

FINAL RAPORT
Held in *Timisoara*
during 8 – 9 September 2014

I	The Name of the Institution to be evaluated	<i>National Institute for Research and Development of Welding and Material Testing (ISIM TIMISOARA)</i>
II	Evaluation Period	8 – 9 September 2014
III	Members of the Team	
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ISIM TIMISOARA
CONCLUSIONS AND RECOMMENDATIONS.

CONCLUSIONS

The overall impression of ISIM is that it is an organisation which is in the process of addressing some specific issues that could affect its future viability. The General Director who has been in post for approximately two years has made a number of strategic decisions to improve the overall efficiency of ISIM. Recruitment and retention of staff is a key area as the policy is to recruit and retain highly qualified research staff. The restructuring of the Scientific Council is seen as being a positive step too.

The research portfolio is wide and is focused on a number of key areas – US welding – friction stir processing– laser processing – cutting technology – joining of plastics – thermal spraying – cutting technologies. It is quite clear that the research in cutting processes has limited potential for future work as the level of investigation is at the current standard of the technologies. Thermal spraying

was not particularly well presented, probably as a result of a fire in that area. The joining of plastics was not particularly well presented either and seems to be an area of development. Friction stir processing was covering too wide an area and there appeared to be a need to tailor the research to the capability of the current equipment which was limited. Laser processing appeared to have focused on some more innovative concepts as were demonstrated during the laboratory visit. US welding is the key technology which could significantly underpin the way ahead in research. The welding training centre is well equipped but is currently almost empty as there is no significant business. In this instance there is a need to use the expertise from that area in a different direction. The staff seems to be well motivated and there is good transparency of decisions down to their levels. They are also encouraged to develop future concepts they are actively involved in funding applications and justifications.

Two areas of the review caused some concern. The first was the International Patenting, and assessment group have all questioned the inclusion of this within the assessment process. Unless ISIM are virtually guaranteed patent rights then the process is very time consuming and costly, and in the end potentially not cost effective for ISIM. The second area was in the area of publications. Targets were generally being met, but the quality was generally only suitable for technical papers and not scientific papers. As a result citation levels were extremely low and the presence in ISI publications was very low. There was roughly a 50/50 split between journal papers and conference papers. The key element here was related to the impression that the publications gave of ISIM as a research organisation. This in turn could be reflected in project partnering levels and consequently funding. However, this will not happen quickly and could take several years before scientific publications become part of the norm for ISIM.

RECOMMENDATIONS

- Review the overall strategy on publications to generate a proportion of scientific articles
- Review the cutting processes research for the future and assess its viability. The assessment group saw limited benefit of this for the future
- Review the friction stir welding process capabilities within ISIM and also reduce the number of research strands currently in place.
- Continue with the work on laser processing but try to identify areas of potential in depth work to generate future funding and partnerships.
- The US welding process could potentially be expanded by taking significant proportions of the technology to other automotive companies. As in other projects the way ahead needs clearer definition.
- The work on thermal spraying was not particularly clear, but once the infrastructure issues are resolved the way ahead needs clearly defined. There may be some value in having a cross functional group looking at surface treatment processes (Thermal / laser / friction stir / combinations of them)
- The Development Plan needs to be reviewed: a clearer identification of the strategic choices is needed, and the level of detail reduced.
- The Scientific Council should consider having a researcher on it on a yearly rotational basis.

Observations regarding each research team

Team E1 *‘Elaboration of welding technologies’*

The team is funded through five programmes and there were between 7-14 people within it although recently this has gone to 9-10. This is a result of different teams merging.

There are six research directions which is probably too many for the staff numbers. The overall funding is from national and international sources. The cross border programmes are a valuable

source of work and finance and must be sustained. Currently there are two cross border programmes with Hungary.

There is a very good publication rate – 95 in journals, 27 in conferences up to 2011 and for the time since then 51 journal papers and 13 conference papers. However, views have been expressed elsewhere about the need to develop journal papers of higher scientific content.

For the future the team plans to visit companies to understand their needs and how ISIM can contribute to their improvement. In addition there will be a strategy for Horizon 2020.

The average age of the team of the team is acceptable and will drop with the recruitment of new researchers.

The representative project of the institute was from this team. Some of the results between 2007-2011 were good. However, the panel expressed some concern over where this project was being directed with the limited equipment capability it had. Some questions during the presentation were not answered which was disappointing. Later on the panel agreed that the US welding work was far more impressive and was leading edge technology.

Team E2 ‘Development of welding, cutting and non-destructive testing equipment’

The team has an FP6 project which is to be commended. At international level they are showing good progress with two MANUNET programmes, one Leonardo da Vinci programmes and two cross border programmes with Serbia. An ERA-NET project was being prepared. It was considered that they had too many research directions. However, as long as the targets are being met then this comment can be ignored. Overall the level of contacts in this team was good – Germany and Italy have contracts with ISIM, there is co-operation from Slovenia, Serbia and France.

