

GOAL-LINE TECHNOLOGY

Recommendations for implementation in competitions
based on experience from the FIFA Club World Cup Japan 2012

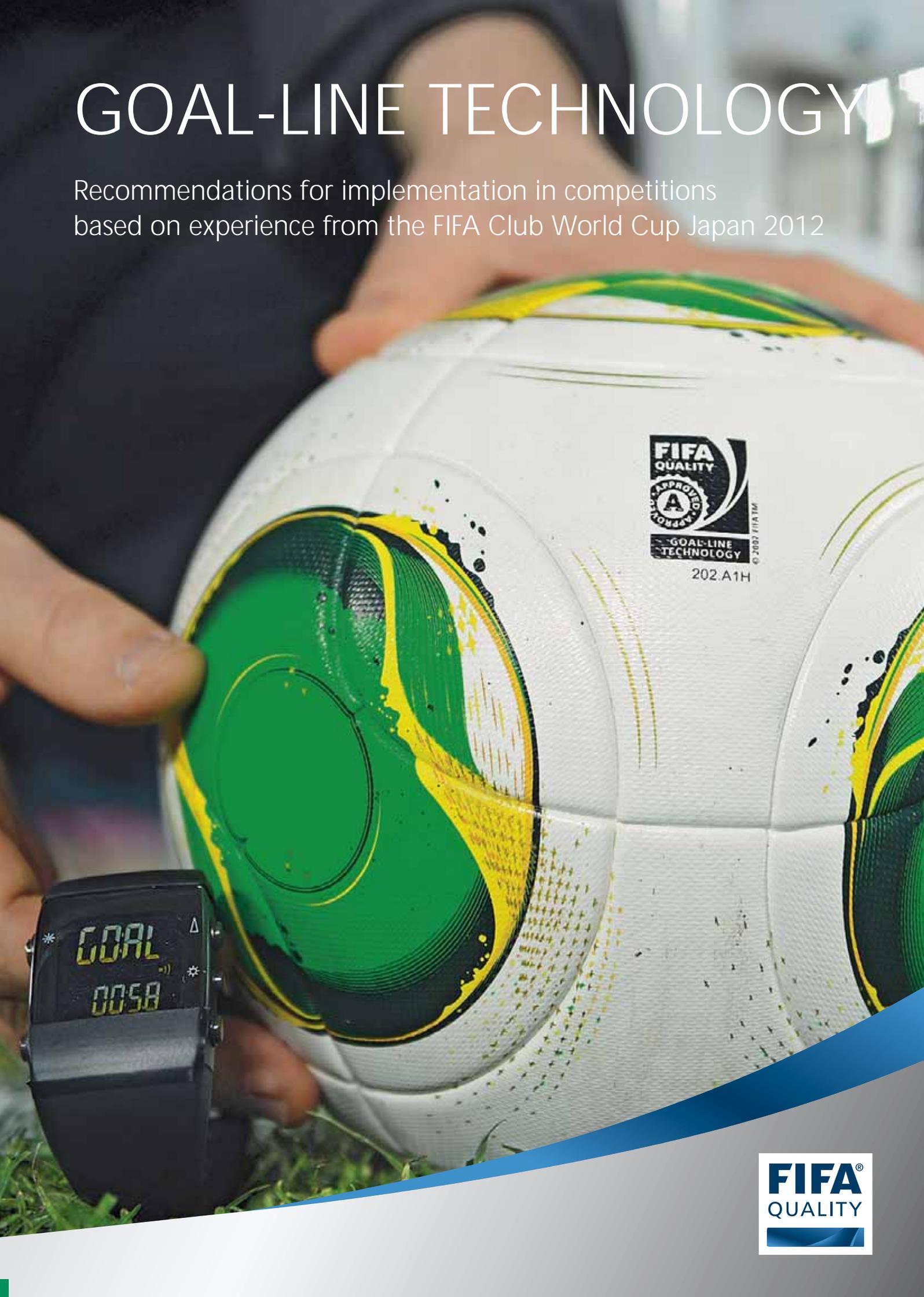
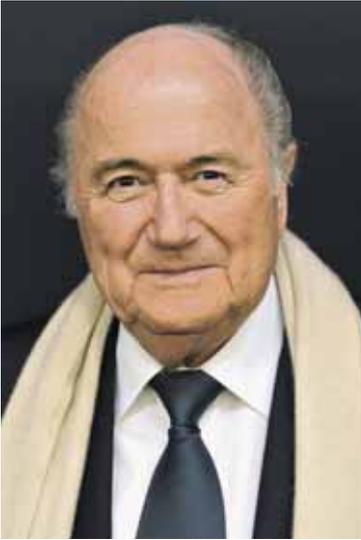


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“This is a momentous decision for football and one that I have been supporting ever since Frank Lampard’s goal against Germany at the 2010 World Cup was not given.”

Dear friends of football,

The unanimous decision of the International Football Association Board (IFAB) to allow goal-line technology (GLT) to be used in our game has shown how a sport as rich in tradition as football can move with the times without losing sight of its fundamental values. While the introduction of goal-line systems is certainly a major innovation, it is important to remember that the basic principles of football remain unchanged, particularly in regard to the status of the referee as the ultimate decision-maker.

Accuracy, speed and reliability were the main criteria which the manufacturers of goal-line technology systems have had to meet, and they will also need to prove that their technology meets these standards once it has been installed in stadiums by passing a final test. This is a momentous decision for football and one that I have been supporting ever since Frank Lampard’s goal against Germany at the 2010 World Cup™ was not given. In this age where the game has evolved so much technically and tactically and players’ athleticism is ever greater, goals are at a premium and it is more important than ever to be able to determine whether one has been scored. That said, the IFAB unanimously agreed that any technology should be for the goal line only and that it did not support any technology in the game beyond GLT.

A handwritten signature in black ink, which appears to read 'J. Blatter'. The signature is stylized and fluid.

Joseph S. Blatter
FIFA President

Executive summary

This document serves both as a support for the implementation of goal-line technology (GLT) in football competitions and as a comprehensive guide to its development in recent years. It is therefore aimed mainly at competition organisers along with any other party affected by the implementation of goal-line technology. The recommendations are based on the test phases from 2010 to 2012, FIFA's GLT Testing Manual 2012 and practical experience gained from the very first use of goal-line technology at the FIFA Club World Cup in Japan in December 2012.

The implementation of goal-line technology in football is based on a four-step procedure for the licensing and certification of GLT systems and installations. In addition, the final check of the installed GLT system by the referee before each match completes the quality assurance programme for goal-line technology.

