

# Research No:1

**Research title:** ((The IR measurement of the valuable secured circulated paper documents' life spans)).

**Publishing date:** 3 March 2011.

**Publishing language:** English language.

**The publisher:** E-publishing on the internet. The International Newspaper Publisher Organization \ IFRA. <http://www.wan-ifra.org/node/33691>. ((Article ID 12922)).

**Research problem:**

- 1- The **unavoidable** mechanical & optical deterioration ratios of the long life printed paper documents circulated universally, costing **millions** for reissuing yearly.
- 2- The existent two means to predict the longevity ((life span)) of a printed circulated paper document **yield non precious unreal** estimating results.

**Research target:** developing a **standardized** paper document life span digital technology methodology **too close to the actual circulation** mechanical forces & ambient severe circumstances.

**Research methodology:** A descriptive, **analytical** methodology has been applied. Data was collected, analyzed then results have been detected & extracted.

**Research results:**

- 1- **Improving** the document circulation simulation technology with:
  - a- The idea of **IR** ((circumference, inner tears & holes)) **scanning**.
  - b- The geometric dimensions **measuring SWS**.
  - c- The suggestion of **multi various circumstances & increasing time periods** life span estimating testing.
- 2- **Suggestion** an improved, more reality adapted **evaluation methodology** of the paper document circulation simulation technology, containing three evaluated parameters:
  - a- Paper document **wearability**.
  - b- Paper document printing inks **mechanical & chemical fastness**.
  - C- Paper document **soilability**.
- 3- **Putting** the finding procedures of a **mathematical equation**, detecting the relationship between **the test exposure period** and what it represents of **actual circulation duration**.

# Research No:2

**Research title:** ((The Egyptian machine readable passport & ID card- evaluation of their compliance to ICAO and ISO/IEC standards)).

**Publishing date:** February 2012.

**Publishing language:** English language.

**The publisher:** ((Keesing: Journal of Documents & Identification)), volume: 1, issue: 37, the official judged scientific journal specialized in secured prints technology researches. Netherland, ISSN: 1571-0564. Published by: **Keesing Reference Systems. [www.keesingreferencesystems.com](http://www.keesingreferencesystems.com)**  
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## **Research problems:**

- 1- Till now there's no any scientific research evaluates the conformance of the Egyptian booklet digital machine readable passport\ MRP with the International Civil Aviation Organization\ ICAO standard requirements.
- 2- The current Egyptian booklet digital machine readable passport\ MRP is not a smart ePassport.
- 3- Also, and after 14 years of being issued, there hasn't been yet any scientific research evaluates the conformance of the Egyptian digital machine readable identification card- physical characteristics with the International Standardization Organization\ ISO' requirements.
- 4- The current Egyptian digital machine readable identification card is not a smart ID card with a micro chip or with a contactless RFID chip.

## **Research targets:**

- 1- Standardizing the necessary adaptation of the current Egyptian MRP reaching its full conformance with the **ICAO** standard requirements.
- 2- Standardizing the inevitable informative reconfiguration of the Egyptian MRP upgrading it to be a **smart booklet ePassport**.
- 3- Standardizing the necessary physical adaptation of the current Egyptian digital machine readable ID card reaching its full conformance with the requirements specified in the **ISO / IEC 7810: Identification cards — Physical characteristics**.
- 4- Standardizing the inevitable informative reconfiguration of the Egyptian digital machine readable ID upgrading it to be a **smart ID (eID) card**.

**Research methodology:** Analytical comparative methodology.

## **Research results:**

The results analysis had indicated that.....

- The Egyptian MRP conforms to the ICAO-Doc 9303 Part1\volume1 in **81** physically, informatively & securely requirements (**59** mandatory requirements & **22** optional requirements).
- The Egyptian MRP doesn't conform to the ICAO-Doc 9303 Part1\volume1 in **25** physically, informatively & securely requirements (**2** mandatory requirements & **23** optional requirements).
- The current Egyptian digital machine readable ID conforms to the ISO / IEC 7810 in **30** mandatory physical requirements.
- The current Egyptian digital machine readable ID doesn't conform to the ISO / IEC 7810 in just **one** mandatory physical requirement.