There is a drive to reduce the average of the team by recruiting new researchers.

Between 2007 and 2011 they published 73 journal articles which is just over one per month and 38 conference papers, since 2011, the figures are 10 journal papers and 25 conference papers.

The cutting technology programmes have been discussed in detail elsewhere, but there was a general view that this work was almost at the same level as the industry norm. This was aimed across all the cutting technologies. It is possible that some bespoke cutting work could be taken on by the company as a contribution to their overall costs.

The quality of R and D activities and their results

The overall score in the first section was lower than might have been expected. The most significant factor affecting this was the lack of international patents. The panel of experts questioned the validity of this as one of the assessment criteria. It was quite clear that the cost and potential benefit of international patenting is questionable in the perception of ISIM. However, this is their decision as a business and should be respected as being that.

The panel were unanimous in their views about publications and that also brought the average mark down. Overall the number of publications was meeting targets – as combined conference and journal presentations. However, the number published in ISI journals and liable to be cited was low. There was also a need to change the balance between what could be termed technical and scientific papers. It was in the area of technical papers that the problem existed. There was a need to develop some of the technical papers into scientific papers, developing a more in depth understanding of the effect of significant process parameters and material structure. To produce a scientific paper on the basis of ‘this works and gives acceptable properties’ is not acceptable. It has to state why it works, what the critical factors are and whether the material structure has changed significantly – then what the effect of that change etc. is. In this area it is not the number but the quality of publications. A suggestion is to have a weighted approach to publications 1=technical journal, 4= scientific journal, and consider the categories 2 and 3. A similar sort of concept could be developed for patents. Publishing papers and presenting at conferences is a form of technical marketing of ISIM, and so any move to upgrade scientific level will result in that being seen externally. In addition the higher scientific level approach could result in an increased level of approaches on joint European projects.

The funding from private and International funds is reasonable. The cross border projects with Serbia and Hungary are to be commended. It is important to look at synergy effects between organisations in this area. Other sources of funding such as Leonardo da Vinci and Erasmus should be maximised. The application for MANUNET programme funding is also a positive step. Funding from industry is good too, but will be subject to economic trends and that has to be considered. If the overall capabilities of ISIM are more widely recognised then the scope to attract international funding should increase.

Start-ups and spin offs also scored low overall. On a positive note, this has been recognised by the management, and a couple of spin offs are envisaged. However, no start-up are planned as ISIM feel that this puts know how at risk and avoids competition. Again, this is a business decision, which is correct under the circumstances.

Sharing and dissemination is carried out in a very positive manner. The main avenues for this are workshops, seminars, conferences, technical papers and technology transfer to industry. ISIM has its own journal produced 4 times per year and it attracts reasonable advertising which will reduce overall costs. In the most recent edition there are four articles, three from ISIM. Overall the articles are interesting but not of high scientific content. There is an interesting article on US welding and in Figure 7 there is a photograph of a joining, but there is little comment about it or the detail of the joint etc. This would lead on to responding to an obvious response of how and why this was working.

Although the overall score for this sector was low, there are obvious reasons for it, most of which are **not** a reflection on technical competence.

Human resources quality

There did not appear to be issues of performance unity, and the situation between younger and older researchers was indicative of smooth relationships.

The average age is 46, which by some is considered to be high, but it is more critical to balance that up with capability and getting the correct balance. The average age has been brought down a little as the overall numbers have been reduced. In addition there is a concerted effort to recruit more highly qualified younger researchers. There was evidence of a good group of younger researchers who were strongly motivated by research and the freedom given to them (within limits) to initiate work. In addition to this the management have developed a revised salary review where on an annual basis where a salary increase is a function of performance.

The ratio of R and D staff to administrative staff seems to be at an acceptable level. However the administrative staff costs are an overhead cost and that should be monitored on an ongoing basis. In summary the score for this section reflects an area with no obvious problems. In addition there is a clear awareness of the issues related to brain gain and also brain drain

Quality infrastructure and its rate of exploitation

Within the quality infrastructure there is a mix of new and old equipment. The old equipment is still functioning and well maintained. There is therefore no specific need to invest in these areas. Equipment investment has been in areas where there is good specific longer term development potential. The US welding facility illustrates this point. As a result of that the work being done in that area is exemplary. As some of the laboratories hold specific accreditation, it may be that the bodies granting accreditation could ask for equipment upgrade in the future and that has to be considered. The welding training area is well equipped with good high quality equipment. It was surprising to see Fronius equipment there and also the CMT equipment. This underpins a good arc welding development facility. The lack of use will be commented on later.