This process reflects the structure of this guide, the main focus of which is on steps three and four of the abovementioned licensing and certification process, in which the competition organiser is directly involved. The experience gained from the FIFA Club World Cup Japan 2012 is also included, so that readers will obtain a detailed overview of

the various challenges involved in fulfilling the requirements of a certified installed GLT system. The three main chapters of this document are therefore structured as follows:

The first chapter provides an overview of the development process of goal-line technology in recent years, the IFAB's decision on 5 July 2012 and its subsequent integration into the Laws of the Game and an explanation of the FIFA Quality Programme for Goal-Line Technology (including steps one and two of the licensing and certification process), together with the obligatory referee check before each official match.

The second focuses on steps three and four of the licensing and certification process based on experience from the FIFA Club World Cup Japan 2012. Each section in this chapter contains general information, experience from the FIFA Club World Cup 2012 and a checklist. The latter serves as a guide to obtaining a certified installed GLT system and should therefore be completed by the competition organiser.

The final chapter provides answers to the most frequently asked questions on goal-line technology and its implementation process. If you have any further questions or individual requirements, please contact FIFA (quality@fifa.org).

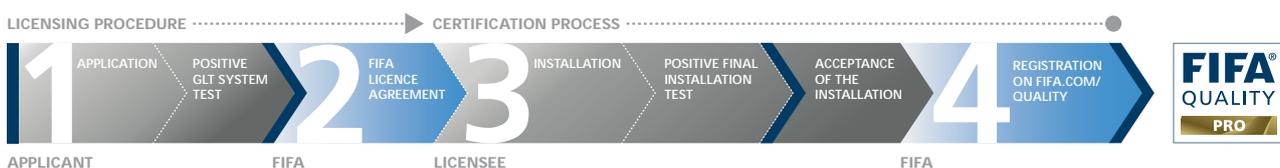


Figure 1: licensing procedure and certification process



«The IFAB’s decision did not oblige anybody to use goal-line technology. Instead, organisers of leagues and competitions around the world will be able to choose themselves whether or not they wish to install the system.»

(FIFA Secretary General Jérôme Valcke, IFAB press conference, 5 July 2012)

The following four icons will guide you through the document and should simplify understanding of the licensing and particularly the certification procedure of goal-line technology systems.

- 
 application / GLT system test
- 
 FIFA licence agreement
- 
 installation / final installation test / acceptance of the installation
- 
 registration on fifa.com/quality

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1. Goal-line technology

1.1 Review

At its Annual Business Meeting on 20 October 2010, the IFAB discussed the implications of measurement systems that are capable of automatically detecting the scoring of a goal during a football match (so-called goal-line technology or GLT). Consequently, the IFAB laid down a set of four basic requirements a GLT system has to fulfil:

- The goal-line technology applies solely to the goal line and only to determine whether a goal has been scored or not;
- The GLT system must be accurate;
- The indication of whether a goal has been scored must be immediate and automatically confirmed within one second; and
- The indication of whether a goal has been scored will be communicated only to the match officials (via the referee's watch, by vibration and visual signal).

After preliminary tests at the Home of FIFA in Zurich in February 2011, FIFA and EMPA (the Swiss Federal Laboratories for Materials Science and Technology, an independent Swiss test institute), in cooperation with the



Test at the Home of FIFA in Zurich



Test at Wembley Stadium in London

“ ... but goal-line technology would have made it 2-2 today and given us the confidence and belief that we could beat the Germans.”

(England player Steven Gerrard following the Germany v. England match, 27 June 2010, Daily Telegraph)

IFAB, initiated a comprehensive and professional testing process in order to evaluate potential GLT providers on the market and performed test phase 1 in November and December 2011.

Phase 1: general evaluation of the system

It was decided that only those GLT systems that had successfully met the pass/fail criteria for test phase 1 would be allowed to progress to test phase 2. Of the eight GLT systems that participated in test phase 1, only two GLT systems performed well enough to progress to test phase 2.

Phase 2: testing the systems to their limits

Evaluation of the reliability and robustness of the GLT system, including in-depth analysis of its accuracy with the aim of testing the various GLT systems to their limits

Based on these independent test results from test phases 1 and 2, the IFAB decided on 5 July 2012 that the potential use of goal-line technology would be implemented in the Laws of the Game and that a licensing and certification procedure should control the quality of GLT systems in future.

1.2 Implementation in the Laws of the Game

The IFAB Special Meeting at FIFA's Zurich headquarters on 5 July 2012 certainly lived up to its name, as the so-called "guardians of the game" finally gave the go-ahead for goal-line technology to be written into the sport's 149-year-old rule book, the Laws of the Game.



The IFAB Special Meeting at the Home of FIFA in Zurich on 5 July 2012

1.2.1 Challenges for the referee

The objective of goal-line technology is not to replace the role of the officials, but rather to support them in their decision-making due to the speed of the game and their position on the field of play.

One of the challenges for referees is that the human eye can handle only approximately 16 images per second, which means the ball needs to be behind the line for at least 60 milliseconds. However, in some cases the ball is only behind the line for a few milliseconds before a player kicks it back or it rebounds back into the field of play, with the result that the human eye cannot see whether the ball has crossed the line. The ball can only be detected by the human eye at a speed of 12km/h or less, whereas nowadays players are able to shoot at a speed of over 120km/h (cf. "The hardest recorded shot in football – ever", 14 February 2007, *The Guardian*).

Another challenge is the vantage point. When viewed from certain angles, it is easy to misjudge the ball's position. Cameras placed at different angles can mislead viewers when showing images "proving" whether or not the ball has crossed the line, which is why only technology dedicated to evaluating such incidents can support the referee in the decision-making process and contribute to a fair game.



Figure 2: one situation, different perceptions

1.2.2 Amendments to the Laws of the Game

As a consequence of the IFAB's decision in principle to approve the use of GLT, the following amendments to the Laws of the Game were approved (cf. FIFA's circular no. 1315 to the members of FIFA, 3 August 2012):

Law 10 – The Method of Scoring

Present text	Proposed text
Goal scored (...)	Goal scored (...)
Winning team (...)	Winning team (...)
Competition rules (...)	Competition rules (...)
	Goal-line technology (GLT) GLT systems may be used for the purpose of verifying whether a goal has been scored to support the referee's decision. The use of GLT must be stipulated in the respective competition rules.