### **Research finding:**

- The Egyptian machine readable passport\ MRP has proved an excellent conformance with the **ICAO-Doc 9303 Part1\volume 1**; by a **(59\61= 96.7) %** compliance ratio to its mandatory requirements.
- Also, the current Egyptian digital machine readable ID has proved an excellent conformance with the **ISO / IEC 7810**; by a **(30\31= 96.8) %** compliance ratio to its physical mandatory requirements.

### **Research recommendation:**

#### **The research recommends that.....**

- To be in a full **mandatory** conformance with the ICAO standards, the current Egyptian MRP must comply with the **2** ICAO-Doc 9303 Part1\volume1 **mandatory** requirements which it doesn't meet.
- To be in a full **optional** conformance with the ICAO standards, the current Egyptian MRP must comply with the **23** ICAO-Doc 9303 Part1\volume1 **optional** requirements which it doesn't meet.
- The current Egyptian MRP should be informative upgraded to be a **smart** digital booklet passport (booklet ePassport), via replacing its two static data carriers with a changeable data micro chip or RFID chip.
- The thickness of the multi laser image\ MLI component on the face side of the current Egyptian machine readable **must be decreased** to be **< 940** micron, adapting the Egyptian ID card to be in full **mandatory conformance** with the ISO/IEC 7810 physical mandatory requirements.
- Replacing the 2D barcode machine readable static data carrier device laser burned on the current Egyptian machine readable ID with a higher storage capacity changeable data microchip (ICC chip) or with a RFID contactless chip, informatively upgrading it to be a **smart** digital multi functions ID (eID) plastic card.

# Research No:3

**Research title in Italian :** ((Dall'Egitto un primo studio sull'uso di steli di giacinto d'acqua - Per fare carta ci vuole (anche) un fiore)).

**Research title in English :** ((The Egyptian waterhyacinth offset paper strength properties & printability parameters evaluation)).

**Publishing date:** May 2012.

**Publishing language:** Italian language.

**The publisher:** (Industria della carta) magazine. The address: Via Eritrea, 21 Milano Italia -20157. The official magazine of the Association of Italian Paper Industry (Assocarta). [www.industriadellacarta.it](http://www.industriadellacarta.it). Issue No: 3 Volume Of: 2012. **ISSN: 0019-7548**

**Research problem:** The waterhyacinths cause many environmental & economical problems in Egypt. Consuming massive amounts of water and oxygen, impeding the navigation movement, threatening the lives of fish and aquatic organisms & housing snails and snakes are examples. The biological stiffness of the waterhyacinths takes years & costs Egypt around 150 million pounds every year. The industrial usage of the waterhyacinths has become an Egyptian national critical demand issue.

**Research target:** Measuring & evaluation the physical strength properties and the printability parameters of laboratory offset paper samples made from the Egyptian waterhyacinths' stalks pulp, against the European WFU offset paper.

**Research methodology:** Experimental comparative methodology.

## **Research results:**

- The imported WFU offset paper had surpassed the Egyptian waterhyacinths uncoated offset paper in the **all** tested physical properties: folding strength, tensile strength, perforation strength, tearing strength & burst strength.
- The **lowest** solid density & optical 60° gloss ink requirement factors had been achieved by the European WFU offset paper, on the contrary the solid density & optical 60° gloss ink requirement factors of the Egyptian waterhyacinths paper samples were **higher** (with around **double folds** more).
- The solid density & 60° gloss unevenness averages for the Egyptian waterhyacinths offset paper samples were **higher** (with around **triple folds** more) than that for the imported WFU offset paper.