The rate of exploitation seems high apart from the arc welding training area. Within it there is a very competent manager, whose expertise should be utilised in developing alternative business. Many small companies would welcome involvement at this level giving advice / organising accreditation / carrying out equipment/consumable evaluation on their behalf etc. There may also be scope to let less academic school children be given a short introduction into welding as a future job. The rate of exploitation of US welding is high and impressive, and this is reflective of a true

centre of excellence. The laser centre looks as though it has refocused and is currently looking at more innovative concepts which could give significant paybacks in the future. The friction stir welding process needs reviewed. The current equipment is very limited and compared to other research institutes it is well behind technologically. From the work seen, there were too many strands to it and as a result overall the potential rate of exploitation was low. A similar situation exists related to cutting technologies. It was the feeling of the group that the various cutting technology work was at the level of current industrial know how, where it should have been ahead of it. Consideration needs to be given whether this strand of research should continue or be completely reconfigured. The equipment could be used for small bespoke cutting jobs and be used as a source of some income.

Despite the latter comments there are positive signs overall in this area. One area that could be considered is developing a work strand on surfacing technologies. The equipment is there from a variety of processes and offers a relatively unique situation having thermal spraying / laser / friction stir surfacing technologies under one group of 'surfacing'. It is also strongly recommended that the future of the welding training area is reviewed.

Management efficiency and quality of the research environment

The score in this area is high and is reflective of a change in the upper management philosophy. Staff motivation was very good based on the 6 researchers that were interviewed. No criticisms of ISIM or the management were raised and all were enthusiastic about the research they were doing. A revised staff evaluation process was now in place which granted salary increases on the basis of annual performance. This had raised the salary level but there was still scope for researchers to be attracted to other organisations on the basis of salary. This will happen through time and recruitment will be covered in a later section. ISIM have to be realistic and understand that this will happen. All those interviewed were enthusiastic about the work they were doing.

Administrative procedures seem to be efficient and within standards.

Satisfaction of R and D staff was covered earlier, but the representative group also commented on the level of autonomy each of them had. Whilst they all claimed not to be financially motivated, then that is the situation now and could/will change in the future. A dynamic and forward looking senior management team will help retain staff.

Administrative efficiency is monitored and seems to be showing favourable trends. The reduction in staff numbers has had a positive effect. In addition as some of the laboratories are accredited, the processes will be in place.

A new Scientific Council was set up at the start of the year under the Scientific Director. As a group they seemed to be relatively coherent and members were allowed to express their opinions openly to the panel. As a result it would appear that decisions made by this Council are transparent. The interviews with the researchers further emphasised this observation. Previously the Council had Union members on it and this was seen as being counterproductive and the General Director took the decision for this change. One point for consideration is the appointment of one researcher on the Council for one year and then that researcher is replaced by another. This has two functions – better representation and an understanding of how the Council works as part of their development. It was recognised that one of the researchers was secretary to the Scientific Council and perhaps that could be the source of the annual change.

The involvement of staff in decision making did not seem to be a problem area. The Scientific Council makes strategic decisions and is structured to do that quickly. The Heads of Groups 1 and 2 are on the Council and will be in a position to transmit opinions of their colleagues.

The professionalism of the staff at every stage of the visit demonstrated the standard of good behaviour and ethics.

Availability of administrative and auxiliary staff - available, correct, efficient, co-operative.

European and International best practices – ISIM have membership of European and International Societies and are the IIW representative as well as EWF. As a result of this there is an awareness of best practices and also a willingness to reach these levels.

ISIM is qualifying “Welding Coordinators” according to the international standard of IIW accepted as Welding Supervisors in more than 40 countries all over the world.

There was little to criticise in this section and much to commend. This reflects the senior management recognition of the issues they have had and the ones they have in front of them. It also has to be recognised that as well as a research institute, they are running a business, and some unpopular decisions have to be made, especially in areas of financial viability. There was also a suggestion to promote benchmarking at International level.

Quality and credibility of the institutional development plan

The development direction appears to be well defined and correct. Some of the points on the plan are at too low a level and should be removed. As a result a clearer plan with better objectives will be developed. In addition there was a great deal of comment about the closeness of some of the deadlines. It will be difficult to respect them. The efforts of the plan should be more structured on existing projects – their way ahead or terminating them. The next level could be currently developing projects and how to advance them and lastly the target areas for new projects. The direction has to be clear and simple – this was the view of the majority of the panel.

Stimulating new ideas and direction of R and D comes mainly from the national industry needs. In addition staff are actively encouraged to propose new directions / projects. Overall there is no shortage of ideas or potential funding. Perhaps more applications for higher value funding specifically with Europe will be better all-round option. If the approaches are not made the funding bodies will not come to visit!!