Law 10 – The Method of Scoring

(Interpretation of the Laws of the Game)

Present text	Proposed text
No goal (...)	No goal (...)
	Goal-line technology (GLT) Principles of GLT <ul style="list-style-type: none"> • GLT applies solely to the goal line and only to determine whether a goal has been scored • The GLT system must be in accordance with the FIFA Quality Programme for GLT • The indication of whether a goal has been scored must be immediate and automatically confirmed within one second • The indication of whether a goal has been scored will be communicated by the GLT system only to the match officials (via the referee's watch, by vibration and visual signal)
	<i>Requirements and specifications of GLT</i> If GLT is used in competition matches, the competition organisers must ensure that the system meets the requirements set out in the FIFA Quality Programme for GLT Testing Manual. This manual must be approved by the International Football Association Board. An independent testing institute must verify the accuracy and functionality of the different technology providers' systems according to the Testing Manual.

Law 5 – The Referee

(Decisions of the International F.A. Board)

Present text	Proposed text
Decision 1 (...)	Decision 1 (...)
Decision 2 (...)	Decision 2 (...)
	Decision 3 Where goal-line technology (GLT) is used (subject to the respective competition rules), the referee has the duty to test the technology's functionality before the match. The tests to be performed are set out in the FIFA Quality Programme for GLT Testing Manual. If the technology does not function in accordance with the Testing Manual, the referee must not use the GLT system and must report this incident to the respective authority.

In addition, the members approved the FIFA Quality Programme for GLT and the associated Testing Manual 2012, laying down the licensing and certification procedure for GLT. Furthermore, the IFAB approved the following amendments so that GLT could be used via installations on the field of play (i.e. goals) or inside matchballs:

Law 1 – The Field of Play

(Decisions of the International F.A. Board)

Present text	Proposed text
Decision 1 (...)	Decision 1 (...)
Decision 2 (...)	Decision 2 Where goal-line technology (GLT) is used, modifications to the goal frame may be allowed. They must be in accordance with the specifications stipulated in the FIFA Quality Programme for GLT and according to the above description, "Goals".

Law 2 – The Ball

(Decisions of the International F.A. Board)

Present text	Proposed text
Decision 1 (...)	Decision 1 (...)
Decision 2 (...)	Decision 2 (...)
	Decision 3 Where goal-line technology (GLT) is used, balls with integrated technology are allowed, but they must either be "FIFA APPROVED", "FIFA INSPECTED" or "INTERNATIONAL MATCHBALL STANDARD" (see "Decision 1").

Please note that the wording in the Laws of the Game 2013/14 deviates slightly from the definitions in FIFA's circular no. 1315 to the members of FIFA.

1.3 FIFA Quality Programme

In addition to deciding on the principle of goal-line technology, the Special Meeting of the IFAB in July 2012 finalised the four-step licensing and certification process for all future GLT providers and the procedure for the final check by the referee before each match.

Please note that steps one and two of the licensing and certification process are the responsibility of the GLT company. The competition organiser can only select a GLT system that has been licensed by FIFA for its installations and is therefore only involved in steps three and four of this procedure.

In **step one**, the GLT provider has to meet various application requirements and the test criteria of the GLT system test as defined in the GLT Testing Manual. If the application is successful, FIFA will issue a standard licence agreement to the company in **step two**. In **step three**, the GLT system is tested again on completion of the installation. Based on the successful final installation test, the competition organiser must accept and approve the installation. After final approval of the submitted documents by FIFA, the installation is awarded the FIFA Quality PRO seal in **step four** of the licensing and certification process.

1.3.1 Licensing procedure (steps 1 and 2)

Step 1a: application



Providers of GLT systems are invited to apply for the FIFA licence. In order to guarantee a high level of quality for the end user, GLT providers must prove that they meet certain requirements in terms of system production, business management and social responsibility. These requirements are defined in the application document on www.fifa.com/quality.

Step 1b: GLT system test

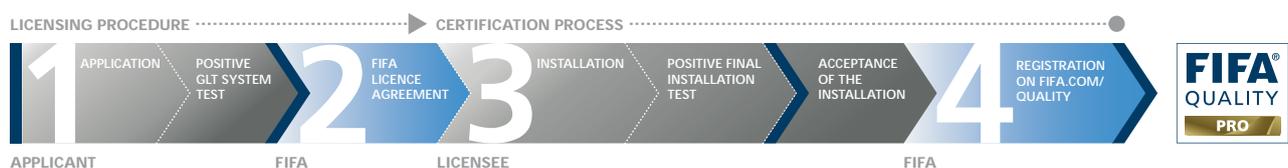


In order to become a FIFA licensee, the GLT system test, which is conducted by a FIFA-accredited test institute, must be passed. This involves subjecting the GLT system to an intensive test programme in the laboratory, on the field and in simulated real game situations.

Step 2: FIFA licence



Following successful application and the GLT system test, FIFA will issue a standard licence agreement to the GLT provider in question. On signing the contract, the GLT provider is then officially licensed as a GLT licensee under FIFA's Quality Programme for GLT and permitted to install its GLT system in any stadium worldwide for use in official matches. The name of the GLT provider as a licensee and the system will be publicly accessible on www.fifa.com/quality.



Licensing procedure and certification process

1.3.2 Certification process (steps 3 and 4)

Step 3a: installation of the system



The FIFA licence authorises the GLT provider to install the GLT system anywhere in the world. The GLT provider must ensure that the end user is properly informed about the technology and how to operate and maintain the system and provide each end user with a maintenance guide. It must also provide the end user with a warranty of at least two years for its GLT system.

Step 3b: final installation test



On completion of installation and in order to be allowed to use the installed GLT system in official matches, each individual GLT system must be tested again by a FIFA-accredited test institute or a test institute that is certified to ISO 17025 for goal-line technology tests. The final GLT installation test is a modified version of the GLT system test, the aim being to test the functionality of each GLT system following installation.

Step 3c: acceptance of the installation



The installation and results of the final installation test must be accepted by the GLT provider's customer (e.g. competition organiser, stadium owner, club, etc.) using FIFA's standard acceptance and acknowledgement form. The signed document must then be submitted to FIFA for final approval and sign-off.

Step 4: FIFA QUALITY certification



On final approval of the documents by FIFA, the installation is awarded the FIFA QUALITY seal and listed on FIFA.com/quality. The GLT system can now be used in official matches/



Goal equipped with goal-line technology at Yokohama International Stadium.

competitions for a period of 12 months and must then be re-tested annually.