## **Results evaluation & findings:** The results analysis had indicated that.....

- The physical strength profiles of the Egyptian waterhyacinths laboratory offset paper are weak with wide tolerances apart from the European standards; it won't endure the printing tensile forces & the loads of handling and circulation.
- The Egyptian waterhyacinths offset paper exhausts high quantities of ink estimated in **twice more** the ink area coverages (g/m<sup>2</sup>) consumed by the European WFU offset paper, for achieving the same targeted solid densities.
- The printing quality profiles on the Egyptian waterhyacinths offset paper are unacceptable, suffering from high solid density & 60° gloss unevenness averages estimated in **three times more** than those for the European WFU paper.

# Research No:4

**Research title:** ((Regulating the differences between the secured documents paper and ordinary paper grades)).

**Publishing date:** (8th to 10th Oct 2012). And another publishing: **November 2013**

**Publishing language:** English language.

**The publisher:** The 13<sup>th</sup> conference (the **second** International) of the **Faculty of Applied Arts** - Design between Innovation & sustainability. [www.faa-design.com](http://www.faa-design.com).

**And also has been published in:** ((**Product & Image security magazine**)), **issue:94 (Nov. \ Dec. 2013)** , the official judged scientific journal of the Product & Image security foundation. United Kingdom (England), 81 Houting, Dosthill, Tamworth B77 1PB.

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**Research problem:** Although there are very few standards, published by institutions like: IGT, FOGRA & the ECB, tackle with the end properties of the secured paper grades. There's no standards standardize the manufacturing & end- properties mandatory requirements of the secured permanent documents paper grades, published by certified authorities like: ISO, DIN, ASTM, JIS, IEC or UNI.

**Research target:** Regulating the various manufacturing & end- properties differences between the genuine secured durable documents paper grades and the ordinary office printing paper grades commonly used in digi-counterfeiting crimes.

**Research methodology:** Analytical comparative methodology.

## **Research results & analysis:**

**1-** Setting **38** differences between the secured documents durable paper grades and the ordinary printing paper grades used in digi-counterfeiting crimes. **14** of those differences are available visible & invisible self security components could be directly added to the secured grades pulps or under making webs.

**2-** Clarifying the reason and securing target of every one of these **38** differences.

**3-** Classifying those differences easily backing to the production flow phases sequence of the secured documents paper itself.

## **Research recommendation:** **The research recommends that.....**

**1-** Both the governmental and non- governmental issuing authorities of paper valuable documents have to re-evaluate their documents physical components' conformance & compliance ratios to the **38** standard mandatory requirements stated in this research.

**2-** The same issuing authorities must order their secured paper grades local or international manufacturer(s) to redesign & modify their products, upgrading them to a full conformance with those requirements.

# Research No:5

**Research title:** ((Evaluation of the Egyptian ID card durability profiles according to ISO / IEC 10373-1 testing methods)).

**Publishing date:** Nov. 2012.

**Publishing language:** English language.

**The publisher:** ((Product & Image security magazine)), issue: 88, the official judged scientific journal of the Product & Image security foundation. United Kingdom (England), 81 Houting, Dosthill, Tamworth B77 1PB.

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**Research problems:** There no yet scientific researches, based on internationally accredited testing methods & procedures, which evaluate the conformance of the Egyptian ID card (mechanical \ chemical \ environmental) durability profiles to the obligatory requirements.

## **Research targets:**

- 5- Re-evaluating the conformance of the durability profiles of the Egyptian digital machine readable ID card to the requirements specified in the **ISO \ IEC 7810 \ 2003** according to the test methods & procedures described in **ISO \ IEC 10373-1 \ 2006**.
- 6- Standardizing the necessary adaptation of the current Egyptian digital machine readable ID card, so that it fully comply with the international obligatory requirements detected in **ISO \ IEC 7810 \ 2003**.

