfortunately we cannot help you with your request. We suggest you review the ISSN. We suggest you contact Scopus [https://service.elsevier.com/app/answers/detail/a\\_id/14883/kw/scimago/supporthub/scopus/](https://service.elsevier.com/app/answers/detail/a_id/14883/kw/scimago/supporthub/scopus/)  
Best Regards,  
SCImago Team

**D Deepika** 4 years ago

Do u give any certificate After published

reply

**A Abdulkareem Merhej Radhi** 4 years ago

Please, I want to publish a paper in this journal while i reading the previous comments !!! How can i be a sure that this journal is not a fake journal or not scopus indexed?



**Elena Corera** 4 years ago

SCImago Team

Dear Abdulkareem Merhej Radhi,

thank you for your request, all the journals included in SJR are indexed in Scopus. Elsevier / Scopus is our data provider.

Best Regards,  
SCImago Team



**Elena Corera** 4 years ago

SCImago Team

Dear Deepika,

thank you very much for your comment. Unfortunately, we cannot help you with your request, we suggest you contact journal's editorial staff so they could inform you more deeply. You can find contact information in SJR website <https://www.scimagojr.com>

Anyway, if there is any user who has already published in the journal, maybe could help us with your request.

Best Regards,  
SCImago Team

**M mohd suhaib** 4 years ago

is this journal still scopus indexed or not??

reply



**Elena Corera** 4 years ago

SCImago Team

Dear Muhd Suhaib,

thank you for your request, all the journals included in SJR are indexed in Scopus. Elsevier / Scopus is our data provider.

Best Regards,  
SCImago Team

**A Adu, Cecilia** 5 years ago

Good day.

Please, is it possible to publish articles on Microfinance Banking in your journal?

If yes, how do I get them submitted?

Kindly send me the link.

Thanks

Adu, Cecilia

reply





**Elena Corera** 5 years ago

SCImago Team

Dear Cecilia,  
thank you very much for your comment, unfortunately we cannot help you with your request. We suggest you look for author's instructions in the journal's website.  
Best Regards,  
SCImago Team

A

**Adu, Cecilia** 5 years ago

Good day.  
Is it possible for your journal to publish research papers on Microfinance Banking?  
Thanks  
Cecilia Adu

reply



**Elena Corera** 5 years ago

SCImago Team

Dear Cecilia,  
thank you very much for your comment, unfortunately we cannot help you with your request. We suggest you look for author's instructions in the journal's website.  
Best Regards,  
SCImago Team

A

**arash adeli** 5 years ago

Is the magazine International Journal of Engineering and Technology canceled from the scopus profile???????

reply



**Elena Corera** 5 years ago

SCImago Team

Dear Arash,  
  
thank you very much for your comment, unfortunately we cannot help you with your request. We suggest you contact Scopus  
[https://service.elsevier.com/app/answers/detail/a\\_id/14883/kw/scimago/supporthub/scopus/](https://service.elsevier.com/app/answers/detail/a_id/14883/kw/scimago/supporthub/scopus/)  
  
Best Regards,  
SCImago Team

Y **Yeri** 5 years ago

I have my article in International Journal of Engineering and Technology (IJET) Vol 8 No 23 published on May 2016. I want to ask, is it my article will index by scopus Q3 ?

reply



**Elena Corera** 5 years ago

SCImago Team

Dear user,

Thank you very much for your participation. Our data comes from Scopus/Elsevier, which offers an annual copy of their database. We understand that since the date (2016) indicated by Scopus/Elsevier the journal is no longer indexed in its database. While the citation window is still active, we can show indicators of the journal.

Best Regards,

SCImago Team

R **Ruby** 5 years ago

I have my article in International Journal of Engineering and Technology (IJET) Vol 9 No 3 published on Jun 2017. I want to ask, is it my article will index by scopus Q3 ?

reply



**Elena Corera** 5 years ago

SCImago Team

Dear Ruby, our data come from Scopus/Elsevier, which offers an annual copy of your database. We understand that since the date (2016) indicated by Scopus/Elsevier the journal is no longer indexed in its database. While the citation window is still active, we can show indicators of the journal. Best Regards, SCImago Team

D **Dr. Aung** 5 years ago

Dear Elena,

Springer AISC ISSN 2194-5357 is included in www.scopus.com but not in SJR SCImago. Is this journal indexed in Scopus?