1.3.3 Final check by the referee before each match

The IFAB have clarified the referee's position in the Laws of the Game (Law 5) by stating that match officials can use the GLT system to support their decision provided they are convinced of its functionality, for which appropriate tests shall be carried out before the match.



FIFA referee Peter O'Leary (NZL) performing the final check of the system

The match officials are obliged to check the functionality of the GLT system by means of specific tests before it is used prior to each match. If the tests do not satisfy the referee (i.e. the technology fails one or more tests), he must decide not to use the GLT system for the relevant match. One hour before kick-off, the stadium operator, club, competition organiser (as appropriate) or GLT provider must hand over the matchballs and six referees' watches to the match officials for the final check and the decision on the use of the installed GLT system.

The stadium operator must be informed immediately by the referee once the decision has been made as to whether the GLT system will be used or not in a match. Furthermore, after the final whistle, the match officials are obliged to inform the organiser of the competition if the GLT system was used during the entire match and whether it functioned properly or its use was rejected by the referee during the match. Detailed information on this procedure can be found in the Testing Manual 2012 on www.fifa.com/quality.

2. Implementation of goal-line technology

Creating a comprehensive project plan is crucial to successful implementation of GLT in a competition. All the parties involved in the organisation of a competition in which goal-line technology is to be used should therefore be included in an initial meeting before a detailed project plan can be developed by the relevant department. Based on the experience of the FIFA Club World Cup 2012, FIFA recommends arranging a kick-off meeting as a starting point to discuss the following points with the relevant people and making a decision only after all the information has been gathered.

concerning goal-line technology. After performing a cost-benefit analysis for this project, it is recommended that the organiser discusses and answers basic questions on the implementation of GLT for the competition in question.

After deciding on the combination of these different options (many different permutations are possible), a legal basis must be established for the use of goal-line technology. As defined in the Laws of the Game, the use of GLT must be stipulated in the respective competition rules (Law 10 – The Method of Scoring).

2.1 Pre-planning

As a first step, the competition organiser should discuss the needs and opinions of the competition members

It is also essential that a budget is allocated not only for the installation of the technology but also for the running costs of the system once installed. This cost calculation should be based on market information and include the following as a minimum:

	OPTION 1	OPTION 2	OPTION 3	OPTION 4
General	Allow GLT use	Do not allow GLT use		
System	All stadiums must have the same system	All stadiums must have the same system	Stadiums may use a system. If they do, it must be the same.	Stadiums may use a system and are free to select it
Ownership / finance	System is purchased by stadium owner	System is financed (lease/purchase) by competition organiser	System is leased/purchased by the club	Ownership is irrelevant as long as there is a system in place
Maintenance	Centrally organised and administered by competition organiser	Individual organised for each installation	Supervised by the competition organiser	
Application in competition	All competition matches to use GLT	GLT need not be used in all games (possible introduction during competition)	Individual schedule depending on specifics of competition	
Replays of goal-line incidents	No replays allowed	Replays accepted only on TV	Replays only accepted on LED screens in the stadium	Replays accepted on TV and LED screens in the stadium

Figure 3: initial questions to be answered by the competition organiser

Figure 4: cost calculation

1. Site inspection with GLT provider(s)
2. Selected GLT system (rent/purchase)
3. Installation of system (temporary/permanent installation)
4. Final installation test by an independent test institute
5. Travel and accommodation
6. Personnel costs (dedicated staff)
7. Education of referees (regular training sessions)
8. Operation by GLT provider during competition
9. Maintenance of GLT system by GLT provider
10. Annual testing of GLT system by independent test institute
11. Other costs (depending on the type of competition)

The abovementioned points should be discussed in an initial meeting with all involved parties and result in a comprehensive project plan including a timetable, action points and responsibilities. The final version of this document will represent the guideline for the implementation of goal-line technology in the competition. It should be available for all involved parties and regularly updated by the relevant person/department.

FIFA Club World Cup 2012: pre-planning

As early as July 2012, FIFA worked with the two licensed GLT companies on preparations for December's FIFA Club World Cup in Japan, where both systems were used for the first time. All stakeholders of the competition who

would be affected by goal-line technology were involved in the implementation process and received regular updates. A project plan was developed with clear action points, a timetable and dedicated responsibilities.

Figure 5: pre-planning checklist

<input type="checkbox"/> Identify the needs and opinions of the competition members regarding goal-line technology
<input type="checkbox"/> Analyse the costs and benefits of the project
<input type="checkbox"/> Answer initial questions about the implementation of goal-line technology
<input type="checkbox"/> Draft a cost calculation for the installation and running costs of the system
<input type="checkbox"/> Finalise the project plan with action points, timetable and responsibilities
<input type="checkbox"/> Update the project plan regularly

2.2 Bidding procedure

In order to find the most suitable system(s), including from a financial perspective, it is highly recommended that a tender process is initiated (ideally at least three to six months before the start of a competition) in order to obtain the desired quality and service at the best price. To avoid a time-consuming process, it is important that the participants obtain as much detailed information as possible on the stadiums and the specific requirements of the competition

“ It is my plan to have it used at Brazil 2014, yes. We will use the system also for the Confederations Cup and this year's FIFA Club World Cup.”

(FIFA President Joseph S. Blatter, interview on fifa.com, 5 July 2012)

organiser before drafting an appropriate bid. It is therefore helpful if the competition organiser is aware of the existing GLT systems and their different technologies on the market when drafting the tender. Based on this initial market analysis, the respective information can be added by the competition organiser to the tender document (e.g. type of official matchball, type of goal, stadium infrastructure, etc.).

Figure 6: recommended content of tender for goal-line technology	
1. Project background	<ul style="list-style-type: none"> – Objectives of the implementation – Competition stadiums (infrastructure of stadiums) – Schedule for installation and tests
2. Project requirements	<ul style="list-style-type: none"> – Delivery of GLT system to competition stadiums – Installation of GLT system (official matchballs) – Operation of GLT system (operational plan for matchdays) – Maintenance of GLT system (maintenance plan) – Dismantling of GLT system (temporary installations) – Schedule for installation and tests
3. Appointment of a project manager by the GLT provider	
4. GLT system (what are the expectations?)	
5. Detailed information on the tender procedure	<ul style="list-style-type: none"> – Date for submission of tender – Form of tender (language, structure, content) – Costs which have to be included in the bid – Dates for site inspection – Schedule of the tender process
6. Installation and operational requirements of the GLT provider	
7. Legal basis for the tender	

Finally, before the decision is taken, a site inspection tour must be organised with the participating GLT licensees. The tour should include either all GLT providers that are



Hawk-Eye camera

invited to tender or selected companies from a shortlist. The following agenda of a site inspection tour is recommended based on FIFA's experience from the FIFA Club World Cup Japan 2012.