The recruitment policy has already been referred to and the aims quite clearly defined. It does seem that ISIM is highly dependent on the local Polytechnic for future researchers. That is a policy that has risk associated with it. Consideration should be given to a wider recruitment base. However, the panel did not have the detail to offer advice here. Visiting researchers from other institutions will not develop recruitment but would add additional resource to the research groups. There was also mention of trying to get ‘young people’ more interested in what ISIM actually did. This is a good concept and well worth piloting.

Collaborations and partnerships have already been discussed in some detail. One point that was discussed relative to this was that project management training was being given to researchers. This is a very positive step as a number of European projects are demanding a more structured approach to research. Although there are significant national collaborations the longer term aim must be to develop more national collaborations.

Scientific communication and major projects – there are a noticeable number of technical communications produced but scientific communications in international journals is scarce. This has already been highlighted. It is not always possible to produce scientific papers from industrial projects. However in some funded projects part of the project management plan should be to aim for higher level publications at various stages of the projects. There are examples of this that can be given, if required.

Critical mass in key areas – the critical areas are research staff and how they are effectively utilised. Staff reductions have been partly compensated for by increased efficiency. However during the visit it was difficult to identify which had higher staff levels than the others. What is apparent is that some project areas should be run down – cutting technologies and the strategic significance of friction stir welding needs to be a priority for re-evaluation. As staff become free from these area then key areas such as surfacing technology and US welding could be augmented to generate a more dynamic approach to some of the projects. This would also create variety for the researchers, which they claimed to enjoy. It would also then have less of an impact if a researcher left ISIM.

Overall this area highlighted that the Development plan needs to be reviewed into a more streamlined version. In addition timescales have to be achievable. Centres of Excellence could be called that to improve the overall perception as these areas do have high credibility

ISIM TIMISOARA MARKING JUSTIFICATION

This section justifies the mark awarded in each main section and highlights areas of weakness and strength. Reference has been in other parts of the report to some of what is contained here.

The quality of R and D activities and their results 3.83

This mark is not a true reflection of the status of this section. There are two points that contribute to it. The panel could not score International patents as none had been produced.

It was made clear to the panel why that was the case and accepted by the panel. The inclusion of this is part of the assessment has to be seriously questioned as one of the criteria being used. This comment was unanimous within the panel.

While publications and patents score reasonably well as a sub group there is a need to revise the assessment criteria to include the category – scientific papers. This could be done using a weighting process. Overall the impetus to publish is impressive.

Start ups and spin off is not a particularly strong category. As with international patents is it really a viable assessment point? The panel again felt that this was very much a business decision area for ISIM.

Some project areas need reassessed as they currently lack strength – cutting process and friction stir processing. Areas of strength are US welding, laser processing, and work on plastics. Thermal spray processing appeared to be strong but was difficult to evaluate.

Human resources Quality 4.6

The score reflects an area where the problems have been identified, actions have been taken and feedback was positive. It is clear there will be an ongoing issue with the flow of researchers in and out of ISIM, to some lesser or greater extent.

Quality infrastructure and its rate of exploitation 4.5

Overall the equipment was good and ranged from modern to old (but in good working order). Some equipment e.g. FSW will limit the rate of development of the processes associated with it. The limitations of the FSW equipment will govern future progress plans due to its physical capabilities.

Management efficiency and quality of the research environment 4.95

This is a very high score for this section. It was the panel's view that the changes to the management structure within ISIM had made a positive impact. The impact of the General Director was highly significant. Only two minor points were raised – researcher representation on the Scientific Council and consider benchmarking other Institutes.

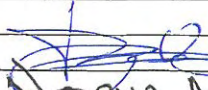
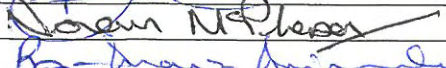
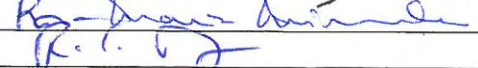
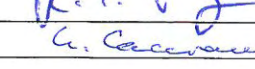
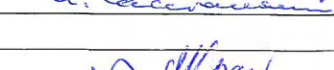
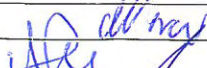
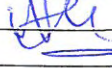
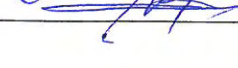
Quality and credibility of the institutional development plan 4.4

To improve this score a better structured Development Plan could have been presented. It needs better clarity and less items of low significance. Within the report there are suggestions made on where to restructure. The other sections were strong in this area and any criticisms were relatively minor.

Overall summary

ISIM has strong senior management leadership at the top level. Issues have been identified and are being tackled.

Other issues identified by this report need to be considered and split into strategic and scientific. There will be overlap in some of these areas. This will mean an evaluation of each of the major project areas and a decision as to continue, redirect, or pull out will have to be taken. Scope for investment has to be identified and funding sought.

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Proposed Certification level: **A**

Date: **9.9.14**