Regards

reply



**Elena Corera** 5 years ago

SCImago Team

Dear Dr. Aung,  
Our data come from Scopus, annually send us an update of the data. Therefore, SCImago has no authority over the presence or absence of a journal in the SJR.  
Remember, the SJR is a static image of the Scopus database, which grows daily.  
We regret any inconvenience this may cause them, but we cannot include data that we have not been supplied by Scopus.

**M** **marya** 5 years ago

i have my articel in Vol 7, No 3.25 (2018)published on 14-8-2018  
i want to ask, is it my articel will index by scopus Q3 ?

reply



**Elena Corera** 5 years ago

SCImago Team

Dear Marya, the publication of articles of 2018 is not over yet (we are in August), and much less it has been possible to cite unpublished articles. The 2018 indicators will not be available until June 2019. We can not see what will happen in the future with this journal. SCImago receives the data from Scopus / Elsevier annually and does not have the authority to include, exclude or modify the data provided by Scopus. Best Regards,  
SCImago Team

**R** **Rudy Trisno** 5 years ago

I had published my article in International Journal of Engineering and Technology (IJET), e-ISSN: 0975-4024 (online Version), p-ISSN: 2319-8613 (Print Version), Volume 10 issue 3 (2018). I had checked in Scimagojr.com, The journal had coverage 2009-2016 (cancelled) but why in 2017 scimagojr.com still give index Q3 in 2017, with index Q4 in 2010-2013, and with index Q3 in 2014-2017. I want asked you, how about the index when I published in June-July 2018 (Still Scopus Q3 or not) and also can my name appears in Scopus.com. Pls your advice thank you. Rudy Trisno

reply



**Elena Corera** 5 years ago

SCImago Team

Scopus has canceled the indexing of the journal, but the citation window is still active and Scopus is still sending us its data. Best Regards, SCImago Lab

**S** **SAM'UN JAJA RAHARJA** 5 years ago

Covered 2009 - 2016 (cancelled). But in 2017, the shading indicated Q3. Does this mean starting in 2017 until now indexed by Scopus?

reply



**Elena Corera** 5 years ago

SCImago Team

Because the citation window is still active. Best Regards, SCImago Lab

**D Dr John Makunza** 5 years ago

I just want to know if:

1. Your Journal is it indexed?
2. Is it necessary to pay for publication?

reply



**Elena Corera** 5 years ago

SCImago Team

Dear user, our data come from Scopus/Elsevier, which offers an annual copy of your database. We understand that since the date (2016) indicated by Scopus/Elsevier the journal is no longer indexed in its database. Best Regards, SCImago Team

**A Asmaa El-Ghamry** 5 years ago

Is this journal classified in SJR during 2018?

reply



**Elena Corera** 5 years ago

SCImago Team

Dear Asmaa, we do not have that information. We suggest that you contact Scopus / Elsevier directly. Best Regards, SCImago Team

**J john paul** 5 years ago

what is the impact factor of this journal

reply



**Elena Corera** 5 years ago

SCImago Team

Dear John Paul, SJR uses Scopus data, our impact indicator is the SJR. Check our page to locate the journal. We suggest you consult the Journal Citation Report for other indicators with a Web of Science data source. Best Regards, SCImago Team

**B** **Baha'a A.M.Al-Hilli** 5 years ago

I am a lecturer doctor in the physics department specialist in the fields: optoelectronics, photonic switching, semiconductor, laser, renewable energy

reply

**S** **Sergio Mora** 5 years ago

I'm confused with the two answers given by Elena Corera. Does it mean that an article published in this journal in 2018 will not be indexed in Scopus?

Thank you

reply



**Elena Corera** 5 years ago

SCImago Team

What I want to say is that we are in August 2018, not all the issues of 2018 have been published (September, October, November and December are still to be published).