Figure 7: recommended agenda of site inspection	
1. Presentation of GLT system to stadium management by GLT provider	
2. Detailed information on the stadium by the stadium management	
3. Discussion on individual requirements for the installation of GLT system	
4. Stadium tour to visit all areas that are important for the installation process	
5. Questions and answers after the stadium tour	

The GLT providers that took part in the site inspection tour should draft and submit a final installation plan for each stadium together with detailed cost estimates to the competition organiser. With this comprehensive information, the competition organiser should now be able to make the right decision based on its needs.

FIFA Club World Cup 2012: Bidding procedure

FIFA announced at the press conference following the IFAB Special Meeting on 5 July 2012 that the goal-line technology systems that had been successfully tested by the independent test institute EMPA and licensed by FIFA were to be used at the FIFA Club World Cup in Japan. After providing general information on the competition stadiums to both companies, the Local Organising Committee (LOC) and two stadium owners facilitated inspection site visits by both GLT companies and FIFA in September 2012. Based on the information gained from these visits, the two GLT providers drafted a final installation document which was used as a road map for the installation period.

Figure 8: bidding procedure checklist

- | | |
|--------------------------|--|
| <input type="checkbox"/> | Gain an overview of the existing GLT systems on the market |
| <input type="checkbox"/> | Gather detailed information about the competition stadiums/matchballs |
| <input type="checkbox"/> | Draft and issue a tender document with all available information |
| <input type="checkbox"/> | Organise a site inspection tour with the participating companies |
| <input type="checkbox"/> | Compare the submitted bids and final installation documents |
| <input type="checkbox"/> | Make the decision based on the individual needs of the competition organiser |

2.3 Concluding a contract

After the GLT provider has been selected, an agreement must be drafted for the provision and installation of the GLT system and related services, such as operation of the GLT system (if applicable). FIFA recommends that following points be discussed internally before entering into negotiations with the relevant GLT-provider:



GoalRef attachment

Figure 9: project agreement – consideration of legal points

- | | |
|-----|--|
| 1. | Appointment of contractor |
| 2. | Fees |
| 3. | Provision, delivery and operation of GLT system |
| 4. | Quality of GLT system (essentially, each GLT installation must pass the final Installation test) |
| 5. | Intellectual property rights |
| 6. | Use of the competition organiser's trademark |
| 7. | Warranties and representations |
| 8. | Confidentiality |
| 9. | Termination |
| 10. | Liability |
| 11. | Insurance |
| 12. | Security |

FIFA Club World Cup 2012: Concluding a contract

The project agreements between FIFA and GLT providers Hawk-Eye Innovations and Fraunhofer IIS (GoalRef) for the use of goal-line technology at the FIFA Club World Cup 2012 were signed before the final installation tests. Thanks to the extraordinary effort made by all parties involved, the tournament still went ahead despite this

late date of signature. Under normal circumstances, this step should be completed significantly earlier in the process.

Figure 10: checklist for concluding a contract

- Draft an agreement that reflects the terms agreed with the GLT provider
- Discuss legal aspects that are important from an internal perspective in detail (please see above)
- Consider worst-case scenarios when drafting the agreement

2.4 Installation period



One of the most sensitive points during this phase of the project is determining a joint schedule for the installation and final test of the goal-line technology systems. All parties in this process (competition organiser, GLT provider, stadium management) should therefore agree on the dates when the company will be allowed access to the stadium(s) to install its system(s), especially those dates when it is allowed to enter the field of play.

Please note that GLT providers calibrate and test their systems during daylight and using floodlights. If special permission is required to use floodlights at the stadium on non-matchdays, it should be provided from the beginning of the installation period.

The following points should be completed before the relevant GLT provider arrives at the stadium concerned for the installation of its system:

Figure 11: clarification before arrival of the GLT provider at the stadium.

1. Determine a joint schedule for access to the stadium and the field of play
2. Prepare access passes for the GLT provider (if needed)
3. Provide a list of important stadium management telephone numbers
4. Receive and store the shipment of the GLT provider (if shipment made before GLT provider's arrival)
5. Select an appropriate lockable storage room in the stadium
6. Select an appropriate lockable operational room in the stadium
7. Fulfil predefined requirements of the GLT provider for the installation
8. Define dates when the GLT provider can speak to local experts about technical matters (e.g. cabling, camera installations, power supply, set-up of LED boards, etc.)

It is essential that stadium management works closely with the goal-line technology provider, with regular updates during the installation period. If there are language differences, it is recommended to have an interpreter on site for the update meetings or special requests. Moreover, regular checks of the installation process by the competition organiser are vital in order to update the project plan and to inform the other parties accordingly.

FIFA Club World Cup 2012: installation period

Between October and November 2012, the GLT providers began the installation of their systems in the two stadiums used for the FIFA Club World Cup in Japan. In close cooperation with the Japan Football Association (JFA), the Local Organising Committee and the local stadium management, Hawk-Eye installed its system in the Toyota



GoalRef antenna behind the goal

Stadium (15th October – 28th November) and GoalRef in the Yokohama International Stadium (19th November – 2nd December).

Figure 12: installation period checklist

- Determine a schedule for access to the stadium and the field of play
- Ask for special permission to use floodlights on non-matchdays (if needed)
- Prepare the competition stadiums (stadium management) for the installation period
- Monitor the progress of the installation
- Update the project plan accordingly



Hawk-Eye control room

“ The installation process went smoothly and Hawk-Eye has developed excellent relationships with both the JFA and stadium management.”

(Hawk-Eye general manager Steve Carter, January 2013, feedback report)

2.5 Final installation test and acceptance of the installation



As stated in the Laws of the Game (cf. 1.2.2), a final installation test must be performed before the referee can use the system in a competition. The final installation of a GLT system has to pass the requirements which are defined in the testing manual (www.fifa.com/quality) and meet the approval of the competition organiser before it can be certified by FIFA. For this procedure, the GLT provider will hand over the FIFA acceptance and acknowledgement form to the competition organiser for the appropriate signature. The results of the final test should be made available by the test institute to the competition organiser before approval of the installation.

Please note that only positive test results of the final installation test can be approved by the competition organiser.