**Research methodology:** laboratory analytical comparative methodology.

## **Research results:** The results analysis had indicated that.....

- The current Egyptian digital machine readable ID conforms to the ISO / IEC 7810 in **29** mandatory physical requirements.
- The current Egyptian digital machine readable ID doesn't conform to the ISO / IEC 7810 in just **4** mandatory physical requirements.

## **Research finding:**

The current Egyptian digital machine readable ID has proved an excellent conformance with the **ISO / IEC 7810**; by a **(29 \ 33 = 87.9)** % compliance ratio to its physical mandatory requirements.

## **Research recommendation:** The research recommends that.....

- The thickness profile of the Multi Laser Image \ MLI on the front of the Egyptian ID card must be decreased to less than **0.935** mm.
- The dynamic torsion resistance profile of the Egyptian ID card must be increased so that the card gives standard convex values (less than **1.5** mm) after standard parameters 1000 torsion cycles.
- The daylight & ultraviolet \ UV resistance profiles of the Egyptian ID card must be reinforced so that the card body doesn't lose gloss and its hue doesn't turn yellowish.

That is for adapting the Egyptian ID card to be in **full (100%)** mandatory conformance with the ISO/IEC 7810 physical mandatory requirements.

# Research No:6

**Research title:** ((Evaluation the mechanical durability of the Egyptian Machine Readable Booklet Passport)).

**Publishing date:** December 2013.

**Publishing language:** English language.

**The publisher:** ((ACTA GRAPHICA - Journal for Printing Science and Graphic Communications)), Volume: 24 issue:3-4 Pages: 99:110, the official judged scientific journal of the Faculty of graphic \ Zagreb University \ Croatia. Getaldičeva 2, HR-10000 Zagreb. And on the permanent web link:

<http://www.actagraphica.hr/index.php/actagraphica/article/view/222>

ISSN: 0353-4707 [www.actagraphica.hr](http://www.actagraphica.hr) E-Mail: [acta.graphica@grf.hr](mailto:acta.graphica@grf.hr)

## **Research problems:**

After 5 years of being issued, there is not yet any scientific research evaluates the conformance of the Egyptian booklet digital machine readable passport\ MRP-mechanical durability profiles to the international civil aviation organization\ ICAO standard requirements.

## **Research targets:**

- 1- Evaluation the conformance of the Egyptian Machine Readable Passport/ MRP-mechanical durability profiles to the obligatory requirements specified in the ICAO-Doc N0232: Durability of Machine Readable Passports - Version: 3.2 - Author: ISO/IEC/JTC1/SC17/WG3/TF4 for ICAO-NTWG \ 30-08-2006.
- 2- Standardizing the necessary adaptation of the current Egyptian MRP mechanical durability profiles reaching the full conformance with the ICAO standard.

**Research methodology:** A laboratory analytical comparative methodology was followed in this research.

## **Research results:**

1- After passing the ( Impact, sheet turning, sheet pull, torsion, back pocket, dynamic bending & abrasion ) durability tests, the Egyptian MRP has achieved **better & higher** results than the standard detected in ICAO-Doc N0232: Durability of Machine Readable Passports - Version: 3.2. That's to say:

- There is no any missed part of the datapage & the holder's photo is recognizable.
- The datapage digital printed data is complete & the OCR two is still readable.
- No page has been entirely separated from the binding spine. The average separation ratio was **20 %**. And the metallic hot stamped slogan rendered a **25%** separation ratio.
- There was no any hole in any page.
- The hot stamped lamination polymer layer has rendered few separation parts (with a **2 mm** length average) from the datapage.
- The whole MRP booklet body warpage = **0.5 cm**.

2- The Egyptian Machine Readable Passport / MRP mechanical durability profiles **conform** to all the ICAO Document: **N0232**-version: **3.2 -30/08/2006** mandatory requirements, with a complete (**100%**) compliance ratio.