**Z** **Zul** 5 years ago

Good day,is it the coverage for this journal is cancelled?

reply



**Elena Corera** 5 years ago

SCImago Team

Dear Zul,

In a previous comment we have answered that question. Best Regards, SCImago Team

**Z** **zul** 5 years ago

Good day,is it coverage for this journal has been cancelled?Need further explanations on this matter.tq

reply



**Elena Corera** 5 years ago

SCImago Team

Dear Zul, our data come from Elsevier, which offers an annual copy of your database. We understand that since the date indicated by Scopus the journal is no longer indexed in its database. Best Regards, SCImago Team



**sunny sharma** 5 years ago

Is this journal scopus indexed?

reply



**Elena Corera** 5 years ago

SCImago Team

Dear Sunny, all the journals included in the SJR are indexed in Scopus. Elsevier / Scopus is our data provider. Best Regards, SCImago Team

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# Evaluation and Remaining Life Assessment of Separator and Demister in a Geothermal Power Generation Plant

Meilinda Nurbanasari and Abdurrachim

**Abstract**—Evaluation and remaining life assessment of separator and demister for 55 MW geothermal power generation plant have been conducted. The equipment has been used for 27 years and has stopped operating due to the failure of steam turbine. Before it is operated back, the condition of separator and demister needs to be evaluated and their remaining life assessment has to be calculated to anticipate the future repair. The methods used for evaluation were UT phased array, thickness measurement, chemical composition, hardness test and deposit composition analysis. The remaining life assessment was calculated in correlation with thickness reduction. The results showed that the chemical composition and hardness of materials met the standard of SA 516 Gr 70. No evidence of internal defect was found in both equipment. The demister in all part is still in good condition and its remaining life was beyond 20 years. In separator, the reduction in thickness extremely occurred on top head and cone. The remaining life of top head separator was below 1.2 years and cone separator was not more than 4.7 years. Deposit analysis taken from demister gave evidence the presence of sulfur, silica, iron oxide, and sulfide iron.

**Index Terms**—Separator, demister, thinning rate, remaining life assessment.

## I. INTRODUCTION

The condition and life assessment of engineering component must be paid great attention for safety and economic reasons [1], [2]. Although the engineering components are designed for long service life under continuous use, the premature failure may occur. Material degradation, corrosion, erosion, fatigue, operational and maintenance errors are common factor for the old engineering components [3]. On the other hand, many engineering components could be used beyond the recommended design life. Therefore, re-evaluation of old components is important to perform safely and well. Separator and demister are important components in geothermal power generation plant to provide a good quality steam for turbine. The separator has a function to split the geothermal fluid into two phases e.g.; vapor and liquid. The separator itself does not need any maintenance except there are corrosion and erosion of internal surface. The function of the demister is to remove all condensed liquid droplets of incoming steam as well as dust particle that can go together the steam. The demister is periodically cleaned to avoid

further accumulation of scale on the elements. In this study, the separator and demister are used for a 55 MW geothermal generation power plant and have been operated for 27 years. The equipment had stopped operating due to steam turbine damage. The steam receiving station separator was designed and fabricated in accordance with ASME code section VII Division 1 [4]. Before they were operated back, non-destructive integrity inspections were conducted to seek chemical leaks, discontinuities, visible corrosion, material degradation and progress of thinning. The integrity inspection aims to ensure that both equipment will operate efficiently, safely and reliably. The assessment of remaining life was also calculated to predict the repair and the spare parts that need to be replaced in the future.

## II. INSPECTION METHOD

The mechanical design of separator is cylindrical shell with a size of 1800 mm in diameter and 19 mm in height. The separator was designed for maximum working temperature of 205 °C, maximum working pressure of 10.2 kg/cm<sup>2</sup> and corrosion allowance is 3 mm. The demister has a diameter of 2200 mm and height of 5990 mm. The non-destructive test (NDT) methods used to evaluate the condition of the equipment namely;