FIFA recommends that the Swiss test institute EMPA, which is currently the only FIFA-accredited testing institute, carries out the test due to its experience and expert knowledge. If the competition organiser would like to use a different test institute, the latter must be FIFA-accredited and briefed comprehensively by EMPA. Furthermore, such test institutes

require official confirmation from FIFA that their test equipment can be used for the final installation test. Training sessions for interested institutes may be conducted in the near future: dates will be announced on fifa.com/quality shortly.



On approval by the competition organiser, the document is submitted by the GLT provider to FIFA for a final check of the documents and certification of the installation. Finally, the stadium with the certified installation will appear on FIFA's website fifa.com/quality. Only then may the GLT installation be used in official matches for a period of twelve months in the stadium in question.

FIFA Club World Cup 2012: final installation test and acceptance of the installation

Before the competition could kick off, both systems had to pass the final installation test. These tests were carried out once again by the Swiss independent test institute EMPA before the tournament.

The final installation test aims to establish the perfect functionality of the system by certifying that the technology performs to the same level once installed in a given stadium as it did during the system test. Both installations passed this test and FIFA gave the green light for the respective systems

“ We can confirm that both goal-line technology installations have passed the final installation test according to the testing manual.”

(EMPA project manager Roman Furrer, opening press conference, 5 December 2012)

to be used in the eight matches of the competition. FIFA Secretary General Jérôme Valcke announced the use of the two systems during the FIFA Club World Cup Japan 2012 at the opening press conference on 5 December 2012.

Figure 13: checklist for final installation test and acceptance of the installation

- Select an independent test institute for the final installation test (contract needed)
- Determine a schedule for final installation test
- Prepare the competition stadiums (stadium management) for the final test
- Approve the final installation based on positive test results
- Submit the signed FIFA acceptance and acknowledgement form to the GLT provider
- Check whether the installation appears on fifa.com before the start of the competition



Final installation test – dropping a plumb to define the goal line



Final installation test – goalkeeper test

FIFA Quality Programme for Goal-Line Technology (GLT)

FIFA Acceptance and Acknowledgement Form

By signing this Acceptance and Acknowledgement Form each party acknowledges the detailed provisions governing the contractual relationship as per Annexe A, including the provisions regarding "no claims/actions against FIFA" and the arbitration clause.

1

GLT-SYSTEM TEST (GLT-system test report attached as Annexe B)

1.1 System ID/name

1.2 FIFA accredited test institute

Name of test institute <input style="width: 95%;" type="text"/>	Address of test institute <input style="width: 95%;" type="text"/>

2

FIFA LICENSEE FOR GOAL-LINE TECHNOLOGY (details attached as Annexe C)

Name of licensee <input style="width: 95%;" type="text"/>	Address of licensee <input style="width: 95%;" type="text"/>
Name of authorised signatory <input style="width: 95%;" type="text"/>	

Date _____ Signature _____

3

FINAL INSTALLATION TEST (final installation test report attached as Annexe D)

3.1 Place of installation

3.2 Test institute conducting final installation test

Name of test institute <input style="width: 95%;" type="text"/>	Address of test institute <input style="width: 95%;" type="text"/>
Name of authorised signatory <input style="width: 95%;" type="text"/>	<div style="border: 1px solid #004a99; padding: 2px; display: inline-block;"> PASSED* <input type="checkbox"/> </div>

Date _____ Signature _____

3.3 Customer's acceptance of...

<input type="checkbox"/> Acceptance of the FINAL INSTALLATION TEST RESULTS of the GLT-system	<input type="checkbox"/> Receipt of MAINTENANCE GUIDELINES for the GLT-system	<input type="checkbox"/> Receipt of MAINTENANCE TRAINING SESSION for the GLT-system
<input type="checkbox"/> Receipt of WARRANTY for GLT-system of at least two (2) years	<input type="checkbox"/> Receipt of MAINTENANCE EQUIPMENT for the GLT-system	<input type="checkbox"/> Receipt of LOGBOOK for the GLT-system

Name of customer <input style="width: 95%;" type="text"/>	Address of customer <input style="width: 95%;" type="text"/>
Name of authorised signatory <input style="width: 95%;" type="text"/>	

Date _____ Signature _____

4

OFFICIAL REGISTRATION ON FIFA.COM/QUALITY

Name of authorised signatory <input style="width: 95%;" type="text"/>	Certification period from <input style="width: 40px;" type="text"/>	to <input style="width: 40px;" type="text"/>	<input type="checkbox"/> Documentation approved

Date _____ Signature _____

* PASSED according to TESTING MANUAL 2012 for Goal-Line Technology (www.fifa.com/quality)

Figure 14: FIFA acceptance and acknowledgement form

2.6 Education of referees

At this stage, referees are not yet familiar with this new supporting tool and regular training on how to use the technology is therefore essential to both their trust in the system and their performance on the pitch. In this respect, the following aspects should be included in GLT training sessions for referees (see figure 15):

These training sessions should also be used to obtain direct feedback from referees on the performance of the installed goal-line technology system and to identify any complications regarding the practical use of the technology.

Figure 15: training session on goal-line technology

1. Explain why goal-line technology supports referees (vantage points!)
2. Present the installed GLT system
3. Demonstrate the accuracy of the system
4. Explain the referee's watch in detail
5. Hand over a referee checklist for the obligatory referee check
6. Provide training in the referee check for all participating referees
7. Explain the procedure should the watch malfunction during a match
8. Ask for feedback on the functionality of the GLT system after each match
9. Questions and answers after the training session



Goal-line technology training session

FIFA Club World Cup 2012: education of referees

To ensure that all match officials were comfortable with the new technology and to explain the new procedure in more detail, all referee teams took part in a GLT training session before the first match kicked off. The general functionality and accuracy of the systems and in particular the mandatory referee check were important parts of this training.

Figure 16: checklist for education of referees

- Organise referee training sessions before the use of goal-line technology
- Distribute a referee checklist to all referees in the competition
- Define a procedure in case the GLT system malfunctions during a match
- Analyse the referees' feedback on goal-line technology (information stream)

“ It was important that we had the training session before the tournament to show the referees the accuracy of the system and that they could rely on the new technology.”

(FIFA Head of Refereeing Massimo Busacca, 16 December 2012)



Goal-line technology training session



FINAL GOAL-LINE TECHNOLOGY CHECK REFEREE CHECKLIST

1 Referee's watch

Please test the functionality of the referee's watch.