# Research No:7

**Research title:** ((Banknotes microscopic analysis)).

**Publishing date:** April 2015.

**Publishing language:** English language.

**The publisher:** ((Journal of the British Association of Paper Historians)),

**Volume: issue:94 Pages: (40 - 45)** , One of the official judged scientific journals of the Paper Industry Technical Association-PITA. Great Britain - Watlington OX49 5HR Littlefield Christmas Common- BAPH.

ISSN: 0957 – 4506

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## **Research problems:**

After the Egyptian revolution (January 2011), the rates of the currency counterfeiting crime have increased dramatically. In June 2014 the counterfeited Egyptian currency volume was estimated by 10 billion pounds in circulation. These high ratios of circulated fake money result in serious damages of the Egyptian economy.

## **Research targets:**

This research set out to discover the weakness reasons of the Egyptian banknotes making them liable to be counterfeited. To do so, it was decided to microscopically inspect and register all the Egyptian banknotes security components against those used to secure a major currency with a world-wide circulation, the European Euro.

## **Research methodology:**

The research work utilized an experimental and analytical methodology.

## **Research results:**

Tenths of microscopic inspections and analyses of the Egyptian 50 LE banknotes samples comparatively with the 50 Euro banknotes samples have resulted in:

**1-** Setting of 19 quality microscopic analysis parameters contributed between the Egyptian 50 LE banknotes and the 50 Euro banknotes.

**2-** The Egyptian banknotes samples were superior to the Euro banknotes samples in terms of 11 of these quality microscopic analysis parameters, and for the rest 8 parameters the Egyptian banknotes samples also recorded accepted readings

**3-** Proving that the Egyptian banknotes are of normal and good reliability in terms of printing technologies quality, secured cotton paper base, various security inks, printed security components and unprinted security devices.

**4-** Demonstrating that the Egyptian banknotes counterfeiting crimes cannot be attributed to any default in their security levels.



# Research No:8

**Research title:** ((Evaluation the Egyptian banknotes durabilities profiles)).

**Publishing date:** January 2015 and April 2015.

**Publishing language:** English language.

**The publisher:** ((Bulgarian pulp & paper magazine)), Volume: XLV 2015, Issues: 1 & 2. The official judged scientific journal of the Bulgarian Pulp and Paper Institute. Bulgaria – Sophia 1258. Tel: +359(2)9732785. [www.ppibg.com](http://www.ppibg.com)

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**Research problem:** There is a major problem in that the circulating Egyptian banknotes exhibiting extreme levels of mechanical and optical deterioration. In addition, there is the degradation arising from endless sources of soiling, such as oils, grease, dirt, chemicals... etc.

**Research target:** Proving that these problems do not originate in the banknote paper and to demonstrate the quality of that paper in terms of mechanical and optical properties and durability. To do so, it was decided to test Egyptian banknote paper against a major currency with a world-wide circulation, the American Dollar and against the obligatory requirements of the specialized ASTM standards.

**Research methodology:** Experimental, analytical comparatively lab methodology between the Egyptian banknotes & the USD ((American Dollars)).

**Research results & findings:**

- 1- The Egyptian paper banknotes samples have surpassed the USDs banknote samples in: tensile strength, tear strength, burst strength, perforation strength, electrical conductivity resistance, folding & tear strengths retentions under various chemical & environmental deterioration factors & printing inks fading resistance under "high alkalinity, NaClO<sub>2</sub>, mechanical rubbing & artificial daylight".
- 2- The Egyptian paper banknotes durability & properties profiles have conformed to all the mandatory requirements of the ASTM specialized standards (D3290, D3458, D3208, D5634 and D3460)
- 3- Many of the Egyptian paper banknotes' strength physical properties & durability profiles values have exceeded their parallels of the USDs banknotes samples.
- 4- The "normality & good reliability" of the Egyptian paper banknotes' properties & longevities & importation conditions, has been proved.
- 5- Identifying the mis-circulation , misuse & inadequate respect towards the Egyptian paper banknotes, as the causers of their ((too extreme)) mechanical & optical deteriorations levels))