- 1) UT phased array (Olympus) was used to find internal defects
- 2) Wall thickness was measured using ultrasonic testing (Olympus EPOCH 4)
- 3) Bulk chemical composition of material separator and demister was determined using PMI – OES method (positive material identification - optical emission spectroscopy; Master Pro – Oxford instrument)
- 4) Chemical composition of deposit was analyzed using SEM EDS and conducted on JEOL 610-LA operated at 20 KV. XRD was also used to identify the compound of deposit and was conducted on Shimadzu XD-610 using Copper radiation with 0.05° step size. The sample was scanned from  $2\theta = 5$  up to 80°.
- 5) In-situ hardness test used Mitech MH 320 portable hardness tester with a 200 gram load. The average thickness was calculated from twelve measurements.
- 6) The remaining life assessment was calculated using the equations below [5]:

$$RLP = \frac{t_{measured} - t_{min}}{(f)L_p} \quad (1)$$

where: RLP = Remaining Life Prediction,  $t_{measured}$  = measured thickness

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$t_{min}$  = minimum allowed thickness and calculated using equation [6]:

$$t_{min} = \frac{PD_i - t_{initial}}{2(SE - P(1 - Y))} = \frac{PD_i}{2SE - 1.2P} \quad (2)$$

$\gamma$  = safety factor (in this study,  $\gamma = 2, 15$ )

$L_p$  = thinning rate and calculated using equation [7]:

$$L_p = \frac{t_{measured} - t_{initial}}{n} \quad (3)$$

$t_{initial}$  = initial thickness,  $n$  = operating time (= 27 years)

$P$  = working pressure,  $D_i$  = inside diameter

$S$  = allowable stress =  $\frac{\sigma_y}{f} = 260 [8] / 2,15 = 120,8$  MPa

$E$  = Joint efficiency ( $E$  is equal to 0.85 based on manufacturer's data)

$Y$  = Material factor ( $Y$  is equal to 0.4 based on manufacturer's data)

Fig. 1 shows location for integrity inspection on demister and separator.

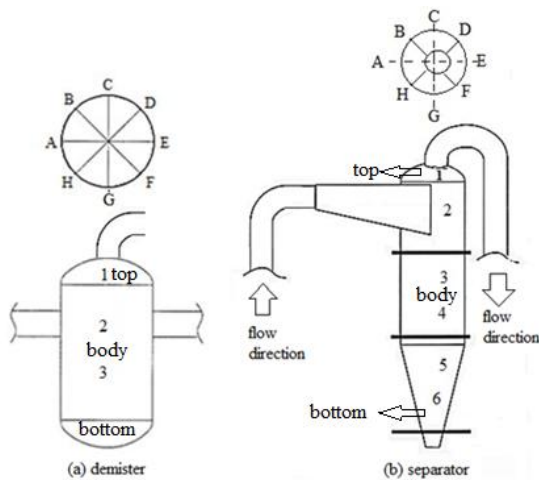


Fig. 1. Location for integrity inspection on (a) demister and (b) separator. For a description of numbers in the figure, see text.

In general, the inspected area was divided into three parts; top (number 1 on demister and separator), body (number 2 and 3 on demister, and number 2, 3, 4 on separator), and bottom (number 5 and 6 on separator). The area for internal defect inspection and thickness measurement is shown by number 1, 2, 3 on demister and 1, 2, 3, 4, 5, 6 on separator. The area for chemical composition determination was on the bottom of the equipment. The area for hardness test was number 1, 2, 3 on demister and number 2, 3, 6 on separator.

### III. RESULTS AND DISCUSSIONS

The measured chemical composition of demister was 0.21 %C, 0.65 %Mn, 0.22 %Si, 0.05 % P (in wt%) and separator was 0.19 %C, 1.06 %Mn, 0.17 %Si, 0.02 %P (in wt%). The average hardness value of demister and separator was  $168.9 \pm 25.7$  HB and  $142.42 \pm 9.3$  HB, respectively. It can be concluded from the chemical composition and hardness data that the material of demister and separator met

the standard of ASTM 516 Gr.70. The recapitulation of thickness measurement on demister is shown in Table I.