2 Official matchball

Official matchballs are marked with the FIFA APPROVED seal and the GLT word mark.



The matchball is marked with the FIFA APPROVED seal and the GLT word mark.

No other ball except the one used by the referee for the check may be on the pitch during the check.

3 Goal-line technology tests

Three simple tests need to be performed to verify the functionality of the installed GLT system.



The ball is carried once over the goal line outside the goal.

The watch indicates...

NO GOAL



The ball is rolled once with the foot or hand over the goal line inside the goal.

The watch indicates...

GOAL



The ball is carried once in the arms over the goal line inside the goal.

The watch indicates...

GOAL

4 Feedback – after the final whistle

After the final whistle, please inform the organiser of the competition as to how the technology performed.

Figure 17: referee checklist

2.7 Competitions

For the integration of goal-line technology in the match procedure, it is essential to work closely with the people who are responsible for the tournament organisation. Depending on the type of competition, different aspects come into play. For the FIFA Club World Cup in Japan, the FIFA Competitions Department was involved and the following challenges were discussed:

Figure 18: touchpoints with the tournament organisation	
1.	Inform the participating teams in advance on the use of goal-line technology
2.	Provide teams with the modified balls in advance for training purposes (only if GLT is inside the ball)
3.	Determine a match countdown for goal-line technology
4.	Double-check the delivery of replays of goal-line incidents to the competition broadcaster (if any visualisation of replays is desired)
5.	Include the GLT match countdown in the overall match countdown
6.	Carry out a functionality test of the GLT system before the match starts (three to five hours before kick-off)
7.	Hand over the referees' watches, matchballs and referee checklist to the referee team when they arrive at the stadium
8.	Wait for the green light by the referees after the referee check
9.	Stay in contact with the fourth official during the match in case of any problems with the system
10.	Receive the referees' watches and feedback after the match
11.	Return the referees' watches to the GLT provider
12.	Obtain feedback from the GLT provider about the performance of the system during the match

The adopted match countdown should include the procedure for the referee check, which was defined in the GLT Testing Manual 2012 (p. 37) and approved by the IFAB. The check by the referee team can be carried out earlier than proposed in the GLT Testing Manual, but the information on the use of GLT by the referees should be submitted to the competition organiser no later than 45 minutes before kick-off.

COUNTDOWN MATCH 2 FIFA CLUB WORLD CUP 2012	
10.00	Team meeting GLT staff
10.30	Meeting with GLT provider
11.00	Functionality test on both goals by competition organiser
14.15	Arrival of referees at the stadium
14.15	Handover of official matchballs and referees' watches to referee team
14.20	Checks by the referee team
14.30	Information by referee team to competition organiser (use or not to use)
16.00	Kick-off of MATCH 2
17.45	Final whistle of MATCH 2
18.45	Return of referees' watches to GLT provider
19.00	Feedback by referee team to competition organiser
19.45	Feedback by GLT provider to competition organiser

Figure 19: example from the FIFA Club World Cup Japan 2012

FIFA Club World Cup 2012: competition

The final, intrinsic element in the implementation of GLT system is the pre-match check by the match officials, who are obliged to check the functionality of the GLT system by means of specific tests in both goals, ensuring that the system is in full working order before the first whistle blows.

All referee checks were performed successfully and the goal-line technology was used in all eight matches.

During the tournament, both goal-line technology systems worked without any problems and indicated all 21 goals correctly. The referees were satisfied with the new technology and happy about the support they received.

Figure 20: checklist for implementation in the competition

- Draft a GLT match countdown
- Carry out a functionality test of the GLT system before each match
- Hand over the referees' watches, matchballs and referee check list to referees
- Monitor the referee check before the match
- Monitor the performance of the GLT system during the match
- Return the referees' watches to the GLT provider
- Analyse feedback from the GLT provider and referee team



Rafael Benitez talks to an assistant referee during the FIFA Club World Cup final

“ The technology worked with no problems. The watch indicated a goal when both goals were scored and did not indicate a goal when the ball hit the side netting.”

(FIFA referee Peter O'Leary (NZL), AI-Ahly SC v. CF Monterrey, 16 December 2012, feedback report)



Referee performing the final check of the system

3. Questions and answers

3.1 Use of GLT in leagues and competitions

Must a system be used for a whole season, or can it be utilised as soon as it is installed?

This is entirely up to the competition organiser and one of the first things to define when integrating goal-line technology into a competition.

The UEFA President advocates using additional assistant referees. Isn't that easier, more "human" and cheaper?

According to EMPA, in critical situations when the ball is behind the goal line for a fraction of a second, a human eye is not able to clearly detect whether a goal has been scored or not. That is why the IFAB have called upon technical specialists and former elite referees to observe the tests and provide their expert opinions throughout this process.

3.2 Refereeing

Does the referee have to use the technology?

The IFAB has defined the referee's position in the Laws of the Game by stating that he can use the GLT installation subject to the referee check that is carried out before the match. However, the referee can disregard the information sent to his watch during a match if the watch or GLT system is not working properly. The ultimate decision as to whether the ball has crossed the goal line or not rests with the referee, who must rely solely on the GLT system installed.

How can a referee check the functionality of the GLT system?

The referee and his team are obliged to check the functionality of the technology before each match by applying the referee check. If the referee check does not

satisfy the referee (i.e. the technology fails one or more tests), the referee must reject the use of the GLT system for the relevant match. The decision must be made no later than 45 minutes before kick-off. In such cases, the organiser of the competition must be informed accordingly of the decision.

How does the referee receive the information?

If the ball has fully crossed the goal line, the GLT system automatically sends a signal to the match officials' watches within a second. In addition, the watches vibrate when the ball crosses the goal line.

What happens if a system malfunctions during the game? What do officials do then?

The technical requirements of FIFA's Quality Programme for GLT are very strict. The GLT should work properly during each official match. Should there be a failure of the relevant GLT system, the referee needs to report this to the appropriate authority.

3.3 Licensing and certification

How good are GLT systems licensed under FIFA's Quality Programme for GLT?

All officially-licensed GLT systems are subjected to a strict regime of tests. The GLT system test comprises of an extensive test on the field, in training sessions and in the laboratory. Furthermore, after a prototype has passed the GLT system test, every installation is subject to another set of tests, the final installation test, which ensures that the installation concerned meets the same quality requirements for which it was tested under the GLT system test.

How soon can other companies be tested/potentially come onto the market?



As of today, all providers of goal-line technology systems can apply for the FIFA licence. One of the crucial application criteria is to pass the GLT system test that is carried out by a FIFA-accredited test institute (currently EMPA) and that takes around four months. It does not matter which technology the system is based on (e.g. camera-based as opposed to technology in the ball) as long as the test criteria of the GLT system test, which are defined in the GLT Testing Manual 2012, are passed. Detailed information about the application process and requirements can be found on www.FIFA.com/quality.

Technology develops quickly. Will companies have to submit to re-testing if their systems change?

As soon as any changes to the GLT system have been made, the entire system has to be re-tested. The GLT licensee must inform FIFA immediately about any changes to its licensed GLT system before installation. FIFA reserves the right to decide, at its sole discretion, whether the entire GLT system or certain elements of it should undergo the GLT system test once again.

How long is a licence/certification valid?

The FIFA licensing agreement with the GLT licensee is valid for two years and can be renewed after this period, whereas the GLT installation has to be re-tested every year. It is important to understand that the certification period of a GLT installation is separate from the licensing period of a GLT provider, i.e. the certification term of a GLT installation may be valid beyond the term of the license agreement between FIFA and the GLT licensee. In this regard, the GLT licensee or its customer can request a re-test of the GLT installation in a stadium.

How often do the systems need maintaining and by whom?

The maintenance frequency of a GLT system in a football stadium depends on the technology. It is an obligation of

the provider of goal-line technology systems to provide a detailed maintenance guide and appropriate maintenance equipment and to carry out a maintenance training session for its customer/stadium operator. Another option is for the entire maintenance process to be carried out by the GLT provider on a regular basis. This must be stipulated in the agreement between the GLT provider and its customer.

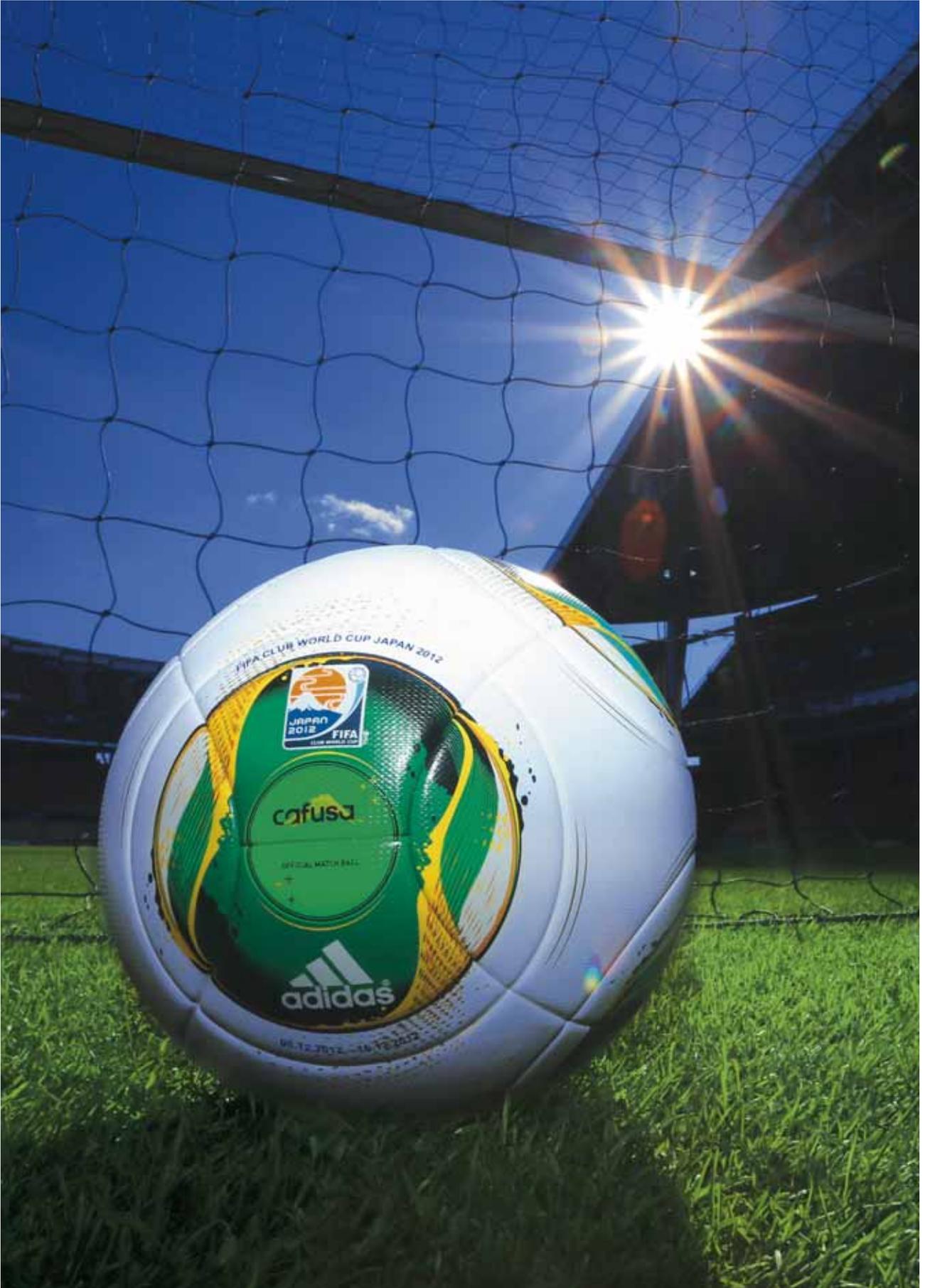
Is EMPA the only test institute that can test all installations if multiple leagues want to use GLT? Will more test institutes be trained?

EMPA have tested the systems since 2010, and FIFA recommends they should at least be involved in future tests, having gained great experience and insight in this field. But EMPA may not be able to test multiple installations at the same time. FIFA expects other institutes to be trained (just as with balls and artificial turf), and will recommend that they are certified to ISO 17025 in accordance with the final GLT installation test, to ensure that the testing quality is uniform. An initial training session for all interested test institutes is planned for the first half of 2013.

3.4 Replays on TV and on LED screens in the stadium

Is it permitted to show replays on TV or in the stadium?

This is up to the competition organiser. The question of whether and how replays are shown on TV or on an LED screen in a stadium should be one of the first discussion points when starting the implementation of goal-line technology in a competition. FIFA recommends involving referees in this discussion as well, due to the fact that the main objective of GLT is to support and protect the referee.



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