TABLE I: THE RECAPITULATION OF THICKNESS MEASUREMENT ON DEMISTER

Location / Area	Thickness (mm)									
	A	B	C	D	E	F	G	H	Min	Average
1	20.97	21.00	20.92	21.45	20.53	21.45	21.33	21.56	20.53	21.15
2	22.38	21.80	21.93	21.93	21.86	21.52	21.77	21.74	21.52	21.87
3	22.83	21.83	22.41	21.93	22.82	22.14	21.20	22.72	21.20	22.24

From the Table I, it can be seen that the average thickness on top head demister is 21.15 mm and on body demister is 21.87 mm. The minimum thickness on top head and body demister is 20.53 mm (location 1 E) and 21.20 mm (location 3G), respectively. The results show that in general, the wall thickness of demister decreased uniformly, which indicates that uniform corrosion had occurred at internal surface. Using equation (3) and based on technical specification of demister from manufacturer, the initial wall thickness of demister is 22 mm, hence the thinning rate at top head demister is 0.05 mmpy and at body demister is 0.03 mmpy. From data in the Table II, it can be checked that some of the measured thickness data is higher than initial thickness that may be due to inhomogeneity walls thickness during manufacturing process. By considering the corrosion allowance is 3 mm, and all measured thickness is above 19 mm, therefore the demister is still in good working condition. The recapitulation of thickness measurement on separator is also presented in Table II.

TABLE II: THE RECAPITULATION OF THICKNESS MEASUREMENT ON SEPARATOR

Location / Area	Thickness (mm)									
	A	B	C	D	E	F	G	H	Min	Average
1	11.79	11.81	11.91	11.75	11.73	11.69	11.98	11.81	11.69	11.81
2	19.97	20.07	19.87	20.19	20.06	20.18	20.21	19.94	19.87	20.06
3	20.00	21.00	19.53	20.99	20.11	20.73	20.22	20.39	19.53	20.37
4	19.93	19.83	20.12	20.21	20.23	20.41	20.28	20.03	20.00	20.13
5	11.95	11.98	12.36	11.97	12.27	12.24	12.03	12.03	11.95	12.10
6	12.04	12.33	12.44	12.26	12.32	12.30	12.06	12.23	12.04	12.25

The data in Table II reveals that the minimum thickness on top head separator is 11.69 mm (location: 1F) and the minimum thickness on body separator is 19.53 mm (location: 3C). The lowest thickness occurred on bottom (cone) separator, which is 11.95 mm (location 5A). It must be noted that the top head separator has been repaired by jacketing process in 2009 due to leakage. The wall thickness of jacket is 15 mm. Hence, the thinning rate on top head separator was calculated using the initial thickness of jacket (15 mm). The initial thickness of body separator and cone separator is 19 mm and 25 mm, respectively. The initial thickness of body separator is lower than measured thickness. As occurred in the demister, it is probably due to inhomogeneity during manufacturing process. From the aforementioned thickness data, and the corrosion allowance for separator is 3 mm, it can be concluded that the body separator is still safe to be used. However, great attention must be given on top head and cone separator as their wall thickness is extremely decreasing, which indicates that the corrosion rate of them was fast. The remaining life assessment was calculated using the equation (1) and the data is shown in Table III.

TABLE III: REMAINING LIFE ASSESSMENT OF DEMISTER AND SEPARATOR

Equipment	Material	Area	Inside Diameter (mm)	Initial thickness (mm)	Working pressure (MPa)	Allowable stress (MPa)	minimum allowed thickness (mm)	Result		Remaining Life Prediction (year)
								minimum thickness (mm)	thinning rate (mmpy)	
Separator	SA 516 - 70 (ASTM A516 Gr.70)	Top head	2900	19	0.67	120.8	9.5	11.69	0.83	< 1.2
		Body						19.53	-	> 20
		Cone	2175	25				7.1	11.95	0.48
Demister	ASTM A516 Gr.70	Top head	2200	22	0.67	120.8	7.2	20.53	0.05	> 20
		Body						21.20	0.03	> 20

From the data in Table III the remaining life assessment of top head and body demister is beyond 20 years and indicates in good condition. This condition is different from separator. In separator, as the decrease of measured thickness on body is not significant compared with initial thickness, it results the remaining life assessment of the separator can be beyond 20 years. Whereas, the remaining life assessment of top head and cone separator is less than 1.2 years and less than 4.7 years, respectively. Both parts must be given full

consideration, especially on top head as the leakage may occur any time. Qualitative analysis of deposit SEM-EDS is shown in Fig. 2.

It can be seen that the deposit taken from demister contained of Sulphur, Aluminum and Silica. It is believed that both elements came from the geothermal as impurities and reacted with oxygen in the demister producing scale [9]. X ray diffraction was used to identify the compound in the deposit and the result is presented in Fig. 3.

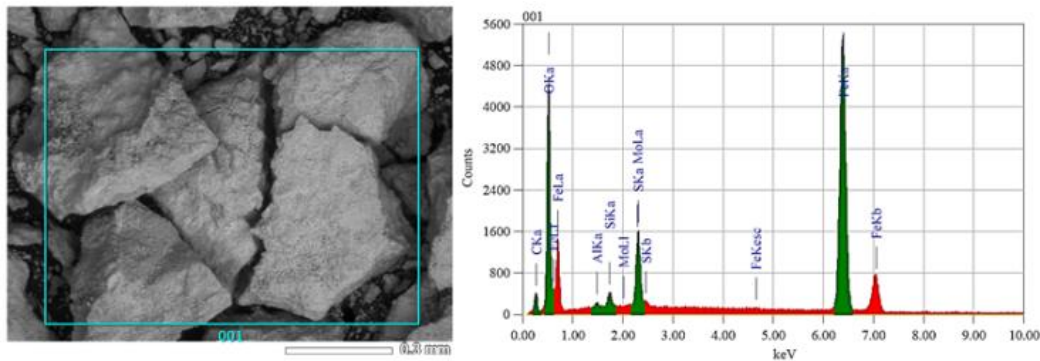


Fig. 2. SEM – EDS analysis of deposit from demister.

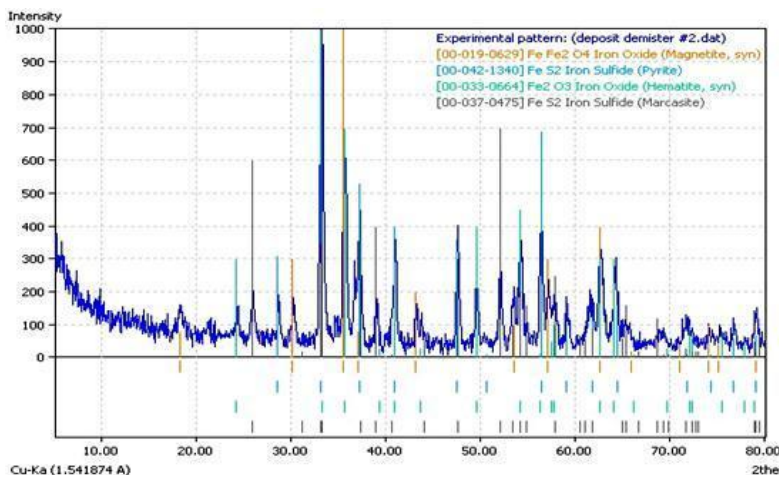


Fig. 3. X-ray diffractograms of deposit.

X rays diffraction detected some peaks in good agreement with  $Fe_3O_4$ ,  $FeS_2$ ,  $Fe_2O_3$  and  $FeS_2$ . The presence of iron oxide on deposit gives strong evidence that corrosion had occurred inside the demister. No indication in the Fig. 3, the peak belongs to Silica compound. It seems that the scale containing Silica in the deposit is less than 5 % that cannot be detected by XRD. The corrosion and formation of scale occurred simultaneously that cause reduction in thickness wall of the equipment.

Compound	Powder Diffraction File
$Fe_3O_4$ (Iron Oxide; Magnetite, <a href="#">syn</a> )	19-0629
$FeS_2$ (Iron Sulfide; Pyrite)	42-1340
$Fe_2O_3$ (Iron Oxide; Hematite, <a href="#">syn</a> )	33-0664
$FeS_2$ (Iron Sulfide; Marcasite)	37-0475

#### IV. CONCLUSION

Based on integrity inspection on demister and separator, the following conclusion can be made:

- 1) Demister is in good condition in all part and its remaining life assessment is beyond 20 years.
- 2) Deposit analysis shows the steam contained some impurities elements, such as Si, Al, S.
- 3) Top head separator is in critical condition and its

- remaining life is less than 1, 2 years.
- 4) The remaining life of cone separator is less than 4.7 years. The body separator is still in good condition and its remaining life is more than 20 years.

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